Department of Computer Sciences. 1964/2001

[Madison, Wisconsin]: [s.n.], 1964/2001

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Computer Science dept

University Communications

News Releases

UNIVERSITY OF WISCONSIN MADISON

FOR IMMEDIATE RELEASE
4/11/01
CONTACT: Laura Cuccia, (608) 262-0017

'VIRTUAL ENVIRONMENTS' EXPERT TO GIVE MAY 3 LECTURE

MADISON - An internationally renowned expert on computer graphics and virtual environments will lecture on three-dimensional tele-immersive environments Thursday, May 3, at the University of Wisconsin-Madison.

Henry Fuchs, a professor of computer science from the University of North Carolina at Chapel Hill, will speak 4-5 p.m., AB20 Weeks Hall, 1215 Dayton St. He will give the annual J. Barkley Rosser Memorial Lecture, a free public event sponsored by the computer sciences department and made possible through a generous gift of Annetta Rosser.

Fuchs, also an adjunct professor in both biomedical engineering and radiology oncology, is a member of the National Academy of Engineering. He has established research groups that have made some of the world's fastest and most accurate tracking systems for virtual environments, as well as for head-mounted display applications of virtual environments to assist in surgical procedures.

Fuchs's talk, "Seas of Cameras and Projectors for Tele-immersion and the Office of the Future", will focus on the ongoing work of developing realistic three-dimensional "tele-collaborative" environments.

The Rosser lecture series is named for J. Barkley Rosser, a UW-Madison professor of computer sciences and mathematics and director of the Mathematics Research Center, 1963-78.

For more information, contact Laura Cuccia, (608) 262-0017.
# # #
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News Releases

UNIVERSITY OF WISCONSIN MADISON

FOR IMMEDIATE RELEASE 10/25/99

NEWS BRIEFS FROM THE UNIVERSITY OF WISCONSIN-MADISON

-- Sledge funeral scheduled Tuesday
-- Cramer memorial set for Thursday
-- Food drive this week at Morgridge Center
-- Expert to discuss DNA computing: Real or not?

SLEDGE FUNERAL SCHEDULED TUESDAY
CONTACT: Rick Daluge (608) 262-3127;
richard.daluge@ccmail.adp.wisc.edu

MADISON -- A funeral is scheduled Tuesday, Oct. 26, for George W. Sledge, a longtime administrator in the University of Wisconsin-Madison's College of Agricultural and Life Sciences,

Sledge died Wednesday, Oct. 20, of cancer. He was 71 years old.

The funeral will be at 11 a.m. Tuesday at First Baptist Church, 518 North Franklin St., Madison.

Sledge joined the dean's office at CALS in 1960. From 1966 until his retirement in 1993, he served as associate dean of academic student affairs.

Dedicated to strengthening educational programs, Sledge developed awards to recognize the outstanding teachers and advisors in the college each year. Under his guidance and with the help of faculty and staff, the college initiated a new honors degree program and internship program for students, and it expanded its scholarship program, personal advising program, and career advising and placement service.

Under Sledge's supervision, the college revised and expanded its curriculum twice and enhanced its reputation for individual attention to the needs of undergraduates.

CRAMER MEMORIAL SET FOR THURSDAY
CONTACT: Roger Howard, (608) 263-5700

MADISON -- A memorial for University of Wisconsin-Madison student George Joseph Cramer, Jr., who died Oct. 20, will be held 5-7 p.m. Thursday, Oct. 28, in the Alumni Lounge, Pyle Center, 702 Langdon St.

Cramer was the son of professor George Cramer and Alice Cramer. He was an undergraduate student in the Department of Art in the School of Education. Cramer died of a bacterial upper respiratory infection.

In lieu of flowers, contributions may be made to the George Joseph Cramer Scholarship Fund in Glass, in care of the Art Department, 6241 Humanities, 455 N. Park St. 53706.

FOOD DRIVE THIS WEEK AT MORGRIDGE CENTER
CONTACT: Susan Dibbell, (608) 263-4009;
smvandeh@facstaff.wisc.edu

MADISON -- With local food pantries running low, the Morgridge Center for Public Service is sponsoring a food drive through Monday, Nov. 1.

University of Wisconsin-Madison students, faculty and staff may drop off non-perishable food donations at the Morgridge Center, Room 154, 716 Langdon St., in the Red Gym, from 8:30 a.m. to 5 p.m.

EXPERT TO DISCUSS DNA COMPUTING: REAL OR NOT?
CONTACT: Laura Cuccia, (608) 262-0017

MADISON -- An internationally known expert on DNA computing will discuss the basic ideas behind DNA computing, as well as key roadblocks to making DNA computing practical, during a lecture Wednesday, Nov. 3 at the University of Wisconsin-Madison.

Richard J. Lipton, a computer scientist from Princeton University, will speak at 4 p.m. in AB20 Weeks Hall, 1215 Dayton St. He will give the annual J. Barkley Rosser Memorial Lecture, which is sponsored by the Computer Sciences Department and made possible through a generous gift of Annetta Rosser. The free event is open to the public.

Lipton's lecture titled "DNA Computing: Real or Not?" will address the question of whether DNA can be used effectively to solve problems that electronic machines cannot, or whether the ability of DNA computers to work will remain a kind of curiosity.

Lipton is professor of computer science at Princeton University, where he has been on the faculty since 1980. Previously, he was at the Computer Science Departments at the University of California-Berkeley and Yale University. He is a Guggenheim Fellow and a Fellow of the Association for Computing Machinery. Recently, he was elected to the National Academy of Engineering.

The lecture series is held in memory of the late Professor Rosser, a UW-Madison professor of Computer Sciences and Mathematics and director of the Mathematics Research Center from 1963 to 1978.

For more information, call Laura Cuccia, Computer Sciences Department, (608) 262-0017.

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Ethicists provide insights on biotechnology advances

Terry Devitt

As biologists press toward a greater fundamental understanding of the basis of life, ethical conundrums trail in their wake.


Fost

From the ability to screen for genetic predisposition to disease to the creation of genetically altered foods, a host of ethical dilemmas has surfaced for society to contend with.

The issues are difficult ones with no clear-cut right or wrong answers, says Norman Fost, professor of pediatrics and a founder of UW-Madison's quarter-century-old program in medical ethics.

Some of the first ethical manifestations derived from the increasing power of modern biology surfaced in the medical field as, for example, intensive care technology improved to the point where patients with little or no hope of long-term recovery or even survival were being kept alive indefinitely with the help of new machines and medicines.

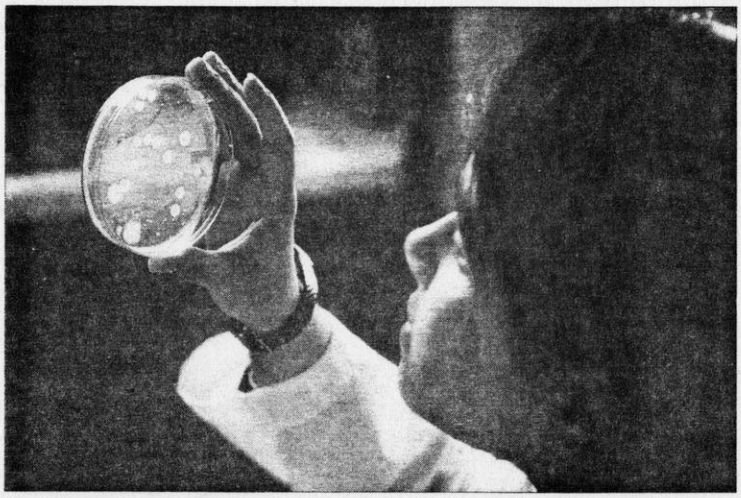
The technology, says Fost, provoked a lot of questions: "Who should be kept alive? How long should people be kept alive? Who should make the life or death decisions?"

Those were questions, Fost says, that were new and chillingly uncomfortable to physicians. In the past 25 years, as biologists have nudged ever closer to knowing the intimate genetic details of life, those questions have been amplified and extended to other social realms such as agriculture.

With the help of the governor and the Legislature through the Madison Initiative public-private funding partnership, UW-Madison is in the process of hiring new faculty to strengthen what is already one of the world's preeminent centers of bioethics.

The goal is to provide the expertise and insight to help society and policymakers tackle the difficult questions posed by modern biology. As part of the university's program in medical ethics, faculty in the Law School and the Department of Philosophy engage in scholarly explorations of bioethics issues — journeys that will help society make the larger decisions about the use of the powerful new technologies emerging from labs worldwide.

In addition to scholarly research, faculty are engaged in training a new generation of bioethicists and extending their expertise through service on national committees such as the National Bioethics Advisory Commission and through such organizations as the World Health Organization. ■


A research assistant examines a culture growing in a campus lab. The university has a half-dozen biotechnology-related graduate programs ranked in the top ten by the National Research Council. UW-Madison generates more than $200 million each year in funding for biological research. Photo: Jeff Miller

Biotechnology disciplines rank among nation's best

- Several UW-Madison biotechnology-related departments are ranked among the nation's best. Graduate programs in biochemistry, molecular biology, molecular and general genetics, chemistry, computer science and biostatistics all are ranked in the top 10 by the National Research Council.
- In 1998, UW-Madison conferred the most doctorate degrees in science and engineering in the nation. The total number for that year was 537 degrees awarded.
- Interest in the biological sciences is strong among incoming students. Approximately 30 percent of 1999 incoming freshmen reported they intended to major in a biology-related department.
- In 1998-99, nearly 70 percent of all faculty in the biological sciences were receiving either federal or non-federal extramural funding support for their research.
- More than half of UW-Madison's $417 million in extramural research support in 1998-99 went to faculty affiliated with the biological sciences. Total research grants in genetics and genomics topped $57 million in 1999.
- New initiatives are under way in genetics research, starting with the formation of the Genome Center of Wisconsin last year. The center will draw together faculty from diverse fields to participate in national-scale genetics research.
- A strategic hiring initiative in genetics has attracted four new, highly accomplished faculty to Madison. They include experts on mapping of genomes, cereal crop genetics, the evolution of corn and the genetics of vertebrate development.

Campus is home to national bioscience leaders

Brian Mattmiller

Here are just a few examples of the many leading figures in bioscience research who work at UW-Madison:

Professor of biochemistry **Richard Amasino's** studies of plant genetics has led to a better understanding of how plants regulate flowering time and senescence, the process of aging in plants. His work has far-reaching implications in agriculture, and could lead to crops with greater tolerance to frost and less spoilage.


Banfield

Jillian Banfield, professor of geology and geophysics, is pioneering a new field of science known as geomicrobiology, the study of microorganisms at the boundary of earth and its biosphere. Some of the microbes she studies have potential value in environmental cleanup. She is a 1999 winner of the prestigious MacArthur Foundation Fellowships, known as "genius grants."

Fred Blattner, professor of genetics, is director of the new Genome Center of Wisconsin, a concentration of faculty who are developing tools to sequence the complete blueprints of life forms and determine the functions of individual genes. Blattner achieved a milestone in the field in 1997 by sequencing the complete genome of E. coli.

Alta Charo, professor of law and history of medicine, is a leading scholar of bioethics and public policy on biotechnology. She has brought a unique interdisciplinary background to controversial topics such as cloning and embryonic stem cell research.

James Dahlberg, professor of biomolecular chemistry, is a pioneer in a number of molecular studies involving the health of cells. His work is influential in understanding how cells develop and protect themselves from disease.

Norman Fost, professor of pediatrics, is the founder of the program in medical ethics, and has garnered national recognition for his leadership in the field. His opinions are sought nationally on subjects such as health care access, testing for genetic diseases, cloning and patient's rights.


Kiessling

Laura Kiessling, professor of chemistry and biochemistry, has pioneered studies into the causes of inflammation, the body's response to injury or infection that causes pain and swelling. Her work may lead to new treatments for inflammation in its most serious forms, such as arthritis. She is another MacArthur Foundation "genius grant" recipient.

Judith Kimble, professor of biochemistry, focuses on the molecular basis of embryonic development and sex determination. She recently authored an influential study that elucidated how organ shape is directed and controlled.

Ann Palmenberg, professor of animal health and biomedical sciences, is doing influential studies of the genetic structure, function and evolution of viruses that are human health threats.

Tomas Prolla, professor of genetics, studies how cancers can develop from various genetic defects in DNA repair pathways. His work may shed light on the molecular pathways that cause cancers to grow.

Ron Raines, professor of biochemistry, studies the molecular makeup of proteins in the body. In particular, his research on the stability of collagen — a protein that gives the body its structure and shape — could lead to novel therapies for collagen-related disorders such as arthritis. He has also studied how a common protein first discovered in frogs can act as a potent killer of cancer cells.


Schwartz

David Schwartz, a professor of chemistry and genetics, is a national leader in the development of better, faster ways to decipher genetic information in plants and animals. His optical mapping technology creates whole genome maps in a fraction of the time of comparable technologies. His technology is in use in mapping the human genome, the rice genome, and was recently used in completing the genome for malaria.

Lloyd Smith, professor of chemistry, is a world leader in the design and development of technologies used in the race to sequence the genetic material of plants and animals. He has recently made big advances in demonstrating the potential of DNA-based computing. He is also a co-founder of Third Wave Technologies, one of Wisconsin's most successful biotech companies.

Michael Sussman, director of the Biotechnology Center, leads a center at the heart of the biosciences on campus, with active programs in public education and service to Wisconsin's thriving biotechnology industry. The center is meant to be a core service facility for biology faculty campus-wide, and a guidepost for the economic and ethical challenges in the field.

Tom Zinnen, director of biotechnology education for the Biotech Center, has trained hundreds of Wisconsin teachers and educated thousands of school children about the social and technical issues of biotechnology. He teaches a range of workshops from "Defining Biotechnology" to "Exploring Enzymes and Bacteria," and runs a wildly popular experiment showing students how to extract DNA from a plant. ■

Comp Science

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FOR IMMEDIATE RELEASE 6/1/99
CONTACT: Raghu Ramakrishnan, (608) 262-9759, raghu@cs.wisc.edu; Olvi Mangasarian, (608) 262-6593, olvi@cs.wisc.edu

MICROSOFT GRANT ESTABLISHES UW DATA MINING INSTITUTE

MADISON - The almost infinite capacity of computers to collect and store information poses a practical dilemma: How does one find the gems in this mountain of raw data?

Research on that question at the University of Wisconsin-Madison received a boost this month from Microsoft Corp. The research division of the company based in Redmond, Wash., awarded the computer sciences department a four-year grant, valued at approximately $720,000, to establish a Data Mining Institute to study the hidden potential of huge databases.

"This grant is part of our overall commitment to collaborating with major academic institutions and fostering the growth of important new cross-disciplinary areas like data mining," said Jim Gray, senior researcher for scalable servers at Microsoft Research. "UW-Madison is one of the top academic database research groups in the world, and we're delighted to be working with this premiere group of scientists."

Raghu Ramakrishnan, a UW-Madison computer sciences professor and co-director of the institute, defines data mining as finding things in huge data sets that hadn't been identified before. "As opposed to a conventional search, data mining looks for trends and patterns," he said.

Numerous applications exist today, from medical prognosis to credit-card security, but the field is only beginning, he said. The institute will explore fundamental new methods of advancing the field, and also work on specific applications in science, medicine and industry.

Microsoft is recognized as an industry leader in data mining research and applications, and the grant will build on UW-Madison's national prominence in database research and mathematical programming. Ramakrishnan said the university is especially equipped to work on real-world applications with enormous databases.

"That's one of our strengths," he said. "For us, 10,000 data points is nothing. You talk a million points, we start getting mildly interested."

Applications on this scale already exist. Companies specializing in credit card fraud reduction have programs that can analyze millions of daily credit transactions. The search programs are trained to flag peculiarities that might suggest theft, such as changes in location or types of purchase.

The World Wide Web will be the catalyst for much broader data mining applications, he said, since it provides the ultimate publicly accessible database. Mining the Web is different from conventional keyword searching, since the programs are designed to find patterns or trends across different subjects.

One exciting example at UW-Madison is a breast cancer diagnosis and prognosis tool developed by UW-Madison computer sciences professor Olvi Mangasarian and Medical School colleagues. The data mining program analyzes tumor size and fine-needle aspirate samples to estimate cancer-free periods for patients.

The program recently mined a National Cancer Institute database of more than 40,000 breast cancer patients, helping the program achieve more reliable results. The goal is to provide a non-invasive option for prognosis. Patients currently have to undergo a painful removal of lymph nodes under their arm to receive an accurate prognosis, said Mangasarian, co-director of the institute.

Other members of the institute research team are computer sciences professors Michael Ferris and Jeffrey Naughton. The group is exploring seven research areas, including the development of parallel computing techniques for data mining, finding ways to exploit data that is dynamic and evolving, and increasing compatibility between different technologies.

Microsoft has donated two powerful multiprocessors and other data mining hardware to the group. The grant will help support a team of graduate students and will help the department attract a new faculty member with expertise in databases and mathematical programming.

"Data mining has received a great deal of attention among large corporations and industrial research labs for years," said Usama Fayyad, senior researcher in data mining and exploration for Microsoft Research. "I'm excited to see one of the top universities in database systems form a Data Mining Institute bridging several disciplines. I hope to see many more computer science departments establish formal academic programs in data mining."

Ramakrishnan said the computer sciences department and Microsoft have had a fruitful collaboration for years. Microsoft is one of the department's formal corporate affiliates and employs many of its graduates.

# # #

-- Brian Mattmiller, (608) 262-9772

FOR IMMEDIATE RELEASE 1/8/99
Contact: Provost John Wiley, (608) 262-1304

NOTE TO EDITORS: An accompanying release provides a summary of accepted proposals.

CHANCELLOR APPROVES PLAN TO ADD 32 FACULTY

MADISON-Twelve faculty hiring proposals spanning the biological, physical and social sciences and humanities have been approved by Chancellor David Ward in the first round of the Sesquicentennial Hires program.

Provost John Wiley says the proposals were chosen from 147 applications that were all worthy of consideration. The proposals will add 32 new faculty members, and 16 to 25 of them should be at work by the fall semester, Wiley says.

The Sesquicentennial Hires program is part of Ward's budget initiative, which the chancellor says gives concrete meaning to the concept of "public-private partnership." Under Ward's proposal, the state would provide enough funding to bring UW-Madison to the median of its peer group in terms of state support. In turn, the campus would take responsibility for raising non-state funds to maintain and strengthen the margin of excellence in its budget - money from federal/private grants and contracts and annual giving that will keep the university among the best in the world for years to come.

Currently, the Madison campus is below the median of its peers by about $1,900 per undergraduate student in state support, which seriously threatens the university's ability to raise additional private funds and maintain its competitiveness to attract the best faculty, staff, students and research grants, Ward says. The shortfall totals roughly $57 million, which the chancellor is asking the state to provide over the next four years. Some of the additional money would be used to restore faculty positions lost to budget cuts and reallocations during the past few years, and would be matched by private funds from the University of Wisconsin Foundation and the Wisconsin Alumni Research Foundation.

Wiley says the university is using gift funds now to add the new Sesquicentennial Hires faculty to show university commitment to strengthening and preparing the campus for the challenges of the future. The Sesquicentennial Hires will be in addition to the estimated 400 faculty the university will need to hire in the next four years due to normal turnover.

Overall, Wiley says, virtually all of the 147 proposals were excellent in that they identified interesting and potentially important opportunities for the campus.

"They also revealed some intriguing themes that have arisen spontaneously in many different parts of the campus," Wiley adds. "For example, more than a dozen proposals concerned expansions in computational areas that would take advantage of and expand the use of high-speed computation and communication, novel computer architectures or computer graphics."

Wiley says the university intends to convene strategy sessions organized around several of these common-theme areas.

"Obviously, we cannot hire all of the 40 or 50 faculty proposed by a dozen different groups in one theme area," he says. "What we can do, though, is ask the proposers to think about the most critical missing elements, areas of commonality, and strategic positioning of the campus, and return with proposals that are more tightly focused on those few positions that would provide the highest payoff for Wisconsin."
###
-- Erik Christianson, (608) 262-0930

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Buddhism; and Religious Ethics.

* Structural Biology (three positions): This proposal targets faculty with teaching and research interests in x-ray crystallography, nuclear magnetic resonance, atomic force microscopy, computational biochemistry and other structural biology areas.

* Visiting Artist (two positions): This proposal aims at creating an interdisciplinary visiting artist program under the direction of the Arts Institute.
###

Wisconsin Week

For Faculty and Staff of the University of Wisconsin-Madison

January 13, 1999

Comp-
CompSci

Sesquicentennial week looks to UW's future

Clear your calendars for Feb. 8-12. It's UW-Madison's 150th birthday, and you're invited to the party!

Be sure to check the next issue of *Wisconsin Week*, published Wednesday, Jan. 27, which will feature detailed information about the week of sesquicentennial events by and for faculty, staff and students. The week is organized around the theme, "Building on Excellence: Creating Our Future."

You'll be able to join the campus community in marking the week the first classes were held 150 years ago. Events during this week are designed specifically for the campus community to learn and celebrate together.

Events will honor our 150 years, explore new developments and contribute to shaping our future. Among other topics, lectures and other events will look at the future of work, technology, popular culture, journalism and other communication. Teaching, learning and research advances will be highlighted. Awards and other events also are planned.

Kicking off the week, a Scholarship Gala Feb. 6 will benefit the Sesquicentennial Undergraduate Scholarship Fund. And the Sesquicentennial Anniversary Concert at the Kohl Center Feb. 7, featuring more than 500 musicians and singers, will be one of the largest performances ever by the School of Music.

The special edition of *Wisconsin Week* Jan. 27 also will commemorate the university sesquicentennial with stories and photos. To find out more about activities throughout this year, visit the university's sesquicentennial Web site: www.uw150.wisc.edu.

More sesquicentennial news, page 5. ■

Photo by Jeff Miller

Thousands of Wisconsin residents fled their sub-zero homeland for the sun and postcard fun of southern California on New Year's Day as the Badgers defeated the UCLA Bruins. For an account of the heady atmosphere in Wisconsin West in the days leading up to the bowl, see page 12.

Chancellor approves plan to add 32 faculty

Erik Christianson

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continued on page six

Professor takes on death row appeal

Erik Christianson

At Holman Correctional Facility, just north of the Florida panhandle in Atmore, Ala., Jeffrey Day Rieber waits to die — and some Madison lawyers, UW-Madison law students and a law professor are laboring to prevent his death.

Convicted in the shooting death of a convenience store clerk in 1992, Rieber is one of about 160 inmates on Alabama's death row. A jury sentenced Rieber to life in prison without parole, but the judge overruled the verdict and sentenced him to death. Alabama is one of only four states that allows a judicial override of a jury verdict.

Rieber's case now rests with UW-Madison Law Professor Frank Tuerkheimer, several law students and two Madison attorneys. They are seeking to overturn Rieber's death penalty verdict because of what they believe was inadequate legal representation.

Because of attorney-client privilege and confidentiality concerns, Tuerkheimer and his students are prevented from discussing the specifics of their legal work on the case. But in general, they are re-examining the defense by Rieber's former attorney, researching death penalty laws at the state and federal levels, and investigating Rieber's background.

"We are going back and doing everything his lawyer should have done," says Tuerkheimer, a former U.S. attorney and former Watergate special prosecutor.

The student journeys to the prison where Rieber is incarcerated mark the first time Wisconsin law students have visited death row while working on a capital case. Capital punishment is legal in 38 states, but not Wisconsin.

Like most of his fellow death row inmates, Rieber is poor and was represent-

continued on page eleven

Inside

Helping the campus environment

Page 7

Faculty hirings

continued from page one

adds. "For example, more than a dozen proposals concerned expansions in computational areas that would take advantage of and expand the use of high-speed computation and communication, novel computer architectures or computer graphics."

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LIST OF PROPOSALS ACCEPTED

The following proposals were selected for immediate recruitment (also see: www.wisc.edu/provost/hiring/sesqui.html).

- Chemical Biology (three positions): This new field studies the intersection of chemistry and biology, specifically the diversity of small molecules and their interactions with cellular proteins. This proposal will increase cell biology understanding and lead to new chemical discoveries in agriculture and medicine.
- Chemistry (two positions): The department, ranked in the top 10 nationally, has not hired any faculty in the past six years, while its teaching credits have increased 43 percent. Targeted areas are biological, materials, environmental and computational chemistry.
- Computer Engineering (two positions): The department will hire faculty with knowledge of electrical and computer engineering and computer sciences to maximize research potential.
- Computer Science (two positions): As this field becomes increasingly competitive, the department will keep pace by hiring faculty to teach and do research in graphics, networking and possibly a third area not yet named.
- Cosmology (two positions): In conjunction with the $100 million AMANDA neutrino telescope in Antarctica, the proposal will hire faculty to help assume the leadership in Antarctica astrophysics and high-energy astrophysics. The astronomy and physics departments will also benefit from the hires. Project AMANDA contains unusually strong components to enhance undergraduate education and outreach to K-12 schools for improved science education.
- Cultural Studies in Global Context (three positions): The proposal will establish an institutional presence for cultural studies in the humanities. It will enhance programming, link faculty from different departments and programs, and provide international visibility for this new field of humanities research.
- Economic Sociology (two positions): This proposal will bolster the economic sociology program and the sociology department, ranked as one of the top three in the country by The National Research Council. Economic sociology studies political and social institutions and how their practices shape and limit the production and exchange of economic values.
- Food Safety (four positions): Details of this hybrid initiative are not ready for announcement.
- Minimally Invasive Medical Technology (three positions): This proposal would link the expertise of the College of Engineering and the Medical School in minimally invasive surgery, biomaterials/tissue engineering, biomedical computing, biomedical visualization and medical imaging.
- Religious Studies (four positions): This interdisciplinary program will seek to add faculty with expertise in the following categories: Islam and Society; Chinese/Japanese Religious History and Literature; Christianity and Society in Asia, Africa or Latin America, 1500-present; Theravada Buddhism; and Religious Ethics.
- Structural Biology (three positions): Targets faculty with teaching and research interests in X-ray crystallography, nuclear magnetic resonance, atomic force microscopy, computational biochemistry and other structural biology areas.
- Visiting Artist (two positions): This proposal aims at creating an interdisciplinary visiting artist program in the Arts Institute. ■

NASA-funded consortium to bring space-age forecasts to farm, forest

Terri Gregory

A new, NASA-funded research initiative, combining expertise from universities, industry, and state and federal government, promises to bring space-age technology to farm and forest in the Upper Midwest.

Organized as a consortium and based at UW-Madison and the University of Minnesota-Twin Cities, the new program is one of seven regional earth science application centers funded as part of a $14 million effort to direct NASA technology to solving environmentally related societal problems.

The UW-Madison component of the new consortium is a combined effort of the Space Science and Engineering Center (SSEC) and the departments of Atmospheric and Oceanic Sciences, Soil Science, and Forest Ecology and Management. It will be directed by George Diak, a senior SSEC scientist, and will focus on the development of new tools — computer models and new remote-sensing and meteorological technologies — to aid management decisions made by agricultural and natural resource managers. UM-Twin Cities scientists will concentrate on monitoring natural resource bases themselves.

The new center, Diak says, has two primary goals: "We want to have a significant positive impact on the economy of the Upper Midwest by applying computer models and new measurement tools to current resource problems, and we want to create new tools to help give us insight into the potential effects of different management practices.

"This includes looking at things like the potential effects of regional climate changes and their influence on forestry and agriculture, and our ability to sustain natural and managed environments," Diak says.

Other members of the Wisconsin component of the consortium include Champion International Corp., Case Corp. of Racine, the Wisconsin Department of Natural Resources and the U.S. Forest Service.

According to Diak, the consortium will work on building computer models that depend on remote-sensing technology, satellite-based instruments capable of making detailed measurements of the atmosphere or land over large geographic distances. As NASA's Earth Observing System is deployed over the next decade, a wealth of new satellites and satellite-based tools for measuring the Earth and its atmosphere will come into play.

Using those measurements to power new computer models, Diak said, scientists can help farmers and resource managers determine things like soil moisture, nitrogen content of the soil and grain moisture as crops mature. In forests, by observing and modeling conditions of the soil, plants and atmosphere, it may be possible to forecast disease and insect infestations.

Already, Diak says, there are models that help farmers decide when to irrigate, when to apply chemicals for disease control, and that warn cranberry growers of the potential for overnight frost. Examples of those models can be found on a Web site at http://bob.soils.wisc.edu/nasacan.html.

The consortium's industrial members would help find "cost-efficient methods of commercializing emerging farming technologies," says James Stoddart, vice president for Case Corporation's Advanced Farming System's Division. ■

Let it snow: UW staff clear the path with safety, environment in mind

Liz Beyler

As snow blankets the UW-Madison campus, university officials continue to improve snow removal efforts to ensure public safety while protecting the environment.

The university's Safety Department, with the help of staff from Environmental Services and Custodial Services, has prepared draft guidelines for wintertime salt use on campus.

"When you're out there slipping around, it's easy to think of salt as a way to improve your safety, but you have to think of the environmental consequences, too," says Peter Reinhardt, director of the Safety Department's Chemical and Environmental Safety Program.

"There are a lot of good ideas out there — common-sense practices — for reducing salt use. We want to put them into the guidelines and share them with the entire campus," Reinhardt says. "Hopefully that will raise awareness of the problem and encourage people to be a little more careful when spreading salt."

Reinhardt says the university has already made significant strides in its salt reduction efforts:

- The Physical Plant reformulated its sanding mixture, which now contains only 5 percent salt. And to cut down on salt use, "No Plow, No Salt" areas were designated in 1995.
- A low berm was constructed at the snow storage area on the west end of campus to keep melting snow from going into the marsh and Lake Mendota.
- Seldom-used walkways, steps and other areas have been closed for the winter to cut down on salt use, which in turn has resulted in lower costs and less time spent on snow and ice removal. Those areas include the path to Picnic Point and some stairs at Steenbock Library, Vilas, Chamberlin and Agriculture halls, and the Educational Science and Teacher Education buildings.
- This year, several stairways were added to the list, including Lathrop Hall, Wendt and Memorial libraries, and Atmospheric Sciences. If you'd like to nominate an area for winter closure, contact Daniel Einstein, Physical Plant environmental management coordinator, at 265-3417.

Photo by Jeff Miller

Snow blankets the university campus every year, but this year, crews have been especially pressed to keep up the first major snowstorm of the winter, which dumped nearly a foot of snow on New Year's weekend. The university's Environmental Services Department and outside contractors, as well as building custodians, spent much of last week clearing and hauling snow from campus streets, sidewalks and parking lots. And they've been at it again this week, cleaning up after several subsequent, lighter snowfalls.

The new guidelines are intended to encourage prudent salt use, minimize salt runoff into Madison lakes, and lessen the damage salt can cause to streets, walkways, vehicles, railings, grass and plantings.

The draft guidelines say early and frequent snow removal is the best practice to minimize salt use because it helps prevent ice formation. Salt doesn't work very well below zero, and has no effect below minus 6 degrees Fahrenheit.

Pedestrians are encouraged to call 263-3333 to report unsafe areas that need to be cleared. They are asked to stay on cleared paths and plowed snow routes, and not cut corners or make their own paths.

For a copy of *Best Management Practices for Salt Use on the University of Wisconsin-Madison Campus*, contact Sally Rowe in the Safety Department by e-mail: sally.rowe@mail.admin.wisc.edu, or call 262-0979. The department welcomes comments on the guidelines. ■

CompSci

Students Take On Real World of Tutoring

By Erik Christianson

A SUCCESSFUL college education is not limited to attending lectures and taking notes. It includes learning from the classroom of real life.

Just ask Amy Thiessen.

A senior in elementary education, Thiessen spent 15-20 hours each week last year as a tutor helping Madison kindergartners learn how to read.

"We learn all these theories in class, but when you go into the school and into the classroom, it's so different," says Thiessen, who is from McFarland, Wis. "It's important to see what teaching is like from a hands-on perspective."

Thiessen got much of her up-close experience through the America Reads Challenge, a federal literacy program started last year to ensure that children know how to read effectively and independently by the end of third grade.

Forty-eight UW-Madison students participated as America Reads tutors during the 1997-98 academic year through the work-study financial aid program. This year, Madison school officials hope that 200 UW-Madison work-study students sign up for the program, which focuses primarily on helping elementary school students with reading difficulties or from low-income homes.

"We've gotten uniformly positive feedback from staff who worked with the UW-Madison students," says Kathy Price, community partnership coordinator for the Madison School District. "We're anxious to build on last year's practice."

Thiessen, who hopes to work as a kindergarten teacher after graduation, honed her teaching skills by tutoring kindergartners and second graders at Franklin Elementary School last fall. She helped them read and spell during class and after school. During the second semester, Thiessen completed her teaching practicum in the same kindergarten class in which she had tutored.

"That was really, really neat," she says. "It built on the relationships I had already established with the students and helped me out as a future teacher."

Senior Amber Wasielewski wants to teach high-school Spanish after graduation, but she still counts her America Reads experience as invaluable. She tutored kindergartners and first graders at Aldo Leopold Elementary School.

"I have an increased ability to think about new ways to do things after working as a tutor with children of different learning levels," says Wasielewski, a Spanish major from South Milwaukee. "I think I'm more flexible. It also reinforced for me that I want to be a teacher."

America Reads is intended to complement classroom instruction and existing federal literacy programs, including Title I and Head Start. College students are encouraged to participate, especially if they qualify for work-study aid.

The program illustrates the value of the work-study program for the university, its students and the community. About 2,200 UW-Madison students held work-study jobs in 1997-98, earning $2.8 million working on campus and at roughly 400 off-campus employers.

"We've had our students work in school districts before, but America Reads focused our vision," says Steve Van Ess, director of the Office of Student Financial Services, which oversees the campus work-study program. "The school districts are happy, the students are happy and we are happy."

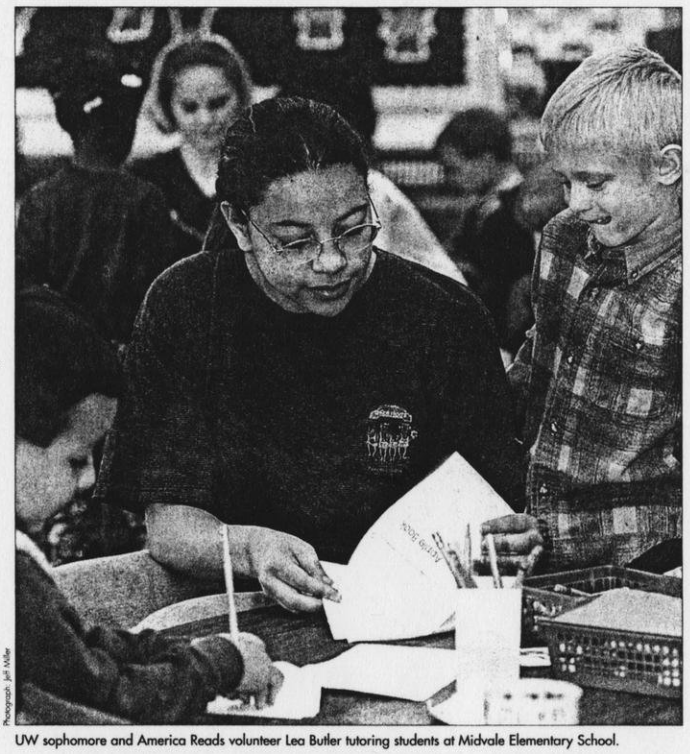
The faculty also is involved. Two UW-Madison professors — Mary Louise Gomez and Ken Zeichner of the School of Education — will evaluate the America Reads program over the next year to measure its success.

Gomez, who is chair of the Council on University-School Partnerships, which seeks to improve learning for children of color and from low-income families in Dane County, says tutoring programs cannot by themselves solve the ills of the nation's schools and childhood illiteracy. But she applauds Read America because it includes two key ingredients that research has shown lead to productive tutoring: linking the help provided by tutors to classroom instruction and providing training for tutors.

"We also know there needs to be a significant commitment each week to tutoring for it to be successful," she added. "Twenty minutes a week won't cut it."

Thiessen and Wasielewski, meanwhile, encourage their classmates to make the same commitment to America Reads that they did.

"I would definitely give it a try," Thiessen says. "I had a good experience and learned a tremendous amount from this hands-on work."



Photograph: Jeff Miller

UW sophomore and America Reads volunteer Lea Butler tutoring students at Midvale Elementary School.

Bonus Babies

A hot job market has computer and engineering grads in high demand

By Brian Mattmiller

STUDENTS still mulling their majors might be interested in this piece of news: signing bonuses, once the sole province of pro athletes and corporate big shots, are suddenly finding their way to college graduates, especially those in computer sciences and engineering.

Desperate to stock their growing companies from a limited pool of young talent, many computer and engineering firms have turned to the signing bonus as a bona fide recruiting tool.

"This is definitely a new phenomenon for engineering students," says Sandra Arnn, UW-Madison's director of Engineering Career Services.

Arnn was accustomed to hearing occasional stories of signing bonuses offered to some of the college's blue-chip students. But last fall, the stories became so common that she added the question to placement surveys of graduating seniors.

The results: roughly two-thirds of all students with electrical and computer engineering degrees accepted a signing bonus from their new employer. And roughly one-third of all engineering graduates — out of more than 400 surveyed for the fall and spring semester — reported receiving such a perk. The up-front bonuses averaged in the $5,000 range.

"What's really remarkable is it's not just computer companies," Arnn says. "Almost every Fortune 500 company is in need of engineers who have computer backgrounds, and they're willing to pay signing bonuses to attract them."

She says the signing bonus phenomenon is just one barometer of the banner market for engineering and computer science graduates. Especially in demand are students versed in complex computer architecture, electronic networks and web design. Students who can help remediate Year 2000 computer bug problems also are sought after.

Many students have exposure as undergraduates to technology that's just being introduced in industry, which means they will make contributions almost immediately, she says.

Like the signing bonus trend, starting salaries also are marching upward for engineers and computer scientists. But, says Arnn, students should consider other factors besides salaries and bonuses in making job decisions.

"We definitely encourage our students to look at the big picture," she says.

Dean Zavadsky, a May 1998 electrical and computer engineering graduate, did just that. He took a job in June with Hewlett-Packard Corporation in Santa Rosa, Calif., the best of five offers he received. The deal came with a $2,000 signing bonus, which he used to buy new living-room furniture, allowing him to leave his tattered college-era couch behind.

The starting salary and bonus were more than he expected when starting his search, but other factors were equally important, he says.

"I really checked into the corporate culture of these companies," he says. "Was there a corporate philosophy of working 55 hours a week, or could I go home after 45 hours a week and not worry about what would be waiting on my desk?

"I don't want to burn out. I worked long and hard in college, and I wanted to enjoy more free time than I was used to."

Comp Sci

FOR IMMEDIATE RELEASE 12/10/98
Contact: Virginia Hinshaw, Graduate School dean, (608) 262-1044

$12 MILLION RAISED TO SUPPORT DISTINGUISHED GRADUATE FELLOWSHIPS

Individuals and companies donated more than $12 million this past year to a new program, Wisconsin Distinguished Graduate Fellowships, that will help the University of Wisconsin-Madison gain a significant advantage in the heated competition for the nation's best and brightest graduate students.

The money has provided nearly 50 Wisconsin Distinguished Graduate Fellowships. UW-Madison officials expect to support as many as 400 graduate fellows by building a $200-million endowment over 10 years.

The Distinguished Graduate Fellowships program, which involves all UW-Madison schools and colleges and has received a commitment of up to $100 million in supplementing funds from the Wisconsin Alumni Research Foundation, would be among the largest programs of its kind anywhere.

"Everyone plays a critical role in generating this endowment -- an effort clearly fortified by WARF's financial commitment," says Graduate School Dean Virginia Hinshaw. "Some of these new fellowships are already underway and the future looks bright. This is a great way to strengthen our future as a leader in research."

For research universities like UW-Madison, graduate students are critical participants in the research, teaching and outreach activities at the heart of the institution. Graduate enrollment at UW-Madison fluctuates between 8,000 to 10,000 students annually, making it one of the largest graduate schools in the nation.

Committing such significant resources should help UW-Madison cope with the continuing decline in support for graduate study from state and federal governments.

Selected fellows pursuing master's and doctoral degrees may receive up to $24,000 annually through the Distiguished Graduate Fellowship program. Full fellows also are eligible for remission of the non-resident portion of fees and tuition.

Leaders of the Graduate School, the UW Foundation and WARF are working with schools and colleges on campus to build the endowment. WARF is a not-for-profit corporation that manages and licenses patents on behalf of UW-Madison faculty and staff. The UW Foundation, also an independent nonprofit corporation, is the principal fund-raising organization for the university.

Schools and colleges that have generated fellowships this year include Agriculture and Life Sciences, Business, Engineering, Education, Letters and Science, Pharmacy and the Graduate School.

"An impressive aspect is the diversity of programs designated to receive the fellowship support," Hinshaw says.

Those programs include German, Scandinavian Studies, Biotechnology, Computer Science, Materials Science, Electrical and Computer Engineering, Industrial Engineering, Physics, Political Science, Accounting and Information Systems, Operations and Information Management, Distribution Management and Kinesiology.

"This is an exciting beginning -- now only $89 million to go," Hinshaw says. "We encourage potential donors to consider this form of giving."

A gift of $250,000, coupled with matching funds, will provide an endowment for a full fellowship. Individuals or organizations making donations at that level may name and designate the fellowship.

For information on supporting the fellowship endowment, contact David Weerts at the UW Foundation, (608) 262-5250, or Jim Knickmeyer at the Graduate School, (608) 262-5801.
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--Tim Kelley (608) 265-9870

FOR IMMEDIATE RELEASE 10/21/97

CONTACT: Jeff Naughton, (608) 262-8737; Debra Woods, Sun Microsystems, Inc., (650) 786-5214

Computer Sciences

SUN MICROSYSTEMS DONATION ASSISTS UW COMPUTING RESEARCH

MADISON - A donation of high-performance computing equipment from Sun Microsystems to UW-Madison will aid projects to make parallel computing a more powerful research tool.

The Mountain View, California, company donated to the computer sciences department three parallel processing computers, each with 16 processors that run the Sun Solaris operating environment. These systems will be connected to a fourth one owned by the department.

The gift will boost UW-Madison projects led by computer science professors James Larus, Jeffrey Naughton and 10 others. Mark Hill and David Wood of the computer science faculty also have collaborations with Sun and will benefit from the new technology.

Unlike conventional computers, parallel computers use many processors operating together in a network, giving the system greater power to handle large and complex problems.

"Our collaborations with Sun have brought a new perspective to computer architecture research at UW-Madison," says Hill. From September 1995 to July 1996, Hill spent a sabbatical working with a Sun engineering team on a parallel systems architecture project. The project led to technical advances that will be making their way into Sun products.

The project led by Larus and Naughton is striving to make computer images a more powerful force in research. Researchers in fields such as genetics, space science and global climate rely heavily on large banks of computer imagery, but they are notoriously difficult to manage.

Naughton says his research team is developing software to help better identify, retrieve and search images. "The goal is to create a system that can manage large collections of images in ways that will allow sophisticated queries," he says.

The department has been a leader in parallel computing research for more than a decade, says Greg Papadopoulos, vice president and chief technology officer at Sun.

"Sun and UW-Madison computer scientists have had a fruitful collaboration for years," Papadopoulos says. "Melding this kind of expertise with Sun engineering teams helps Sun bring new technologies to market more quickly."

When combined, the new computers will deliver power surpassing anything the department currently uses, by having a total of 64 processors working in tandem, Larus says.

Since Sun's inception in 1982, the company has emerged as a leading provider of hardware, software and services for establishing enterprise-wide intranets and expanding the power of the Internet.

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- Brian Mattmiller, (608) 262-9772

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NCR PURCHASES UW-MADISON COMPUTER SCIENCES TECHNOLOGY
COMPANY ALSO GIVES $500,000 FOR GRADUATE FELLOWSHIPS

Computer Sci

MADISON - A major computer firm plans to sink roots in Madison and forge stronger ties with the University of Wisconsin-Madison's computer science department, thanks to a new technology the department developed.

NCR Corporation, an Ohio-based computer firm with 38,000 employees, announced today that it has purchased a new multimedia and parallel database technology created by UW-Madison computer scientists. The software could help future databases become much more versatile, allowing users to take greater advantage of pictures, maps, audio and video to answer questions.

To spur commercial development of the software, NCR plans to open a research and development lab in Madison, beginning with 12 to 15 employees. The company is looking for locations close to the university in order to take advantage of the computer science department's research expertise.

In addition, NCR announced a donation of $500,000 to create two endowed graduate fellowships for computer science Ph.D. students. These fellowships are part of a new initiative called the Wisconsin Distinguished Graduate Fellowships, in which the university will match income generated from the endowment to provide more graduate support.

The ultimate goal of the program is to create a $200 million endowment for fellowships to attract the best and brightest graduate students.

"The NCR partnership is very good for our department, for the university and for the community," says James Goodman, chair of the computer sciences department. "We expect to develop a long-term relationship with NCR that will include support for our programs and additional employment opportunities for our students."

The endowed fellowships are named after two prominent faculty in the department. One will honor Anthony Klug, a former professor who made major contributions to the department from 1978 to his unexpected death in 1983. The second recognizes current computer science professor Lawrence Landweber, who helped build the department and played a major role in the development of the Internet.

The new technology was developed by computer science professors David DeWitt, Jeffrey Naughton and a team of nearly two dozen graduate students and staff. Called "Paradise," the software is specially designed for clusters of processors working together to handle databases too large for a single processor.

"Instead of mundane business data, this software could help store all the data for a business operation, from videos of products to maps of sales regions," DeWitt says. "This makes complex information much more interactive and multi-dimensional."

To visualize what the software can do, NCR spokesman Jim Mazzola used an example for a travel agency. If a traveler wanted a list of resorts in a country that are on the beach and have their own golf course, the data base would list not only their names, but pictures and map locations for each site, he says.

The UW-Madison prototype is one to two years away from commercial use, Mazzola says. But this type of software is expected to become the industry norm in five to 10 years.

The relationship with a major university is a first for the Dayton, Ohio-based firm, Mazzola says. "This is really a benefit for NCR and a recognition of the talent that's in Madison," he says.

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- Brian Mattmiller, (608) 262-9772

Computer Sci

Master of illusion

Computer graphics pioneer reveals bag of tricks in UW course

Brian Mattmiller

Many computer science students dream of creating the Next Big Thing, a killer application that changes the way we use computers.

A few dozen select UW-Madison students this spring are learning the ropes from a guy who invented one of Today's Big Things: a software program that helps movie-makers bend the laws of nature.

Madisonian Perry Kivolowitz co-invented "Elastic Reality" a decade ago, and the image-morphing software has been embraced by Hollywood special-effects wizards. More than 200 Hollywood films and countless television shows and commercials have used Elastic Reality. In 1997, the software earned him an Academy Award in technical achievement.

His transformation to adjunct professor this spring has students and faculty entertaining big ideas for the department. The introductory computer graphics course may be the start of a larger program on the field.

ER's cool factor is simple: It blends together two distinct scenes in one seamless transition, making unlikely effects look believable. It's currently at work in the movie "Titanic," in the scenes that segue from 1912 to the present, in which characters age 80 years before our very eyes.

It helped freak-show aliens come to life in the movie "Men in Black." It makes "Odo," the alien from the TV series "Star Trek: Deep Space Nine," transform from a human-like being to a liquid blob. It made totem poles talk and dogs speak French in the series "Northern Exposure." It even color-corrected a Polar Bear in the movie "Alaska," changing the beast from a dingy yellow to a bone-white coat.

Kivolowitz, it seems, also was ready for a change last year. He recently sold his Madison company, called Elastic Reality, that successfully produced his software for years. His close friend, computer science professor Barton Miller, knew he was looking for new challenges and encouraged him to give university-level teaching a try.

"This course has been tremendously valuable to me already," Kivolowitz says. "The best way to learn something is to teach it. These students are very sharp and they ask tough questions."

Although an introductory course, one-third of its 35 students are graduate students. Kivolowitz made the class very hands-on, where students master the tools well enough to create their own programs. The lessons explore the full range of the computer graphics palette, such as coloring, lighting, texturing and special effects.

The course complements another computer graphics course taught by mechanical engineering Professor John Uicker by focusing more on the latest techniques in creating and manipulating quality images.

Computer graphics as a science is experiencing a golden era, Kivolowitz says. "If you get out of bed in the morning, you are going to see computer-generated images at some point in the day," he says. "They're on print ads, on billboards, on TV commercials, everywhere."

"It is absolutely stunning how far the science has come in a very short time, but there's much further to go," he adds. "I don't think the science will stop progressing until computer images are indistinguishable from real life."

Kivolowitz, who served as technical adviser for many films, will have some computer-biz colleagues popping in for guest lectures. Peter Moyer, a three-time Emmy winner from Los Angeles, will talk about computer graphics applications in movies. Also lecturing will be Paul Haeberli, one of the original software developers for Silicon Graphics; and John Foust, one of the nation's top authorities on three-dimensional file formats.

Kivolowitz's own special-effects lectures will show students how to simulate natural phenomena and create "in-your-face" effects, such as wacky transitions. That segment of the class will end with a high-tech show-and-tell of favorite special effects.

Students ran a gauntlet of tough credentials to be eligible; each was required to have earned an AB grade or better in a 500-level course. Even so, more than 150 students wanted in only two days after the course was posted.

Oguz Yetkin, a senior in the course, says the talent level is noticeable. "It's a lot more hard-core than any computer science classes I've been in. I don't think there are any slackers in this class."

Learning the ropes from an Oscar-winning graphics pro "added a lot more enthusiasm coming into the lecture," Yetkin says. "You learn a lot of great things in computer science, but you don't always learn the fun things."

In addition to computer science, Yetkin has a second major in molecular biology, a field where computer-graphics talent proves valuable. Visualization is taking the science world by storm, and research now often involves building 3-D models of organisms, molecules, weather patterns and other phenomena.

The department plans to build on the foundation Kivolowitz sets. Miller says computer graphics is one of the target fields for faculty hiring in the department, and Kivolowitz's presence here will be a powerful draw.

"There are literally only two people in the world capable of teaching the course Perry's teaching right now," Miller says. (The other is teaching at Stanford University.) What makes them so unique is not just the technical know-how, but the ability to apply the tools in ingenious new ways.

James Goodman, chair of the computer science department, says innovative talents like Kivolowitz are very hard for computer science programs to attract, since every school wants to carve their niche in the field.

"With computer graphics, we're literally looking at the world changing out from under us," Goodman says. "We see this as an opportunity, not just for Perry but for the department. We've got big plans for him, big hopes." ■

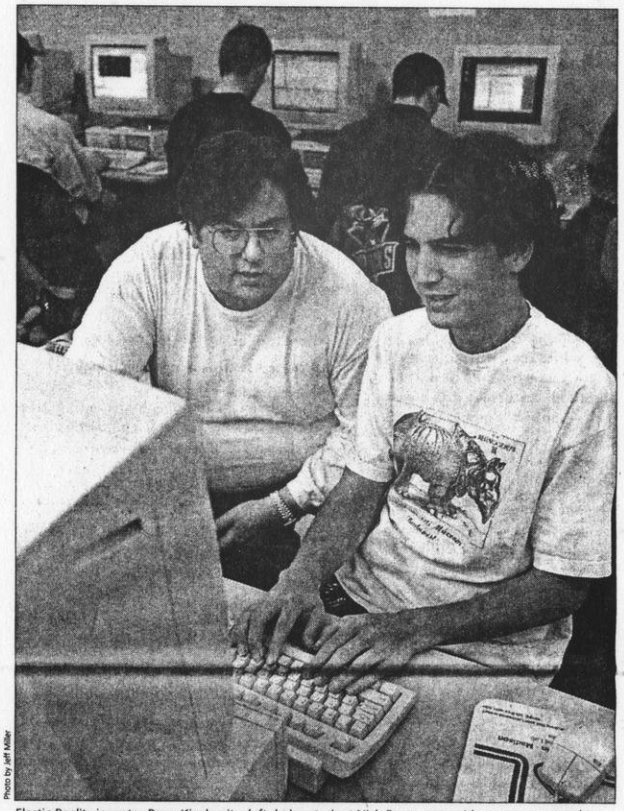

Photo by Jeff Miller

Elastic Reality inventor Perry Kivolowitz, left, helps student Nick Rasmussen with a computer graphics assignment. Students say Kivolowitz has attracted a formidable pool of talent to his class. Rasmussen, a junior majoring in computer science, math and physics, is a prime example.

Kivolowitz's creation a lock for another Oscar

The question Perry Kivolowitz will face March 23 is not *whether* his Elastic Reality software will garner an Oscar but *which* ER film veteran will win for Best Visual Effects.

All the nominees — "Titanic," "Starship Troopers" and "The Lost World: Jurassic Park" — used Kivolowitz's software to great . . . effect. In "Titanic," for example, ER handled all the time morphs; in one scene, the female lead's dewy 1912 eye gently time-travels 85 years to its 1997 incarnation. That effect was achieved through the subtle digital manipulation of lighting, eye shape and tissue texture.

And was Kivolowitz pleased with the way the film's SFX designers employed his software?

"I believe the 'time morphs' in 'Titanic' were the most artfully crafted and tastefully executed I have ever seen," he says. "Typically, morphs are either entirely invisible or all too obvious. In 'Titanic', they fit into and advanced the story in a perfectly natural way."

For the last three years the Academy has chosen an ER picture for Best Visual Effects. Nevertheless, "I'll be thrilled to see another win," Kivolowitz says. "It is a reflection on my work, but keep in mind that Elastic Reality is only one tool that talented visual effects artists employ. Credit belongs to the artists directly involved, but the honor also can be felt by all those, like myself, who created the tools." ■

Barbara Wolff

ER helped Titanic actress Kate Winslet age 85 years before the audience's eyes.
Film stills courtesy of VFX HQ

FOR IMMEDIATE RELEASE 2/24/98

(Editor's note: This story is a sidebar to a main feature story about Perry Kivolowitz's computer graphics course he teaches at UW-Madison.)

KIVOLOWITZ'S CREATION A LOCK FOR ANOTHER OSCAR

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- Barbara Wolff, (608) 262-8292

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For questions or comments about UW-Madison's email news release system, please send an email to:
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For more UW-Madison news, please visit the Office of News and Public Affairs Web site:
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Learning the ropes from an Oscar-winning graphics pro "added a lot more enthusiasm coming into the lecture," Yetkin says. "You learn a lot of great things in computer science, but you don't always learn the fun things."

In addition to computer science, Yetkin has a second major in molecular biology, a filed where computer-graphics talent proves valuable. Visualization is taking the science world by storm, and research now often involves building 3-D models of organisms, molecules, weather patterns and other phenomena.

The department plans to build on the foundation Kivolowitz sets. Miller says computer graphics is one of the target fields for faculty hiring in the department, and Kivolowitz's presence here will be a powerful draw.

"There are literally only two people in the world capable of teaching the course Perry's teaching right now," Miller says. (The other is teaching at Stanford University.) What makes them so unique is not just the technical know-how, but the ability to apply the tools in ingenious new ways.

James Goodman, chair of the computer science department, says innovative talents like Kivolowitz are very hard for computer science programs to attract, since every school wants to carve their niche in the field.

"With computer graphics, we're literally looking at the world changing out from under us," Goodman says. "We see this as an opportunity, not just for Perry but for the department. We've got big plans for him, big hopes."

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- Brian Mattmiller, (608) 262-9772

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FOR IMMEDIATE RELEASE 2/24/98

(Editor's note: This story is a sidebar to a main feature story about Perry Kivolowitz's computer graphics course he teaches at UW-Madison.)

KIVOLOWITZ'S CREATION A LOCK FOR ANOTHER OSCAR

MADISON - The question Perry Kivolowitz will face March 23 is not whether his Elastic Reality software will garner an Oscar but "which" ER film veteran will win for Best Visual Effects.

All the nominees - "Titanic," "Starship Troopers" and "The Lost World: Jurassic Park"- used Kivolowitz's software to great ... effect.

In "Titanic," for example, ER handled all the time morphs; in one scene, the female lead's dewy 1912 eye gently time-travels 85 years to its 1997 incarnation. That effect was achieved through the subtle digital manipulation of lighting, eye shape and tissue texture.

And was Kivolowitz pleased with the way the film's SFX designers employed his software?

"I believe the 'time morphs' in "Titanic" were the most artfully crafted and tastefully executed I have ever seen," he says. "Typically, morphs are either entirely invisible or all too obvious. In Titanic, they fit into and advanced the story in a perfectly natural way."

For the last three years the Academy has chosen an ER picture for Best Visual Effects. Nevertheless, "I'll be thrilled to see another win," Kivolowitz says. "It is a reflection on my work, but keep in mind that Elastic Reality is only one tool that talented visual effects artists employ. Credit belongs to the artists directly involved, but the honor also can be felt by all those, like myself, who created the tools."
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- Barbara Wolff, (608) 262-8292

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Computer Sciences Dept of

SATISFACTION

from page 1

ciology. "The administration and those responsible for providing student services take these assessments very seriously as they set priorities and seek to improve educational programs and student life."

In terms of overall quality of instruction, 63 percent of undergraduates say it is excellent or very good, up from 56 percent in 1995 and close to the 64 percent of 1993. Out-of-classroom accessibility of instructors in 1996 is ranked as good, very good or excellent by 86 percent of the students, compared to 83 percent in 1993.

Eighty-three percent of students rate their teaching assistants as excellent, very good or good, the same percentage as in 1993. Of those who have had experience with non-native-English-speaking TAs, 61 percent ranked them as excellent, very good or good, while the figure in 1993 was 60 percent.

As in previous surveys, undergraduates ranked several university services. Most of them continued to receive a positive response (good through excellent) of 90 percent or higher.

Student assessments of financial aids services, targeted by university officials as a priority in recent years, have improved significantly. In 1993 the positive-response rating of financial aids services was 67 percent; last fall that figure was 77 percent.

Based on a new question asked in 1996, one student in seven reports being involved in faculty research during the current academic year. Their involvement ranges from 7 percent of freshmen to 18 percent of seniors.

Another new question concerned public service. Twenty-seven percent of students report they have done some volunteer service this academic year, including 19 percent of the men and 35 percent of the women.

Alumni couple finds the gift of giving

Computer sciences, Education reading program reap benefits

Lynne Johnson
University of Wisconsin Foundation

Rather than exchanging traditional gifts for their 41st wedding anniversary recently, UW alumni John and Tashia Morgridge instead decided to endow two chairs at the UW-Madison.

Tashia's gift to John was a $1.6 million chair in computer sciences in the College of Letters and Science, while John's gift to Tashia was a $1.6 million chair in reading in the School of Education.

The gift to the School of Education will be used to create the nation's first endowed chair in the field of reading. Tashia Frankfurth Morgridge, a 1955 graduate of the school, has maintained close ties through her service on the Board of Visitors and by helping students prepare to become teachers through scholarship funds she and John have provided. Now retired as a special education teacher, she works as a volunteer teacher for the learning disabled and has written a book on learning.

The professorship will be awarded to a faculty member in curriculum and instruction who has demonstrated outstanding teaching and research in reading and literacy, is actively engaged in training future teachers and is committed to public service. The department began a nationwide search last fall and hopes to fill the position by fall 1997.

The gift — the school's largest ever from an individual donor — comes at a crucial time for faculty and students in reading. Once considered a national leader in instruction and research, the reading program has lost key faculty in recent years. Professors Richard Smith, Wayne Otto and Kenneth Dulin (now deceased) retired, and last October, Professor Thomas Barrett died, leaving the program without a senior faculty member.

"Faculty like these leave a void that is not easily filled," says Charles Read, the school's dean. "The Morgridge professorship will be the pivotal step in rebuilding the reading area, and restoring it to its place as a first-rate program."

The professorship will provide the recipient with an annual auxiliary teaching and research allocation for supplies, equipment, research assistance, salary supplementation and travel.

"The prestige and the funding that accompany the Morgridge professorship will attract attention all over the country," Reads says. "It will allow us to hire the very best teacher and scholar available."

The John P. Morgridge Professor of Computer Sciences is the department's first endowed chair. Professor Lawrence Landweber has been named to the professorship.

"Such positions are important," Landweber says, "both because they serve to recognize the accomplishments and stature of a department's faculty and students, and because they help a department to maintain the quality of its programs.

"The professorship will help me to continue and expand my work involving new networking technologies and their application to supporting new means for people to collaborate and communicate," Landweber says. "Of particular interest is the exploration of the use of network-based communication to enhance learning, both at the university and K-12 levels."

Internationally known for his work with the Internet, Landweber chairs the board of The Internet Society, a non-governmental international organization established in 1992 to seek global cooperation and coordination for the Internet. He recently was named to head the Advisory Committee for the Internet 2 project, which will implement the next-generation Internet for research universities. Landweber adds that "it is a bit intimidating to have a professorship named after someone with John's accomplishments."

John Morgridge graduated in 1955 from the School of Business and has had a highly successful career in the computer industry. He joined Cisco Systems, Inc. in 1988 as president and CEO. The San Jose, California, company is the leading global supplier of computer networking products. He was honored in 1991 as a Distinguished Business Alumnus and received an honorary doctorate degree at the UW in 1994. He is a member of the board of trustees of the Wisconsin Alumni Research Foundation.

John and Tashia Morgridge are members of the UW Foundation, The Bascom Hill Society and the Wisconsin Alumni Association. Further evidence of the couple's generosity can be seen throughout campus from Morgridge Auditorium in Grainger Hall to the lakefront, where the Red Gym, when renovated, will house the Morgridge Center for Community Service.

CLOUDS

from page 1

"Our objective is to study clouds in a way that will further our ability to study climate," says UW-Madison atmospheric scientist Christopher Moeller. "Clouds regulate the Earth's atmosphere. They have a fairly significant impact on the Earth's radiation balance."

The experiment depends on a relic of the Cold War, an ER-2 aircraft that once, as a U-2 spy plane, conducted high-flying espionage missions on behalf of the United States. It achieved fame and notoriety as the aircraft piloted by Francis Gary Powers, the U.S. pilot shot down and held captive by the Soviet Union in 1960 during the height of the Cold War.

But the planes, two of which have been retired from the spy business, have become scientific workhorses, used by NASA since the 1970s as high-altitude platforms for scientific instruments.

For the WINCE experiment, the aircraft will be loaded with a suite of four different sensors and two camera systems to get a detailed picture of clouds over the winter landscape.

Clouds play a critical role in climate, both blanketing the Earth and keeping energy in, and reflecting incoming energy from the sun back into space. But the subtleties of their influence on climate is not well understood, says Paul Menzel, a National Oceanic and Atmospheric Administration scientist stationed at the Space Science and Engineering Center.

"What we've been doing for some time is trying to understand the influence of clouds on the radiation budget of the Earth," says Menzel. "The question we're trying to answer is how much blocking do these clouds do?"

According to Moeller, one important way to approach that question is to obtain a better understanding of cloud microphysics by learning more about the size and shape of the tiny water droplets that make up clouds.

The experiment, says Menzel, is deliberately difficult: "We picked the winter because it is more challenging" to detect and measure clouds, especially cirrus clouds, he says.

These high-altitude clouds, delicate wisps, patches and narrow bands composed of ice crystals, are hard for satellites to detect against the backdrop of a snow-covered Earth, Menzel says.

Moreover, surveying and assaying clouds in northern regions adds to the big picture of cloud influence on global climate, says Moeller.

"We need to know if clouds are increasing in cold regions as well as warm regions," he says. "We need to know what's happening in different climate regimes. We would like to paint this big picture of what's going on on a global scale."

The question of clouds' role is confounded by pollutants such as carbon dioxide, which may be changing the equation, says Moeller. "We know it's a question that's going to be researched for decades to come."

The 115 Fighter Wing of the Wisconsin Air National Guard is providing facilities and support for the ER-2 aircraft; Persoft, Corp. is providing a wireless network to facilitate data transfer between Truax and the Space Science and Engineering Center.

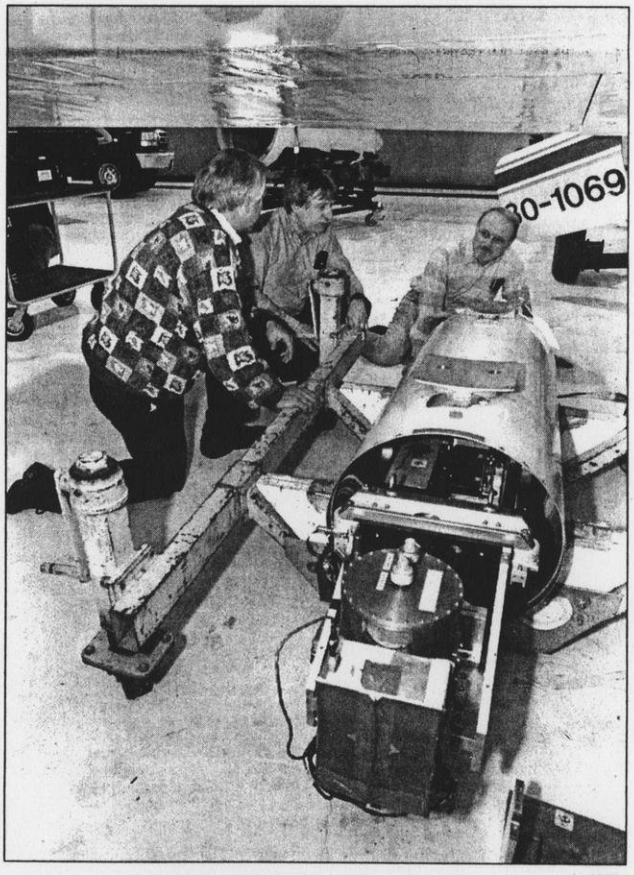
The Aircraft:

NASA ER-2

- Flies above 95 percent of the Earth's atmosphere.
- Built by Lockheed as a high-flying reconnaissance aircraft for the U.S. military.
- Commonly known in military use as the U-2.
- Rechristened ER-2 for Earth Resources.
- Can achieve altitudes of 20 kilometers, making it an ideal platform for scientific instruments engaged in atmospheric or other earth science research.

The Payload:

- Two camera systems
- An interferometer
- A microwave imaging radiometer
- A cloud Lidar system
- A spectrometer known as MAS, a simulator for a multispectral scanner that dissects upwelling radiation into its component spectra.



Jeff Miller

The aircraft's equipment — specially designed for the WINCE experiment — will capture details of clouds over the nothern United States and southern Canada.

Comp Sci

EMBARGOED FOR A.M. RELEASE MARCH 19
CONTACT: John Torphy, (608) 263-2509

U.S. NEWS RANKS GRADUATE PROGRAMS AT UW-MADISON

MADISON - The University of Wisconsin-Madison received several high rankings in the 1999 rating of graduate programs released today (March 19) by U.S. News & World Report.

In library science UW-Madison ranked 8th, placing high in several specialties: 4th in services for children and youth, 5th in school library media and 8th in archives and preservation.

The UW-Madison School of Education ranked 9th, placing 2nd in curriculum/instruction, 2nd in administration/supervision, 2nd in educational psychology, 2nd in secondary teacher, 3rd in social/philosophical foundations, 4th in counseling/personnel services, 4th in elementary teacher, 7th in special education, 7th in vocational/technical and 10th in higher education administration.

The College of Engineering placed 12th, with these specialty ratings: 4th in nuclear, 5th in chemical and 8th industrial/manufacturing.

UW-Madison's Medical School finished 18th among schools teaching primary care and ranked 10th in the specialty of family medicine.

The Law School placed 29th, and the Business School was 36th.

In doctoral programs in the sciences, UW-Madison ranked:

* 9th in computer science with specialty ratings of 3rd in databases, 6th in hardware and 7th in software.

• 10th in chemistry, including 5th in analytical, 7th in physical, 9th in inorganic, 9th in bio-organic/biophysical and 10th in organic.

* 12th in biological sciences, including 3rd in microbiology, 10th in biochemistry/molecular and 10th in genetics.

* 14th in mathematics, with specialty ratings of 2nd in logic, 3rd in mathematical statistics and 8th in algebra.

* 17th in geology, including 3rd in hydrogeology and 6th in sedimentology/stratigraphy.

* 18th in physics.

"These national rankings can be helpful in some ways," says John Torphy, vice chancellor for administration at UW-Madison, "but students should pick the programs that fit their needs the best, not necessarily the ones that rank highest."

# # #

- Jeff Iseminger, (608) 262-8287

MILESTONES

Appointed

The UW System Board of Regents this month approved the following appointments as named professors:

Inge Bretherton, professor of education psychology, to the Audrey Rothermel Bascom Professorship I in Human Ecology.

Mary L. Carnes, professor of medicine, to the Jean Manchester Biddick Professorship in Women's Health Research.

Robin Douthitt, professor of human ecology, to the Vaughan Bascom Professorship in Women and Philanthropy.

Donald A. Downs, professor of political science, to the Glenn B. and Cleone Orr Hawkins Professorship.

David Riley, professor of human ecology, to the Audrey Rothermel and Bascom Professorship II in Human Ecology.

Honored

Jim Ferris, a lecturer in communication arts, has received a Literary Artist Fellowship Award from the Wisconsin Arts Board for his contributions as a professional artist.

Dennis Maki has been named a fellow of the American Academy of Microbiology. He is the UW Medical School Ovid O. Meyer Professor of Medicine and head of the infectious disease section at UW Hospital and Clinics.

The following scholars will study at UW-Madison this year as part of the Visiting Fulbright Scholars program: **Hill Kulu**, researcher, Institute of Geography, University of Tartu, Estonia, to the Department of Geography; **Joy Kwesiga**, dean, Faculty of Social Sciences, Makerere University, Uganda, to the African Studies Program; **Sverker Lindblad**, professor, Department of Education, Uppsala University, Sweden, to the Department of Curriculum and Instruction; **Franco Nigro**, research scientist, Department of Plant Protection, University of Bari, Italy, to the Department of Plant Biology; **Omar Sougou**, assistant professor, Department of English, University of Gaston Berger, Senegal, to the Department of African Languages and Literature; **Chung-Wha Suh**, dean and director, Graduate School of Educational Management, Hong-Ik University, Korea, to the Department of Educational Administration; **Pavel Tvrdik**, associate professor, Department of Computer Science and Engineering, Czech Technical University, Czech Republic, to the Department of Computer Sciences; **Yalemshet Mengesha Wolde-Amanuel**, lecturer, Department of Animal Science, Alemaya University of Agriculture, Ethiopia, to the Department of Animal Sciences.

Published

John G. Webster, professor of electrical and computer engineering, recently co-authored "Analog Signal Processing" (John Wiley & Sons, 1999) with Ramon Pallas-Areny.

Elmer H. Marth, professor emeritus of food science, bacteriology, and food microbiology and toxicology, is the co-editor of the second edition of "Listeria, Listeriosis and Food Safety" (Marcel Dekker, Inc., 1999).

To report faculty and staff news

Faculty and staff members are encouraged to report honors, awards and other professional achievements for publication. We must receive your announcement **AT LEAST 10 DAYS BEFORE PUBLICATION.**

Campus mail: **19 Bascom Hall**

E-mail: **wisweek@macc.wisc.edu**

PROFILE **LARRY EDGERTON**

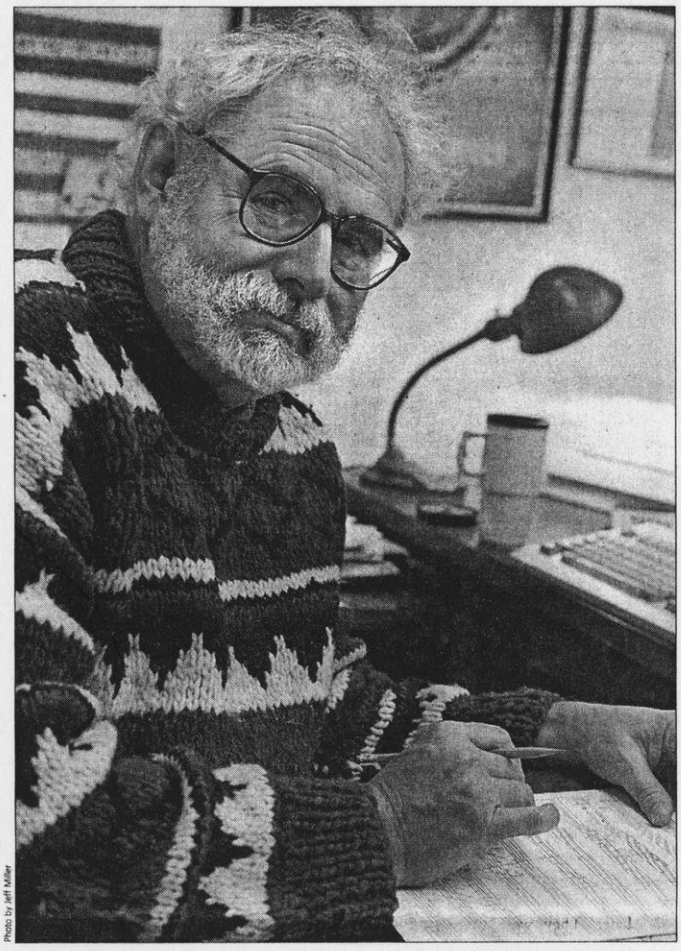


Photo by Jeff Miller

Staffer uses arts to introduce the academic experience

Jeff Iseminger

On the office wall of 7116 Helen C. White, you'll see two people frozen in photographic immortality: Leonard Bernstein and Aaron Copland. The two mute musicians actually say a lot about the office occupant, Larry Edgerton, and so do certain books on his table with intriguing titles such as "Early Benjamin Britten" and "Examples of Gregorian Chant" — intriguing because this is not the office of a music professor, but of a man who uses music and other arts to give wing to the thoughts of his students.

Edgerton is an academic staff member who's been a senior developmental skills specialist and writing instructor in the College of Letters and Science for 18 years. And for the last 10 years he's taught for the Summer Collegiate Experience (SCE) of L&S, which gives about 30 incoming minority freshmen an intense eight-week taste of college life.

That taste includes several flavors flowing forth from Edgerton, who teaches a course on "Approaches to Critical Thinking and Writing." And much of the piquancy of his course comes from the arts, which Edgerton uses as an entry point.

"My overall goal is to introduce students to art forms and give them a language to talk about the works," he says. "I want them to talk critically about the arts."

For instance, Edgerton will show his class the Orson Welles' movie "Citizen Kane," then ask them, "Is this movie really great as so many say? Or is it an example of illogic called the bandwagon appeal?"

Or he might take the class to see abstract art in the Elvehjem Museum or show them a subtitled performance of the Puccini opera "La Boheme." Just the sheer experience of seeing a new art form and trying to understand it can leave a student wide-eyed with wonder."I had a student who saw his first opera during SCE," says Edgerton, "and he said, 'If this is what opera is all about, then I'm moving to Italy.' "

The writing regimen is rigorous in Edgerton's class. Students write 10 pieces over eight weeks, with each assignment involving two to three drafts. "I stress editing," says Edgerton. "I want students to not only think well, but to produce sentences that work well."

His course also helps students stay on track at the college level through units on notetaking, library use and research paper design. "That practical stuff can derail a lot of freshmen," he says. "If I had my way, every freshman would take this course."

Edgerton is remarkably successful with students, says Consuelo Lopez Springfield, assistant dean at L&S. "One SCE graduate told me she learned more from Larry in his course than she had in all of high school."

"My overall goal is to introduce students to art forms and give them a language to talk about the works. "I want them to talk critically about the arts."

One way he expands their intellectual repertoire is by shrinking, through his demeanor, the pedagogical chasm between them and him. "I'm just one scholar trying to hook up with others," he says. "We're all in the same boat, trying to make sense of things."

Edgerton and other SCE staff have clearly had an impact, L&S analysts have found: The retention rates for SCE graduates from freshman to senior years run about 5 percent higher than campuswide figures for minorities. "The SCE students learn they don't have to be afraid of a high-powered university," he says.

Edgerton himself was afraid at times as an undergraduate — of getting gassed. He was at UC-Berkeley from 1969 to 1973, when students frequently had occasion to sniff the delicate and tantalizing Essence of Tear Gas. "I wasn't on the front lines — usually," he says with a smile.

But even during those chaotic days, he fed his passion for the arts by minoring in music and, as he did growing up in Iowa, by playing violin in orchestras. Later, as a doctoral student at UW-Madison, he minored in musicology and majored in American literature.

Edgerton has long been fascinated by connections between music and literature. "For example, the way Bach organized his cantatas has parallels in rhetorical organization," he says.

He's also studied and been inspired by talented people who can perform at a high level in both fields.

Among them are poet Ezra Pound, who wrote an opera; author Anthony Burgess ("Clockwork Orange"), who wrote string quartets; and author Paul Bowles ("The Sheltering Sky"), who wrote three operas.

Edgerton marbles music and literature in his own life. He not only uses music in his writing course, he composes on his piano at home.

He's also written a string quartet and clarinet sonata and now is composing a series of songs about swans.

And he's the author of two books published by Kendall/ Hunt: "What We Owe the Reader: A Resource Workbook for Writers" and "The Editing Book: 101 Problems and Solutions."

Oh, he's done something else, too, something you can rent at Four Star Video on State Street: the schlock horror film, "Blood Hook." He co-wrote the movie in 1986, and the director was Jim Mallon, former head of the student Pail and Shovel Party at UW-Madison and now producer and director of "Mystery Science Theater 3000" on the Sci-Fi Channel. The film tells of a crazed North Woods fisherman with a plate in his head that sets him off on murderous rampages directed at tourists from Illinois.

The things that set Edgerton off in a nonrampageous way are not Illinois tourists — well, maybe sometimes — but sloppy writing and mushy thinking.

His artful antidote for those lamentable conditions will be offered again during this summer's SCE program. With Edgerton as a gentle guide, the arts are an avenue to sharper perception and more lucid, graceful expression.

And that, for incoming freshmen, can be a yellow brick road indeed. ■

Community

Demand increasing for pharmacy graduates

America's burgeoning elderly population, which is using sophisticated drug therapies in record quantities, has helped make highly educated pharmacists one of the hottest commodities in health care, School of Pharmacy researchers say.

Pharmacy schools are responding by re-engineering themselves and their graduates, but demand is outpacing supply and there's no quick cure in sight, according to David Mott, a UW-Madison assistant professor of pharmacy studying workforce and policy issues.

"There is a concern that there are not enough pharmacists to fill traditional roles such as staffing pharmacies and dispensing patient prescriptions," he says. The rising demand may, however, be just the right medicine for people preparing to launch or change careers, Mott says. Pharmacy students are spending longer than ever — at least six years — in school, but upon graduation they are finding a healthy job outlook, above-average salaries, and a larger role in drug therapy decision-making and patient counseling, he says.

Several concurrent developments have boosted the demand for pharmacists:

- A growing population of older Americans who require more drug therapy.
- A sharp rise in the number and complexity of therapeutic drugs.
- Expansion of services requiring pharmacists' knowledge and skills.
- More health professionals approved to prescribe drugs including some advanced practice nurses, physician's assistants and optometrists.

To prepare pharmacists for expanded roles as "drug therapy managers," most of the nation's 79 pharmacy schools — including Wisconsin — now offer an advanced degree or "PharmD" degree requiring one or two additional years of education, Mott says.

The extra training better prepares graduates for direct patient contact, consultation with other health care providers, and work within the managed care setting ■

UW gets two-year probation for self-reported NCAA violations

The National Collegiate Athletic Association (NCAA) has placed UW-Madison on a two-year probation because of self-reported inadvertent NCAA violations.

That action was announced last week by the NCAA for infractions involving the administration and control of athletically related income and supplemental pay from sources outside the university. In addition to being placed on probation, UW-Madison must develop a comprehensive athletics compliance education program.

"We are gratified," said Chancellor David Ward, "that NCAA found that virtually all of the expenditures we reported would be considered proper" had the requisite prior written approval been obtained, that no competitive advantage was gained and that none of the funds accrued to the benefit of enrolled or prospective student-athletes.

"We will readily comply with their penalties; indeed, we already have developed procedures to ensure that such violations will not occur again."

During a teleconference announcing the penalties, the chair of the NCAA Division I Infractions Committee, David Swank, said he considered the penalties "quite light." That was in part because UW-Madison self-reported the violations, he said, and because "most of the expenditures would have been completely legal had permission been requested" ■

Graduate programs ranked by national magazine

The university received several high rankings in the 1999 rating of graduate programs released Friday, March 19, by U.S. News & World Report.

In library science UW-Madison ranked 8th, placing high in several specialties: 4th in services for children and youth, 5th in school library media and 8th in archives and preservation.

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- 18th in physics.

"These national rankings can be helpful in some ways," says John Torphy, vice chancellor for administration at UW-Madison, "but students should pick the programs that fit their needs the best, not necessarily the ones that rank highest." ■

Program seeks more Milwaukee students of color

The university is stepping up recruitment of students of color in the state's largest city – with assistance from their school district and potential future employers.

A new university initiative — the Pre-College Enrollment Opportunity Program for Learning Excellence, or PEOPLE — will enroll 100 Milwaukee ninth graders beginning this summer. Through classes held in Milwaukee and time spent on the UW-Madison campus, the program will acquaint the students with and prepare them for admission to Wisconsin's flagship university.

PEOPLE is recruiting African-American, American Indian, Asian American, Hispanic/Latino and low-income students. Those who complete the program and enroll at UW-Madison will receive full scholarships, if successful fund-raising objectives are met. UW-Madison is partnering with Milwaukee public schools and the Milwaukee business community to create the program.

"The PEOPLE program is a comprehensive and creative partnership to increase the number of students prepared to go to college and be successful," says Chancellor David Ward. "We must work hard together to help provide opportunity to young people in Milwaukee, and we are committed for the long haul."

Program costs are $200,000 for the first year – half of which Milwaukee businesses are being asked to contribute. The university and the state will pick up the other half.

By 2002, PEOPLE will provide pre-college training for 400 Milwaukee high school students of color and scholarships for up to 450 undergraduates each year. The pre-college program alone will cost $2.2 million.

Students who complete the program and go on to graduate from UW-Madison will be prepared to fill management and technical positions with Milwaukee businesses, enter graduate school or assume leadership positions with Milwaukee social, economic and community organizations.

Milwaukee was the logical location to start the program, Ward says, because of its sizable minority population and UW-Madison's modest success in enrolling its students of color. Eventually, Ward hopes to replicate the program in other Wisconsin cities.

The PEOPLE program follows a long line of UW-Madison diversity efforts. The Madison Plan in 1988 included programs aimed at improving student access and graduation. The Madison Commitment in 1993 updated the Madison Plan by emphasizing broader application and accountability in campus diversity programs. In 1995, the university adopted nine priorities for the future, one of which was "maximizing human resources." This priority is designed to strengthen the campus through greater inclusion of viewpoints, backgrounds and gender and ethnic differences.

On Thursday, April 15, the university will finalize its next 10-year diversity blueprint as part of Plan 2008, the UW System Board of Regents' initiative to increase the number of students, faculty and staff of color on all UW System campuses. ■

U.S. Supreme Court plans to decide student fee case

The future of UW-Madison's student fee system now rests with the nation's top court.

The U.S. Supreme Court agreed Monday, March 29, to decide whether the mandatory fees violate students' free-speech rights. Their decision will affect student fee systems at all public universities.

"It's a close legal question that the Supreme Court needs to decide," says Assistant Attorney General Susan Ullman, who will argue the case for the UW System.

Three UW law students sued the university in 1996, objecting to the use of student fees to finance campus groups they disagree with on ideological, political or religious grounds. After a federal judge ruled in their favor and the 7th U.S. Circuit Court of Appeals upheld the decision, the Board of Regents in October asked the Supreme Court to hear the case.

The university and its student government leaders say that student groups supported by the fees are a necessary part of the education experience and are constitutional because they support free speech for students.

The case will be watched closely on other campuses where students have lodged similar objections to using fees to fund certain groups. At UW-Madison, student fees are collected along with tuition for a wide variety of activities. Health services and the Wisconsin Union, for example, are supported through student fees, as are a range of student organizations.

The Supreme Court will take up the case in October when it begins its new term. ■

NEWS MAKERS

Computer Sci

UW LIBRARIES HIGHLIGHTED

The **Library Technology Group** of the General Library System is featured in the current issue of Library HI Tech with a study about the UW-Madison Electronic Library.

Charles Dean edited the study titled, "Shaping the Electronic Library —The UW-Madison Approach." Articles by members of the LTG and GLS staff detail developments in digital libraries from UW-Madison's experience. Other contributors include **Ken Frazier, Nolan Pope, Peter Gorman, Sue Dentinger, Joanne Boston, Hugh Phillips, Steven Daggett, Mitch Lundquist, Mark McLung, Curran Riley, Craig Allan** and **David Waugh**.

PESTICIDE HARM REPORTED

Children exposed to pesticides in the womb or at an early age may suffer permanent brain defects that could change their lives by altering their behavior and their ability to do everything from drawing a picture to catching a ball, according to new research.

Widely used pest-killing chemicals, in amounts routinely found in the environment in farm areas, seem to be capable of skewing thyroid hormones, which control how the brain of a fetus or young child develops, according to a published study. Scientists say the study and other recent research support an emerging theory that pesticides may exact a toll on the intelligence, motor skills and personalities of infants, toddlers and preschoolers.

"Data suggest that we may be raising a generation of children with learning disabilities and hyper-aggression," **Wayne Porter**, a UW-Madison professor of zoology and environmental toxicology, told the Los Angeles Times (March 15).

Porter's study shows that a common mix of chemicals altered the thyroid hormones of young mice. It also suppressed their immune systems.

FIGHTING BUGS, NATURALLY

A humbling chapter in crop science is the one now being written as pesticide companies try to mimic nature. The bug-fighting business is coming full circle to the strategies of the early 1900s when entomologists searched for natural predators to help control crop pests, **David Bowen**, a scientist at UW-Madison, tells the Star Tribune of Minneapolis (March 17).

For example, genes from Photorhabdus luminescens, a bacterium Bowen and his colleagues are studying, could be used to guard crops against borers and beetles. The Wisconsin Alumni Research Foundation has obtained patents on discoveries so far, and the scientists are working with companies to translate their findings into products for field and home.

ROTC NEGOTIATION DETAILED

University Wire (March 24) highlighted recent negotiations between UW-Madison administrators and the Associated Students of Madison's Equal Rights Initiative. The groups agreed to fight against an alleged ROTC anti-gay discrimination policy.

The student group suggested ways to ensure that gay students receive scholarship money and leadership training similar to what the ROTC provides. Provost **John Wiley**, who called the meeting, says he was impressed with how much work went into the report. "[The meeting] was really to congratulate them on a good job and say that we agree with them and want to work with them," Wiley explains.

Computer Sci

Master of illusion

Oscar-winning instructor has UW computer scientists making big plans

Brian Mattmiller

MANY COMPUTER SCIENCE STUDENTS dream of creating the Next Big Thing, a killer application that changes the way we use computers.

A few dozen UW-Madison students this spring are learning the ropes from a guy who invented one of Today's Big Things: a software program that helps movie-makers bend the laws of nature.

Madisonian Perry Kivolowitz co-invented "Elastic Reality" a decade ago, and the image-morphing software has been embraced by Hollywood special-effects wizards. More than 200 Hollywood films and countless television shows and commercials have used Elastic Reality. In 1997, the software earned him an Academy Award in scientific and technical achievement.

His transformation to adjunct professor this spring has students and faculty entertaining big ideas for the department. The introductory computer graphics course may well be the start of a larger program on the field.

Elastic Reality's cool factor is simple: it blends together two distinct scenes in one seamless transition, making unlikely effects look believable. It's currently at work in the movie "Titanic," in the scenes that segue from 1912 to the present, in which characters age 80 years before our very eyes.

It helped freak-show aliens come to life in the movie "Men in Black." It makes "Odo," the alien from the TV series "Star Trek: Deep Space Nine," transform from a human-like being to a liquid blob. It made totem poles talk and dogs speak French in the television series "Northern Exposure." It even color-corrected a Polar Bear in the movie "Alaska," changing the beast from a dingy yellow to a bone-white coat.

Kivolowitz, it seems, also was ready for a change last year. He recently sold his Madison company, called Elastic Reality, that successfully produced his software for years. UW-Madison computer science professor Barton Miller encouraged him to give university-level teaching a try.

"*This course has been tremendously valuable to me already.*" Kivolowitz says. "The best way to learn something is to teach it. These students are very sharp and they ask tough questions."

Kivolowitz made his class of 35 students very hands-on; students master the tools well enough to create their own programs. The lessons explore the full range of the computer graphics palette, such as coloring, lighting, texturing and special effects.

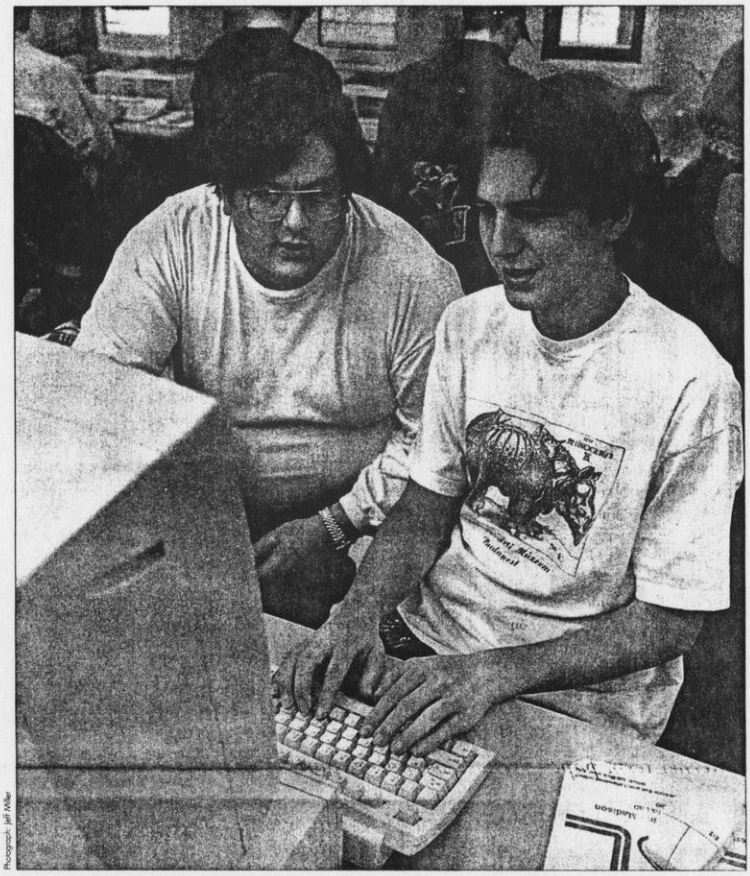
Students ran a gauntlet of tough credentials to be eligible; each was required to have earned an AB grade or better in a 500-level course. Even so, more than 150 students wanted in only two days after the course was posted.

Oguz Yetkin, a senior in the course, says the talent level is noticeable. "It's a lot more hard-core than any computer science classes I've been in. I don't think there are any slackers in this class."

Learning the ropes from an Oscar-winning graphics pro "added a lot more enthusiasm coming into the lecture," Yetkin says. "You learn a lot of great things in computer science, but you don't always learn the fun things."

In addition to computer science, Yetkin has a second major in molecular biology, a field where computer-graphics talent proves valuable. Visualization is taking the science world by storm, and research now often involves building 3-D models of organisms, molecules, weather patterns and other phenomena.

Nick Rasmussen, a junior majoring in computer science, math and physics, has been dabbling in computer graphics for years. He's currently designing his own video game. "Most of the course will be a review for me," he says. "But I'm taking it just to hear Perry's perspective. It's nice to get a professional's opinion."



Photograph: Jeff Miller

Elastic Reality inventor Perry Kivolowitz, left, helps student Nick Rasmussen with a computer graphics assignment. Students say Kivolowitz has attracted a formidable pool of talent to his class. Rasmussen, a junior majoring in computer science, math and physics, is a prime example.

But learning computer graphics and creating new applications are two different things, he says. "You'd probably need another three or four semesters at least before you attempt anything new and revolutionary."

ER helped Titanic actress Kate Winslet age 85 years before the audience's eyes. Film stills courtesy of VFX HQ

Computer graphics programming is experiencing a golden era, Kivolowitz says. "If you get out of bed in the morning, you are going to see computer-generated images at some point in the day," he says. "They're on print ads, on billboards, on TV commercials, everywhere.

"It is absolutely stunning how far the science has come in a very short time, but there's much further to go. I don't think the science will stop progressing until computer images are indistinguishable from real life."

Kivolowitz, who served as technical adviser for many films, will have some computer-biz colleagues popping in for guest lectures. His own special-effects lectures will show students how to simulate natural phenomena and create "in-your-face" effects, such as wacky transitions. That segment of the class will end with a high-tech show-and-tell of favorite special effects.

The department plans to build on the foundation Kivolowitz sets. Miller says computer graphics is one of the target fields for faculty hiring in the department, and Kivolowitz's presence here will be a powerful draw.

"There are literally only two people in the world capable of teaching the course Perry's teaching right now," Miller says. The other is teaching at Stanford University. What makes them unique is not just the technical know-how, but the ability to apply the tools in ingenious new ways.

James Goodman, chair of the computer science department, says innovative talents like Kivolowitz are very hard for computer science programs to attract, since every school wants to carve their niche in the field.

"With computer graphics, we're literally looking at the world changing out from under us," Goodman says. "We see this as an opportunity, not just for Perry but for the department. We've got big plans for him, big hopes."

Kivolowitz wins another Oscar-night honor

The only question Perry Kivolowitz faced March 23 was not whether his Elastic Reality software would garner another Academy Award but which ER film veteran would win for best visual effects.

All the nominees — "Titanic," "Starship Troopers" and "The Lost World: Jurassic Park"— used Kivolowitz's software. "Titanic" picked up the Oscar.

In "Titanic," ER handled all the time morphs; in one scene, the female lead's 1912 eye gently time-traveled 85 years to its 1997 incarnation. The effect was achieved with subtle digital manipulation of lighting, eye shape and tissue texture.

Kivolowitz was pleased with the way the film's SFX designers used his software?

"I believe the 'time morphs' in "Titanic" were the most artfully crafted and tastefully executed I have ever seen," he says. "Typically, morphs are either entirely invisible or all too obvious. In Titanic, they fit into and advanced the story in a perfectly natural way."

An ER picture has won the best visual effects Oscar for the past three years.

Computer Sci

FOR IMMEDIATE RELEASE 4/6/98
CONTACT: Laura Cuccia, (608) 262-0017

VIRTUAL REALITY EXPERT TO SPEAK AT UW-MADISON APRIL 23

MADISON - An internationally renowned virtual reality expert will discuss work underway to allow people at distant sites to communicate and cooperate on complex tasks, while sharing a realistic "virtual environment."

Jaron Lanier, lead scientist of the National Tele-Immersion Initiative, will speak on April 23, from 4 to 5 p.m. in Room AB20 of Weeks Hall, 1215 Dayton Street. He will give the annual J. Barkley Rosser Memorial Lecture, which is sponsored by the computer sciences department and made possible through a gift of Annetta Rosser. The event is free and open to the public.

Lanier is a computer scientist, composer, recording artist, visual artist, and author. He coined the term "virtual reality," and pioneered the scientific, engineering, and commercial aspects of the field.

Lanier will describe ongoing work in the new field of "tele-immersion," a dramatic advance in virtual reality technology that will provide a test application for Internet2. Tele-immersion differs from prior efforts in virtual reality in that it opens up the possibility of photo-realistic human representations or "avatars" as well as an unprecedented integration of physical and virtual objects. Early applications will be in teleconferencing, computer assisted design, and medicine.

The lecture series is held in memory of the late Professor Rosser, a UW-Madison professor of computer sciences and mathematics and director of the Mathematics Research Center from 1963 to 1978.

For more information, contact Laura Cuccia in the computer sciences department at (608) 262-0017.
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Computer Science, Dept. ↑

UW researchers ride supercomputing's new wave

By Brian Mattmiller

A UW-Madison research team is helping to develop computers that are faster and more adept at organizing vast volumes of data

A new generation of supercomputers capable of solving staggeringly complex problems — from mapping the human genome to designing new drugs — is being advanced by a team of UW-Madison scientists.

A $2.4 million federal grant awarded this fall to a computer science group places the university at the forefront of research into parallel supercomputing. The three-year grant from the Department of Defense's Advanced Research Projects Agency (ARPA) will help the UW-Madison team develop new computers that are faster and more adept at organizing vast volumes of data.

The grant brings UW-Madison's total federal support in this area to $4.5 million.

Parallel supercomputers operate by using many processors to work simultaneously on a single complex problem, where a conventional supercomputer uses only a few. The processor is a computer's mathematical engine, and the new parallel machines can have literally thousands of them working in tandem.

The end result: Parallel computers can solve problems once too large for conventional computers.

"In parallel computing, speed is the only thing that matters," said Barton Miller, a computer science professor and one of four investigators in the project. "Your customers are people who have really big problems, where millions of computations per second is not enough. You're trying to reach billions."

Researchers Miller, Mark Hill, James Larus and David Wood, all computer science faculty, have two different projects in the works, nicknamed "Paradyn" and "Wisconsin Wind Tunnel." Paradyn focuses primarily on increasing computer speed by developing tools that will automatically isolate the slowest parts of a program, and give a programmer precise information of the cause of the slowdown.

Wisconsin Wind Tunnel, a name which alludes to the wind tunnels used in aeronautics simulation, aims at developing a model to simulate new ideas in parallel computer software and hardware without the expense of building a prototype.

"We're trying to change the computers that parallel computing vendors will be selling in five years," said Hill. "We can make them faster, make the processors interact more effectively and make the software more reliable."

Parallel computers are already doing remarkable things in laboratories and industry. Miller said American Express has a parallel computer that offers lightning-fast profiles of customer spending patterns and serves as an early-warning system for credit card theft.

The computer can analyze receipt patterns, and notify the company of any radical changes in a customer's spending. That's often a red flag for credit card theft. With a follow-up call to clients, the company has been able to alert customers before they realize their card's been stolen, he said.

American Express is using the same model of computer UW-Madison owns — a Thinking Machines model CM-5, which when purchased in 1991 was one of the fastest in the world.

The research applications are equally sprawling. Parallel computing could provide a timely breakthrough in sequencing the human genome, which is comprised of some three billion distinct chemical bases. It also can be used to greatly increase local precision in global weather forecasting.

Miller uses an employee metaphor to describe the drawback of parallel computing — getting all the processors to operate in sync. If an office of 100 employees must meet continually to keep everyone fully informed on a project, the work will take that much longer to complete.

"The inefficiency of the organization grows along with the number of people who need to communicate," Miller said.

Likewise, the more processors one adds to parallel computers, the less efficient they become. Miller said the research is focusing on ways to make each processor function more independently of the others, while still sharing memory.

Their solution is called "fine-grain distributed shared memory," which, plainly put, allows each part of the computer to quickly share data from other processors. This advance creates the illusion that each processor contains memory for the entire computer.

Although cost puts the technology out of reach for most businesses and research efforts, the UW-Madison group is also looking at developing more affordable variations on the theme. A technology called "Cluster of Workstations" (COW) would allow companies with work stations or networked personal computers to run parallel software, without the costs of a new system.

"Parallel computing will not succeed with just the existence of these big machines," Hill said. "Automobiles wouldn't have succeeded if all we made were Ferraris. We have to provide the Chevrolets as well."

Fostering a sense of community for academic staff ...

(Continued from page 1)

of Administration — is "probably the most important in the last 25 years.

"We are working together to minimize the impact of potential budget cuts and to make sure that academic staff aren't affected disproportionately because of personnel rules that make staff positions the most vulnerable in terms of position elimination. We will be working to ensure that faculty governance, the administration, and ASEC are all in sync on these issues."

Another key issue for ASEC is promoting avenues for job security for academic staff members. Tortorice says ASEC is working to encourage the use of long-term "rolling horizon" appointments, and a more widespread use of the "indefinite" appointment. She says the Personnel Policies and Procedures Committee of the ASA has spent several years revising the language in the policies and procedures to improve and enhance the conditions of employment for academic staff.

Although Tortorice and ASEC have mapped out an ambitious agenda for the next year, she says academic staff members should be aware of some key accomplishments made during the past year. They include:

- Adding academic staff representatives to several UW-Madison committees.
- Creating an Ad Hoc Committee on Women that has contributed to the campus dialogue on issues affecting the approximately 2,700 women who are academic staff at UW-Madison.
- Increasing communication with academic staff through the expanded use of electronic communications, most notably via e-mail.
- Working closely with the Academic Staff Assembly committees to strengthen the Academic Staff Policies and Procedures and to provide professional development opportunities.
- Increasing its communication and interaction with the University Committee and the Faculty Senate.
- Monitoring UW System initiatives and attempting to influence policy from an academic staff perspective (i.e. gender equity studies, conversion of some positions to classified, elimination of pay grade maxima).
- Developing a mission statement for ASEC.

Looking ahead to next year, Tortorice says ASEC will be continuing to promote increased communication and linkage with faculty governance, the UW System Administration, and ASA representatives and the academic staff at large. Also, ASEC will be working to continue efforts to improve the work environment for academic staff by encouraging longer-term appointments, increased use of the "distinguished" prefix, implementation of the findings of the gender equity studies, and involving more academic staff in the governance process, Tortorice says.

For more information about ASEC and academic staff-related issues,contact ASEC members *(see related story)* or the ASEC office, 96 Bascom Hall, 263-2985.

ASEC members

The Academic Staff Executive Committee is the administrative and executive arm of the Academic Staff Assembly, but serves all academic staff members. Currently, ASEC has members from the College of Engineering, Student Academic Services, the School of Education, the College of Agricultural and Life Sciences, the College of Letters and Science and the Center for Health Sciences/UW Medical School.

The Assembly — which meets on the second Monday of each month at 3:30 p.m. in room 272 Bascom Hall — regularly discusses key issues regarding employee compensation and economic benefits, personnel policies and procedures, professional development and recognition, and governance. ASEC members are listed below. (*See Staff Directory for e-mail addresses.*)

- **Char Tortorice** (chair), associate director, Testing and Evaluation Services, 262-5863 (fax: 263-4291)
- **Robert Dye** (vice chair), assistant dean, College of Engineering, 263-1605 (fax: 262-6400)
- **Larry Lockwood**, assistant registrar, Office of the Registrar, 262-0115 (fax: 262-6002)
- **Cathy Middlecamp**, faculty associate, Chemistry Learning Center, 263-5647 (fax: 262-0381)
- **Wilt Sanders**, senior scientist, Space Science and Engineering Center/Department of Physics, 262-5916 (fax: 263-6738)
- **Grayson Scott**, senior scientist, CHS-Medical School, 262-2993 (fax: 262-7306)
- **Bill Steffenhagen**, researcher, Department of Animal Health and Biomedical Sciences, 262-1036 (fax: 262-7420)
- **Sharon Vinson**, assistant registrar, Office of the Registrar, 262-6973 (fax: 262-6002)
- **Kathy Zweifel**, senior administrative program specialist, Genetics Laboratory, 262-3112 (fax: 263-2976)

JEFF MILLER

Charlene Tortorice

Chair, Academic Staff Executive Committee
Associate director, Testing and Evaluation Services, School of Education

- **Education**

B.A. in sociology, UW-Madison, 1972
M.S. in counseling and guidance, UW-Madison, 1975

- **Career**

Program coordinator (1977-80), program supervisor (1980-84), and assistant director (1984-89) of Testing and Evaluation Services, UW-Madison
Counselor (K-12), Poynette Public Schools, 1975-77
Counselor, Stoughton High School, 1974-75

- **Professional interests**

Workshop presenter/facilitator on the use of continuous improvement techniques in higher education and the public sector; workshop presenter and group facilitator on topics such as testing, survey design, study skills, test-taking strategies

- **Awards/Honors**

Student Personnel Association's Chancellor's Outstanding Service Award, 1989
School of Education's Dean's Excellence Award, 1994

Computer Sciences, Dept of

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FOR IMMEDIATE RELEASE 9/13/93

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W.M. KECK FOUNDATION GRANT FUNDS NEURAL IMAGING

MADISON--A $330,000 grant from The W.M. Keck Foundation will establish a neural imaging laboratory at the University of Wisconsin-Madison that promises to help neurobiologists unlock many of the mysteries of the nervous system.

The Keck Laboratory for Neural Imaging, which will be one of the most sophisticated confocal microscope facilities in the nation, is scheduled to open in the spring of 1994. The laboratory will advance both research and training in neurobiology.

The new laboratory will meet a critical need of UW-Madison neuroscientists by providing modern, state-of-the-art facilities in which to conduct imaging research on the nervous system. The Keck Laboratory, a joint venture between the Department of Computer Sciences and the Center for Neuroscience, will be located in newly remodeled space in the Medical Sciences Center, and will serve all researchers interested in neural imaging. This unusually diverse group of faculty includes computer scientists, who are interested in the mathematical aspects of high-speed computing, to neurobiologists whose research interests range from molecular events in simple organisms to integrative mechanisms that may underlie neurological illnesses such as Alzheimer's disease and epilepsy.

"Modern imaging technology is offering unparalleled opportunities in acquiring the information necessary to understand and solve many of the problems in the

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structure and function of the nervous system," said Ronald Kalil, director of the Center for Neuroscience.

For biologists, one of the most powerful imaging tools is the confocal microscope. The microscope forms a bridge between conventional light and electron microscopes and is considered by many neurobiologists to be the most significant advance in microscopy in the last 40 years. The confocal microscope is unusual, however, because it requires a computer to store and display images. The Keck Laboratory will be one of the first in the nation to expand the capability of this powerful microscope by linking it to a supercomputer.

"The Keck Laboratory will open new research opportunities by establishing a link between two fields that are at the leading edge of their respective sciences--neurobiology and massively parallel supercomputing," explained UW-Madison Medical School Dean Laurence Marton. "The outcome of this partnership will be the development of a new research tool for imaging that will benefit all scientists, basic and clinical alike, interested in the workings of the brain and nervous system."

The confocal microscope in the Keck Laboratory, a Bio-Rad MRC-1000, will communicate directly via an optical fiber network with a Thinking Machines CM-5 Connection Machine supercomputer in the Department of Computer Sciences. This computer is capable of processing images captured by the microscope in real time, allowing researchers to analyze images immediately rather than waiting several minutes for images to be processed, as is necessary with conventional computers, according to Kalil. With this new capability available and dedicated to neural imaging, current and future research programs on the nervous system at the UW-Madison will benefit dramatically, Kalil said. These research programs span clinical and basic

neuroscience and range from reconstructing the constituent parts of single nerve cells to studying the structure and development of integrated circuits in the brain.

Because neuroscience is an important area of interest for The Keck Foundation, a major goal of the new laboratory will be to open new lines of research in neural imaging and to share these inquiries with other neuroscientists at meetings, conferences, workshops and in publications.

The level of interest in neural imaging at the UW-Madison is reflected in the diverse research of the scientists whose work contributed directly to the W.M. Keck Foundation's decision to establish the laboratory here. These researchers include: Seth Blair, neuronal development in invertebrates (zoology); Mary Behan, microcircuitry in the mammalian brain (comparative biosciences); Shin-Yan Chiu, neuron-glia interactions (neurophysiology); Renato DeLeone, parallel computing and numerical optimization (computer sciences); Michael Ferris, parallel computing and mathematical programming (computer sciences); Lewis Haberly, neuronal circuitry in the cerebral cortex (anatomy); Katherine Kalil, axon growth and guidance in the central nervous system (anatomy); Ronald Kalil, neural recovery after brain injury (ophthalmology); William Lytton, computer-based neural modeling (neurology); Peter Spear, visual system structure and function (psychology); Laurence Stanford, anatomy and physiology of the retina (comparative biosciences); Antony Stretton, neural control of behavior in nematodes (zoology); Laurence Trussell, regulation of neurotransmitter receptors (neurophysiology); Daniel Uhlrich, modulation of visual information flow (anatomy); and Arthur Weber, neural cell death in the retina (comparative biosciences).

The W.M. Keck Foundation was established in 1954 by the late William Myron Keck, founder of The Superior Oil Company, one of the nation's largest and most

successful independent oil companies. Originally created to support accredited colleges and universities with particular emphasis on the sciences, engineering and medical research, the Foundation has grown under the leadership of the founder's son, Howard B. Keck, its current chair. It is now one of the nation's largest charitable organizations with primary interests remaining in education, science, engineering and medical research.

Assisting in the grant application process was the University of Wisconsin Foundation. Founded in 1945, the Foundation is a private, non-profit organization that raises, invests and distributes funds for the benefit of the UW-Madison.

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— Lynne Johnson, (608) 263-7003
University of Wisconsin Foundation

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NEWS

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Computer Science Dept.

FOR IMMEDIATE RELEASE 11/15/91

CONTACT: Mary K. Vernon, (608) 262-7893, 262-1204; John D. Wiley, (608) 262-1044

UW-MADISON INAUGERATES SUPERCOMPUTING PUSH

MADISON--Inaugurating an effort to vault the University of Wisconsin-Madison to the forefront of supercomputing research, the UW-Madison computer science department today unveiled a version of what is likely the world's fastest computer.

The new supercomputer, made by Thinking Machines Corp. of Cambridge, Mass., is a new generation supercomputer that holds the potential to solve scientific and commercial problems that are beyond the scope of conventional supercomputers.

Known as the CM-5, the new machine is a massively parallel supercomputer and is one of only a handful in the world. It has the potential to harness the power of hundreds or thousands of processors that can work simultaneously and in concert to solve large and intricate problems.

Conventional supercomputers, known as vector computers, have very powerful and fast processors that, for the most part, work on a problem one step at a time.

The computer science department's new $1.7 million supercomputer will be the centerpiece of a push to make UW-Madison a national leader in research on massively parallel computers, according to Mary K. Vernon, UW-Madison professor of computer

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science.

"This will put us at the forefront of parallel computing," Vernon said. "It gives us the ability to experiment on the most advanced massively parallel system you can buy today."

The purchase of the new machine was funded by a $2 million grant from the National Science Foundation. Additional support was provided by the UW-Madison Graduate School and the College of Letters and Science.

UW-Madison computer scientists have been experimenting with parallel computers for 10 years in a multi-million dollar effort to improve the design, capabilities, and programmability of the machines that many believe will dominate the supercomputing field by the year 2000.

The new machine will become a laboratory in which UW-Madison computer scientists can collaborate with scientists in the fields of medicine, biology and engineering.

Already, computer scientists working on projects ranging from cancer diagnosis to the development of new high-performance databases are employing the new computer.

Other scientific uses will include:

- The Development of new parallel programming tools and software.
- Research on artificial intelligence and computer vision.
- Work on genetic sequencing and protein folding, two of the most important questions in modern biology.
- The prototyping of the next generation of massively parallel supercomputers.

Graduate School Dean John D. Wiley said the purchase of the new supercomputer is part of a coordinated computer science-engineering strategy to propel UW-Madison to the forefront of the field of massively parallel supercomputing.

"This machine is the latest of a number of massively parallel computers that have been added on this campus and clearly puts us near the forefront of the next generation of supercomputers.

"This campus missed out on the earlier generation of supercomputers which was done with single-processor machines. But we're in on the ground floor this time."

The CM-5, according to Vernon, unifies two prior approaches to the development of massively parallel supercomputers.

One prior strategy, dubbed MIMD, opted for flexibility over ease of programming. The other approach, SIMD, enabled simple programming but sacrificed flexibility.

"This new machine can shift back and forth, as appropriate, between the two models and makes the SIMD mode more flexible," Vernon said. "The research challenge is to get the best of two worlds for various applications."

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-- Terry Devitt, (608) 262-8282

uw news

From the University of Wisconsin-Madison / News Service, Bascom Hall, 500 Lincoln Drive, Madison 53706 / Telephone: 608/262-3571

Release: Immediately 7/16/91

CONTACT: Mary K. Vernon (608) 262-7893

$2 MILLION NSF GRANT BOOSTS UW-MADISON SUPERCOMPUTER RESEARCH

MADISON--With help from the National Science Foundation (NSF), University of Wisconsin-Madison computer scientists will intensify their efforts to harness the power of the next generation of supercomputers.

NSF recently awarded the UW-Madison computer science department nearly $2 million to purchase two parallel computers and continue research on the machines that promise unrivaled computational power and speed.

"These are very powerful machines," said Mary K. Vernon, a UW-Madison computer scientist who heads the project known as Prism. "They're next generation machines that execute billions of operations per second. They are much more powerful than the machines we have now."

Parallel supercomputers rely on the amassed power of hundreds or thousands of microprocessors -- the same microprocessors that drive personal computers. In a parallel supercomputer, the microprocessors are linked together and work simultaneously and in concert to solve large problems that have been broken down into hundreds or thousands of parts.

Conventional supercomputers, known as vector computers, have very powerful and fast processors that, for the most part, work on a problem one step at a time.

According to Vernon, the computer science department is considering the

-more-

purchase of two parallel supercomputers -- one that has 64 large, relatively powerful processors and another that has 16,384 less powerful microprocessors.

"Each model may be useful for developing future parallel machines," Vernon said. "They represent a very substantial resource."

While parallel computers promise more power and speed, they are more difficult to program and apply to real-world problems.

UW-Madison computer scientists have been experimenting with parallel computers for 10 years in a multi-million dollar effort to improve the design, capabilities, and programming languages and environments of the machines that many believe will dominate the supercomputing field by the year 2000.

The new UW-Madison computers will be used in a variety of research, said Vernon. Specifically, scientists will use the machines to:

--Develop new parallel programming tools and software.

--Conduct experimental scientific research in such areas as computer vision, artificial intelligence, genetic sequencing, protein folding and cancer diagnosis.

--Develop high-performance database capabilities.

--Design and develop new parallel computer hardware.

In addition to the nearly $2 million from the National Science Foundation, UW-Madison will contribute almost $1 million in matching funds for the parallel computing effort here, Vernon said.

-- Terry Devitt (608) 262-8282 5106I

investigation of a 1987 campus student incident with racial and religious overtones. His report was the basis for subsequent actions by the university.

■ **Undergraduate Teaching Improvement Grants awarded**—Four UW-Madison professors are among 18 UW System recipients of 1990-91 Undergraduate Teaching Improvement Grants.

The grants, announced March 9 by the UW System Board of Regents, were initiated in 1971 to support instructional innovation. This year, a total of $169,675 in grants were awarded systemwide, including $93,287 for Design for Diversity projects.

UW-Madison grant recipients are:

• Theater and Drama professor Mary Karen Dahl, who will develop a course that will help students see how cultural stereotypes operate in theater.

• History of Medicine and Preventive Medicine Professor Vanessa Northington Gamble, who will pursue a project integrating the study of black health care into the undergraduate liberal arts curiculum.

• Chemistry Professors Arthur Eggert and Catherine Middlecamp, who will implement CHEMPROF, a computer-based intelligent tutoring system for general chemistry courses.

Dahl and Gamble are among 17 Design for Diversity grant recipients.

Computer Sciences

■ **Odds and ends**—A team of four UW-Madison computer science graduate students placed sixth among 24 finalists in the 14th annual Association for Computing Machinery Scholastic Programming Contest in Washington, D.C., last month. **Richard Maclin, Jon Cargille, Charles Squires** and **Steven Scott** won a total of $1,300 in scholarships. They competed against teams from 19 other U.S. colleges and universities, as well as Canada, New Zealand and the Netherlands. The New Zealand team took top honors. **Jude Shavlik,** an assistant professor of computer science, is faculty advisor to the UW-Madison team. . . . Students in a UW-Madison communication arts class will be producing their own television soap opera this spring. The 11-episode half-hour show, titled "Campus Affairs," will be scripted, directed and produced by students in assistant professor **Laura Kipnis'** Television Dramatic Production class. Funding for the project has come from student lab fees and grants from area businesses; the first episode should air on WHA cable 33 in March.

Library to meet shortfall; no layoffs

WI.Week 3/7/90

By Jeff Iseminger

UW-Madison officials announced a plan Tuesday that will eliminate a projected shortfall in the General Library System by June 30 without laying off staff members.

Making the announcement were GLS Dean Kaye Gapen and John Torphy, associate vice chancellor of budget, planning and analysis. Gapen said she will release in April the results of a broader study of GLS budget priorities for 1990-91 and beyond.

Last month there were reports that the GLS might overspend its current budget of $14.4 million by $800,000. Gapen said that projection resulted from costs of increasing library access through expanding hours and installing microcomputer labs as well as processing costs for an expanded acquisitions program.

After the projection was made, the GLS put a freeze on hiring, deferred the purchase of supplies and equipment and offered staff members the option of voluntary leave without pay. Also deferred until 1990-91 was the $110,000 cost of shifting Memorial Library collections into its new addition.

Those moves changed the budgetary picture for GLS, said Torphy: "If no other actions were taken, we now project that the General Library System would have a $201,000 shortfall by June 30. But now Dean Gapen and I have agreed on additional steps to make sure there will be no shortfall."

The new plan, Gapen said, includes a continued hiring freeze plus these cuts in the current budget:

- $100,000 in equipment purchases.
- $100,000 in computer databases.
- $45,000 in staff travel.
- $22,000 in supplies.
- $14,000 in contractual services.

"Those savings add up to $281,000, which will enable us to create a contingency fund for unexpected budget needs," Gapen said.

Gapen stressed that the budget cuts will not involve layoffs or reduced access. "If the hiring freeze causes service problems, senior administrative staff will help maintain our service levels," she said.

Torphy agreed: "We've committed ourselves in recent years to greater availability of library resources on our campus. We're going to maintain that.

"But we haven't received sufficient funds to do all of it. So for the 1990-91 budget we'll have to make some tough decisions on what we can finance."

That's just what is happening, noted Gapen: "I have asked for recommendations on budget priorities from groups representing all staff members within GLS."

Final recommendations for the broader plan for 1990-91 and beyond will be reviewed by Torphy and the University Library Committee, which includes faculty, academic staff and students, before Gapen presents it in April.

uw news

From the University of Wisconsin-Madison / News Service, Bascom Hall, 500 Lincoln Drive, Madison 53706 / Telephone: 608/262-3571

Release: Immediately 2/15/90

UW-MADISON NEWSBRIEFS

'CAMPUS AFFAIRS' CHRONICLED IN UW-MADISON SOAP OPERA

Students in a UW-Madison communication arts class will be producing their own television soap opera this spring. The 11-episode half-hour show, titled "Campus Affairs," will be scripted, directed and produced by students in assistant professor Laura Kipnis' Television Dramatic Production class. Funding for the project has come from student lab fees and grants from area businesses; the first episode should air on WHA cable 33 in March.

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UW-MADISON TEAM VIES FOR TOP SPOT IN INTERNATIONAL COMPUTING CONTEST

A team of four UW-Madison computer science graduate students will be among 24 teams competing for top honors in the finals of the 14th annual Association for Computing Machinery Scholastic Programming Contest in Washington, D.C. on Wednesday, Feb. 21.

Universities in Canada, New Zealand and the Netherlands, as well as 19 other American colleges, will be represented.

The UW-Madison team -- Richard Maclin, Jon Cargille, Charles Squires and Steven Scott -- came in first among over 100 teams in a regional competition last fall, with Beloit College finishing second. Beloit is also in the finals.

The teams are given eight complex programming problems to solve within a five-hour period. Prizes include a total of $25,000 in scholarships, and the

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winners' universities will receive computers. The sponsor, AT & T, also has provided travel grants to the finalists.

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STUDENT LEADERSHIP WORKSHOP SET

Students will be able to learn about effective group membership at a "Leadership, Education and Development" seminar on Tuesday, Feb. 20, beginning at 6 p.m. in the UW-Madison Memorial Union.

Topics include publicity; multiculturalism; time and stress management; fund-raising and corporate sponsorship; and forming, recruiting and motivating groups.

Facilitators will be drawn from the Wisconsin Union, the UW-Madison Center for New Student Development and Dean of Students Office, the UW Foundation and residence halls.

The seminar is free, but registration is required. For more information, contact the Student Organization Advising, Registration and Finance Office, 27 Bascom Hall, telephone (608) 263-0365.

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STATE-OF-THE-ART PROJECTION NOW AVAILABLE AT UW-MADISON

A new variable speed projection system has been installed in UW-Madison's Vilas Hall by the Wisconsin Center for Film and Theater Research.

Donald Crafton, director of the Center and an associate professor of communication arts, says the 35 mm system features three-channel Dolby sound and will allow silent films to be shown at their original speed.

The UW-Madison College of Letters and Science funded the system. Crafton says its first use will be for screenings in UW-Madison film classes.

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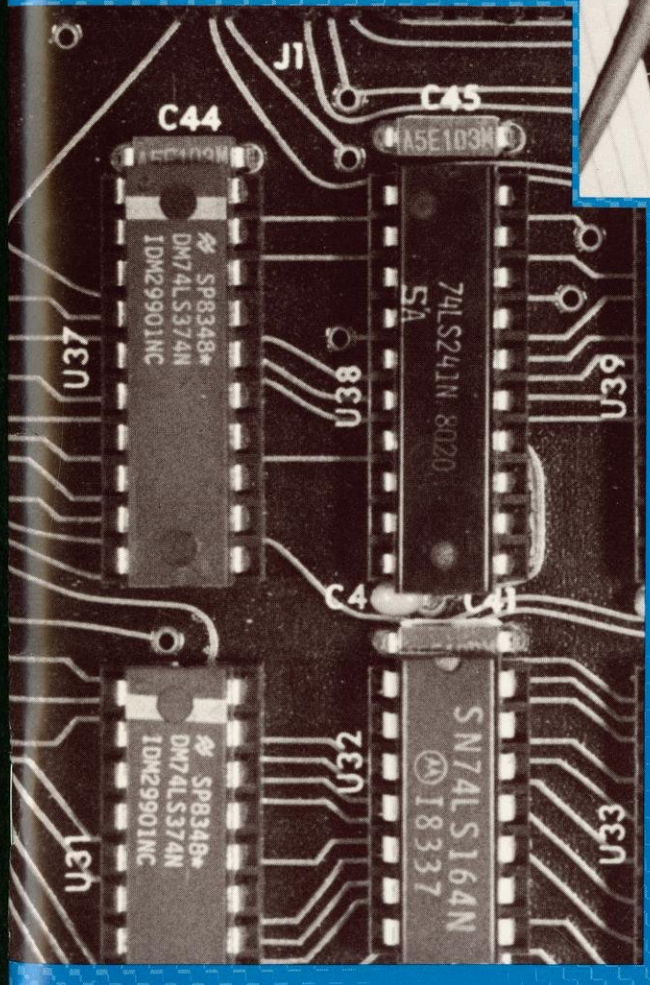

RESEARCH REVIEW 1987–88

DEPARTMENT OF COMPUTER SCIENCES
UNIVERSITY OF WISCONSIN–MADISON

RESEARCH REVIEW
1987–88

ARTIFICIAL INTELLIGENCE

COMPUTER ARCHITECTURE AND VLSI

DATABASE SYSTEMS

MATHEMATICAL PROGRAMMING

MODELING AND ANALYSIS OF COMPUTER SYSTEMS

NUMERICAL ANALYSIS

OPERATING SYSTEMS

PROGRAMMING LANGUAGES AND COMPILERS

THEORY OF COMPUTING

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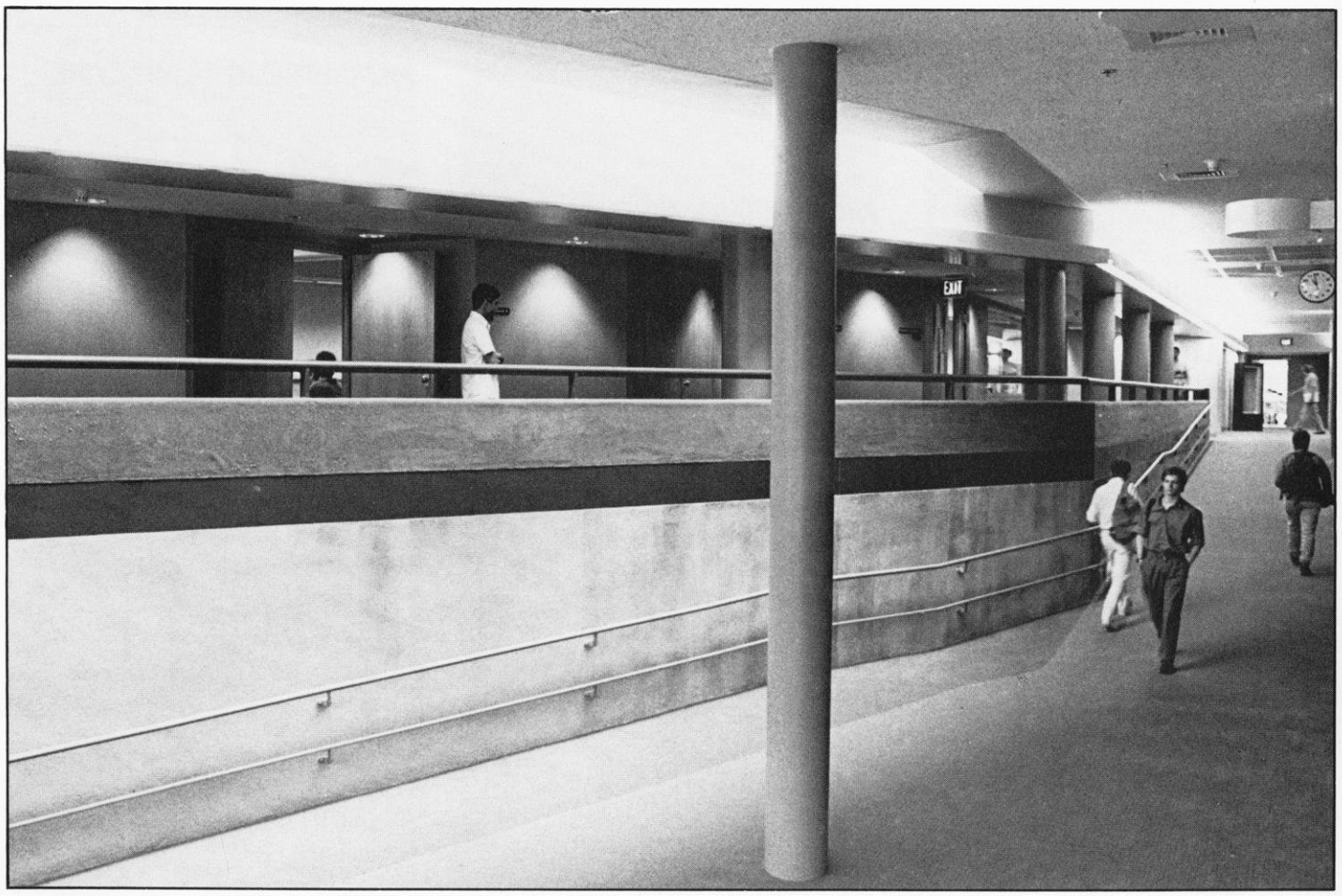
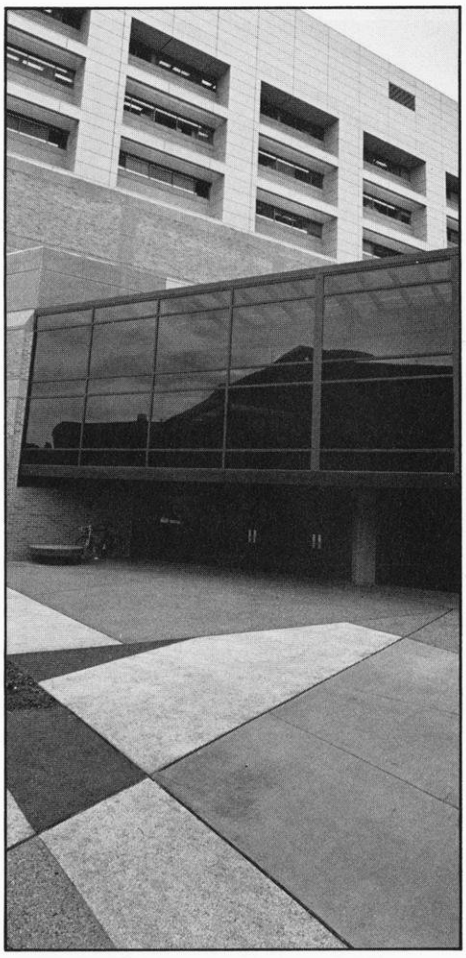


INTRODUCTION

The recent accomplishments of the Department of Computer Sciences have further strengthened our national reputation for excellence. The Department has continued its goal of maintaining a broad range of research interests while improving quality in each area. Highlights of our successes include:

- Research funding for 1987–88 is greater than $3,600,000. New, major grants have been awarded which complement long-term NSF funding for Coordinated Experimental Research in computer science.
- Five new faculty members have joined the Department in the areas of complexity theory, computer-aided design tools for VLSI, computer architecture, logic programming, and machine learning.
- Carl de Boor was awarded the prestigious Steenbock Chair in Mathematical Sciences by the University.
- Mike Carey received an NSF Presidential Young Investigator award, the sixth member of our faculty to be awarded this prestigious national honor.
- Corporate donations have substantially increased, reflecting the quality and joint objectives of our relationships with industry. From June 1986 to September 1987 we received $358,000 to support scholarships, fellowships, faculty development grants, Presidential Young Investigator matching grants and other important projects for both research and instruction. Research and instructional equipment valued at $2,745,000 was also donated during the same period.
- The State of Wisconsin continues to support growth in computer science in the University. In August we moved into our new, $10 million, seven-story building. As a result, space for offices, equipment, and instructional and research laboratories has increased significantly.



The quality of our undergraduate and graduate programs in computer science has steadily improved. The number of undergraduate majors is now approximately 350. With the increase in number of applicants, we have made the entrance requirements more demanding than ever before. Graduate applications have also been increasing, to over 450 last year. Fifty students entered the Department this fall. There are a total of approximately 200 graduate students in the Department.

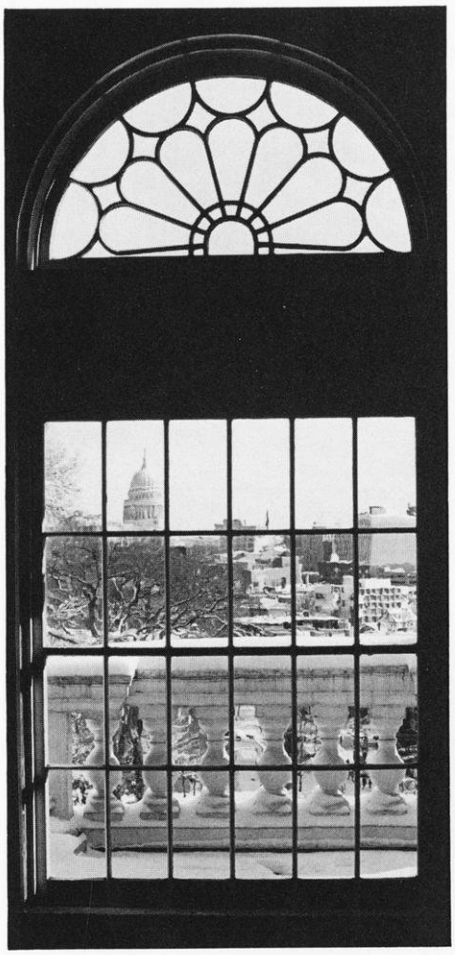
Our graduates are in great demand in both industry and academia. Of the 13 Ph.D. graduates in 1986–87, about half took academic positions and the other half went to industrial research laboratories. In the past year 142 B.S. and 71 M.S. degrees were also granted. Many of these students were hired by our industrial affiliates.

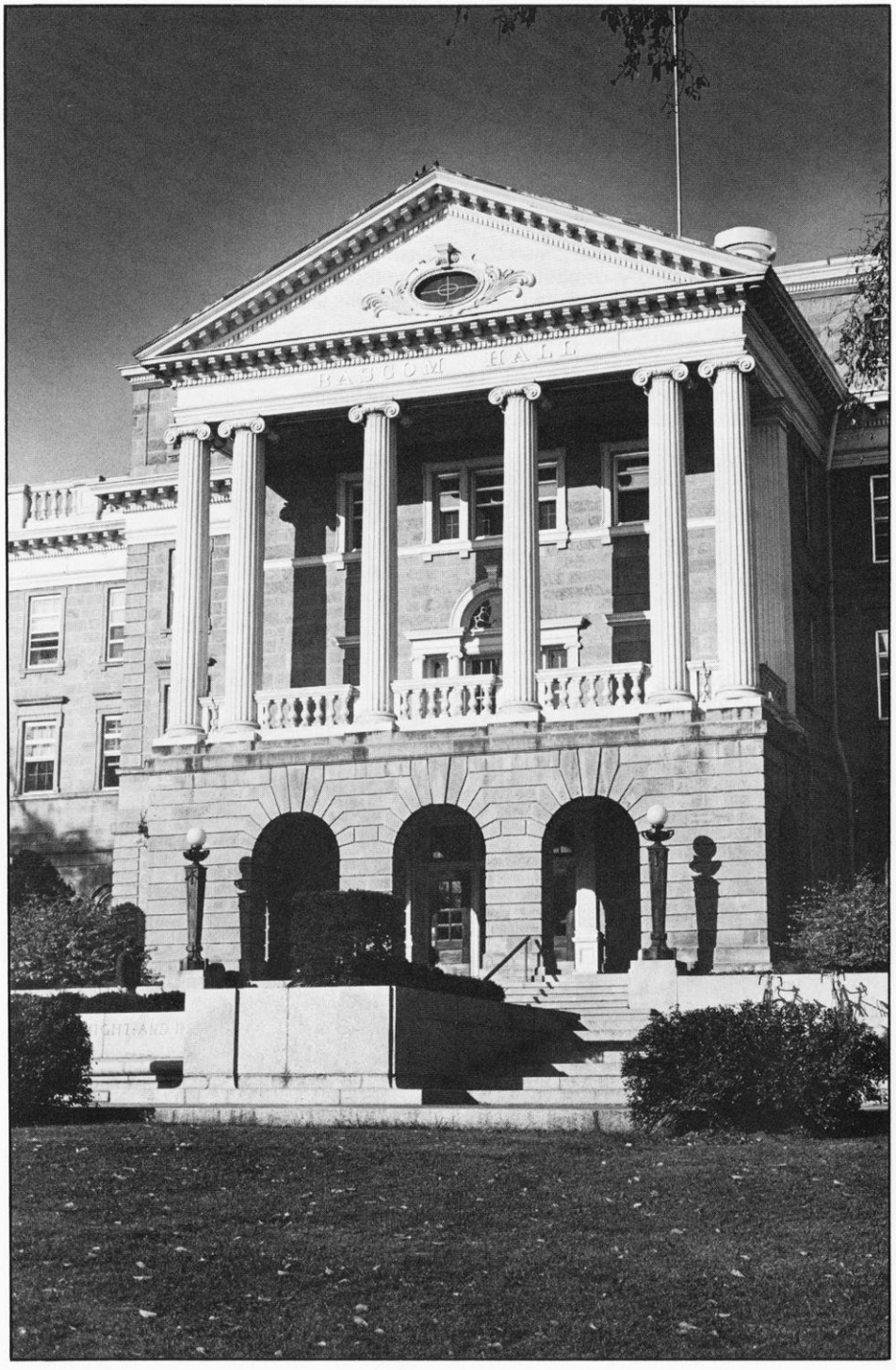
Cooperation and collaboration with industry is becoming a productive and necessary aspect of many of the nation's top computer science departments. Primarily through our Industrial Affiliates Program, we interact with a large number of companies located throughout the country. We believe that these relationships must be expanded in order to assure the long-term growth of computer science technology. The need for highly qualified scientists in industry and top-quality research and instructional facilities and people in the university, are driving forces behind this important symbiosis.

The Department has grown to 36 faculty, 16 of whom are assistant professors. We have been careful to improve quality at the same time that the Department has undergone steady growth. This year Carl de Boor was awarded the Steenbock Chair in Mathematical Sciences. In addition, Olvi Mangasarian currently holds the John von Neumann Chair of Mathematics and Computer Sciences, and David DeWitt is a Romnes Fellow.

Six faculty members have received prestigious NSF Presidential Young Investigator awards in recognition of their research achievements and potential. PYI holders include Eric Bach (theory), Mike Carey (database systems), Klaus Höllig (numerical analysis), Deborah Joseph (theory), Tom Reps (programming languages and environments) and Mary Vernon (performance). Five new faculty joined the Department this year: Anne Condon (complexity theory—University of Washington), Mark Hill (architecture—University of California, Berkeley), Bob Mayo (CAD tools for VLSI—University of California, Berkeley), Raghu Ramakrishnan (logic programming and databases—University of Texas), and Jude Shavlik (machine learning—University of Illinois).

As the Department has grown, research areas and projects have made significant efforts to foster a collaborative research environment. In this regard, most areas in the Department now hold weekly seminars in which students and faculty discuss common research problems. Our department has a history of cooperative interaction and we are happy to say that this productive and congenial research atmosphere continues to thrive.




BASCOM HALL

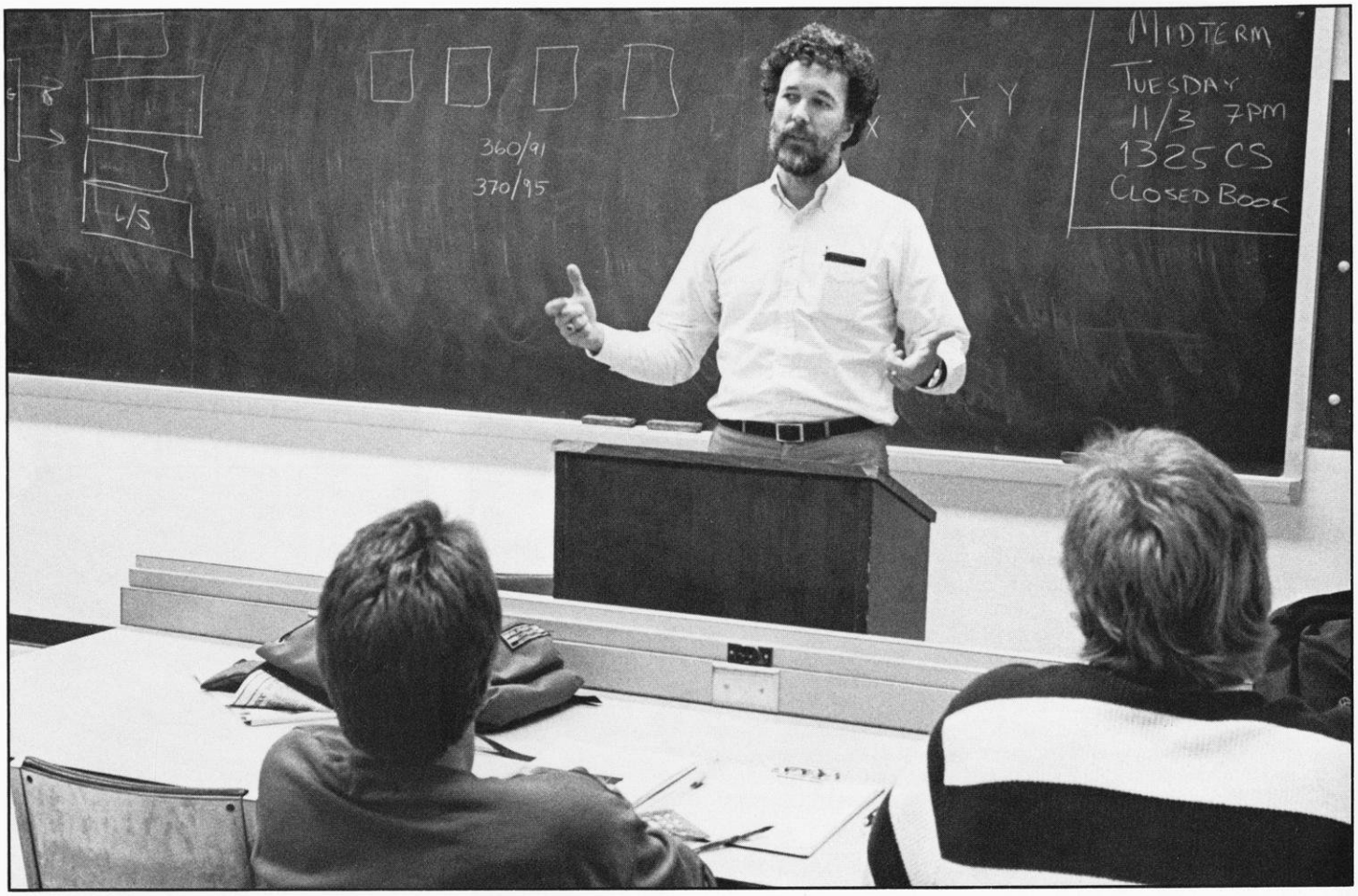
UNIVERSITY OF WISCONSIN–MADISON

Founded in 1849 as a public, land-grant institution, the University of Wisconsin–Madison was built on a hill overlooking the state capitol building and three lakes. Today, the campus spans 1 1/2 miles along the south shore of Lake Mendota. Nearly 44,000 students attend the University.

The Madison campus consists of 125 departments offering unusual breadth and expertise in nearly all academic disciplines. The university is placed consistently among the top ten research universities in the country. A recent National Academy of Science study of research-doctorate programs rated Wisconsin fourth in the nation overall and fourth in the mathematical and physical sciences.

The city of Madison provides an attractive setting for the University. With a population of about 175,000, the city is situated on the shores of four lakes, Mendota, Monona, Wingra, and Waubesa. The Capitol sits on a high point of the narrow isthmus between Lakes Mendota and Monona. The rolling hills and numerous lakes of southwestern Wisconsin are readily accessible and provide an ideal environment for outdoor recreation. In particular, the University Arboretum is set close to campus on Lake Wingra and contains 1,200 acres of woodland, marsh, prairie, and horticultural gardens. The university sailing club, membership in which is available to all students and faculty, offers sailing opportunities for a wide range of skill levels via its fleet of over a hundred sailboats. Within the city, municipal beaches, golf courses, parks, tennis courts, and outdoor skating rinks and ponds are within short walking distance of most neighborhoods.

As the state capital and the home of the University, Madison offers a rich cultural life, a well-developed public transportation system, and numerous other civic attractions. The University and city host many cultural events including music, dance, drama, and film presentations from around the world. There are three major museums as well as numerous smaller galleries. City, state and university libraries in Madison contain more than six million books. The bus system is efficient and convenient, and there are almost 100 miles of posted bikeways in the city.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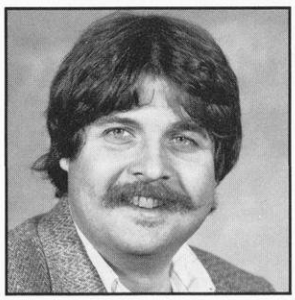
Eric Bach
Assistant Professor
Presidential Young Investigator
Ph.D., University of California, Berkeley, 1984



Interests: Theoretical computer science, computational number theory, algebraic algorithms, complexity theory, cryptography

I am interested in how one uses computers to efficiently solve algebraic and number-theoretic problems (example: how does one tell if a 100-digit number is prime without examining all possible factors?). These problems have intrinsic mathematical interest, as well as applications to random number generation, codes for reliable and secure information transmission, computer algebra, and other areas.

Most recently I have studied the question of why randomized algorithms work well in practice. As an example, for several years we have known how to quickly test large numbers for primality with an extremely small probability of error. The theory of these algorithms assumes a perfect source of randomness such as a fair coin. However, even when the random source is simulated by a deterministic process, these algorithms are fast and accurate. In 1987 I published a theoretical analysis explaining this phenomenon in terms of "internal randomness:" the witnesses that a primality algorithm seeks are distributed so as to make even simple search strategies very successful.

Recent Publications:

Realistic analysis of some randomized algorithms, *Proc. 19th ACM Symp. on Theory of Computing,* 1987.

Sums of divisors, perfect numbers, and factoring (with J. Shallit and G. Miller), *SIAM J. Computing,* 1986.

Analytic Methods in the Analysis and Design of Number-Theoretic Algorithms, MIT Press, Cambridge, MA, 1985.

Carl de Boor
Steenbock Professor of Mathematical Sciences, Chebyshev Professor of Mathematics and Computer Sciences, and member of the Center for the Mathematical Sciences
Ph.D., University of Michigan, 1966

Interests: Approximation theory, numerical analysis

I am interested in the use of piecewise polynomials, univariate or multivariate, for the representation of functions. This requires methods of approximation theory, such as interpolation or best approximation, when the function is given explicitly. When the function is given implicitly, as the solution of a differential, integral, or other functional equation, numerical analysis techniques come into play. When the function is to describe a curve or surface in some design (or in a designer's head), the tools of computer-aided geometric design are used.

I am interested in algorithms for the generation and use of piecewise polynomials in these and other contexts as well as in a mathematical understanding of their capabilities and limitations.

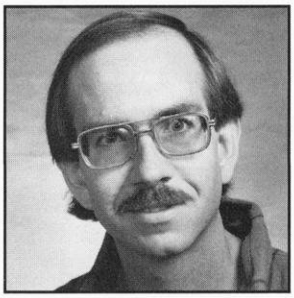
Recent Publications:

Corner cutting always works, *Computer Aided Geometric Design,* 1987.

B-form basics, in *Geometric Modeling,* G. Farin, ed., SIAM, 1987.

Efficient computer manipulation of tensor products, *ACM Trans. on Mathematical Software,* 1979.

Michael J. Carey
Assistant Professor
Presidential Young Investigator
Ph.D., University of California, Berkeley, 1983



Interests: Database management systems, distributed computing, applied performance evaluation

My research program is currently focusing on two areas: database system performance and extensible database systems. In the area of performance, topics of interest include the design of dynamic load control and load balancing mechanisms for a DBMS, real-time database systems, and the effects of concurrency control, data distribution, and transaction structure on distributed DBMS performance. In the area of extensible database systems, I am involved in the design and implementation of EXODUS, a system for supporting the rapid implementation of database management facilities for applications where current relational database systems fall short. The EXODUS project is developing "database system generator" software, including a set of versatile kernel database facilities and software tools to simplify the construction of customized database management systems.

Recent Publications:

Concurrency control performance modeling: alternatives and implications (with R. Agrawal and M. Livny), *ACM Trans. on Database Systems*, 1987.

Object and file management in the EXODUS extensible database system (with D. DeWitt, J. Richardson, and E. Shekita), *Proc. 12th Int. Conf. on Very Large Data Bases*, 1986.

Load balancing in a locally distributed database system (with H. Lu), *Proc. of the ACM SIGMOD Int. Conf. on Management of Data*, 1986.

Anne Condon
Assistant Professor
Ph.D., University of Washington, 1987

Interests: Complexity theory, randomized complexity classes, multi-person protocols, theory of distributed computation

The study of abstract computational models has greatly benefited the field of computer science because it has provided a framework in which the intrinsic complexity of problems can be understood. I am studying the power of various computational models, in particular game-like models of computation. These models extend traditional models in allowing two or more computational players to interact. Important parameters of games, such as randomness, secrecy and power are included in the model. By varying these parameters, different classes of problems can be modeled. One motivation for this work is that it helps our understanding of the complexity of problems in distributed computation and cryptography, where many problems have game-like qualities.

Recent Publications:

Computational Models of Games, Ph.D. dissertation, University of Washington, 1987.

Space bounded probabilistic games, Computer Science Department Technical Report 87–05–04, University of Washington, 1987.

Probabilistic game automata (with R. Ladner), *Proc. Structure in Complexity Theory Conf.,* 1986.

Edouard J. Desautels
Professor
Ph.D., Purdue University, 1969

Interests: Systems programming, personal computer systems and applications

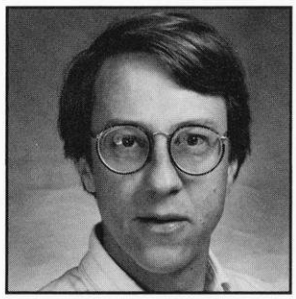
My interests focus on personal computers, their applications and limitations. I am concerned with more effective ways of introducing the use of personal computers to non-specialists. I have been looking into the uses of mass-storage devices such as CD-ROM and their implications for traditional areas such as publishing. I continue to follow developments in computer aids for the handicapped. I have begun work on a personal paperless library especially suited for use by motor-impaired individuals unable to handle conventional books.

Recent Publications:

Lotus 1–2–3 for the IBM PC, William Brown, Dubuque, IA, 1984.

Assembly Language Programming: An Introduction to Computer Organization, William Brown, Dubuque, IA, 1982.

David J. DeWitt
Professor and Romnes Fellow
Ph.D., University of Michigan, 1976



Interests: Database management systems, computer architecture

One focus of my research program deals with the design, implementation, and evaluation of highly parallel database machines. As a research vehicle for exploring such issues as the effectiveness of alternative parallel join algorithms, the impact of different horizontal partitioning strategies on multiuser transaction rates, and the evaluation of dataflow query processing strategies, my group has constructed the Gamma database machine using twenty Vax 11/750 processors connected by an 80 megabit/second token ring.

The second direction of my research program is attempting to address the problems posed by emerging applications of database system technology including CAD/CAM, scientific, statistical, and image/voice applications. To solve the needs of these applications, I am investigating the design and implementation of an extensible database management system named EXODUS. The tools provided by EXODUS are designed to enable the rapid implementation of high-performance, application-specific database systems.

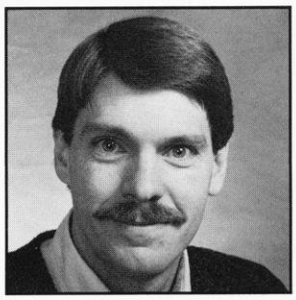
Recent Publications:

A single user evaluation of the Gamma database machine (with S. Ghandeharizadeh, D. Schneider, R. Jauhari, M. Muralikrishna, and A. Sharma), *Proc. 5th Int. Workshop on Database Machines,* 1987.

The EXODUS optimizer generator (with G. Graefe), *Proc. 1987 SIGMOD Conf.,* 1987.

The architecture of the EXODUS extensible DBMS (with M. Carey, D. Frank, G. Graefe, J. Richardson, E. Shekita, and M. Muralikrishna), *Proc. Int. Workshop on Object Oriented Database Systems,* 1986.

Charles R. Dyer
Associate Professor and Associate Chairman
Ph.D., University of Maryland, 1979



Interests: Computer vision, artificial intelligence, robotics

My research program focuses on four areas of computer vision: parallel algorithms and architectures for vision, three-dimensional object representations, stereo vision, and multiscale image analysis.

Current projects in the first area include the development and analysis of basic vision algorithms for two multiprocessors, the Aspex PIPE and the Sequent Balance. In the second area, I am studying general methods for analyzing two-dimensional images of three-dimensional scenes. A major goal is the definition and study of a new continuous, viewer-centered representation of polyhedral objects called the aspect representation. This representation makes explicit the appearance of an object from all possible viewpoints, hence directly describing visibility and occlusion information. A project in my third area of interest is designing new algorithms for stereo vision which are based on the integration of multiple constraints. The approach is important not only because it improves on previous stereo algorithms, but is defined and implemented using a structured, connectionist (neural network) model of computation. Studying multiscale and multiresolution representations of visual data is another area of interest. I am interested in methods for constructing and analyzing image representations which make explicit properties such as edges, shape and texture at multiple scales.

Recent Publications:

The Asp: A continuous viewer-centered representation for 3D object recognition (with H. Plantinga), *Proc. First Int. Conf. on Computer Vision,* 1987.

Heuristic scheduling algorithms for PIPE (with C. Stewart), *Proc. Workshop on Computer Architecture for Pattern Analysis and Machine Intelligence,* 1987.

Multiscale image understanding, in *Parallel Computer Vision,* L. Uhr, ed., Academic Press, New York, 1987.

Charles N. Fischer
Professor
Ph.D., Cornell University, 1974

Interests: Compiler theory and design, interactive program development environments, automatic code generation

Current research efforts involve the design and implementation of advanced program development environments. This includes the automatic implementation of execution facilities from denotational specifications, type inference techniques for main-stream and logic programming languages, and the design of interactive language development tools.

Work involving the use of attribute driven automatic code generators continues. Recent efforts have aimed at integrating code generation and peephole optimization into a single component that may be automatically generated from a target machine specification.

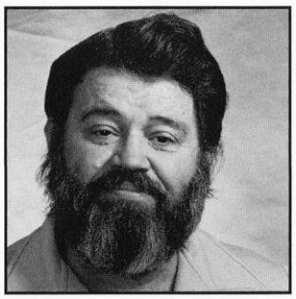
Recent Publications:

Semantic attributes integrate code generation and peephole optimization (with M. Ganapathi), *Acta Informatica,* 1987.

Crafting a Compiler (with R. LeBlanc), Benjamin Cummings, Menlo Park, CA, 1987.

Affix grammar driven code generation (with M. Ganapathi), *ACM Trans. Programming Languages and Systems,* 1985.

Donald R. Fitzwater
Associate Professor
Ph.D., Iowa State University, 1958



Interests: Science of design, distributed system design methodology, operating systems

I am designing and developing prototypes of formal design environments that will allow machine analysis for verification and validation at each step in the development process. The goal is to support development processes in which many desirable properties of both the process and the developed system are "built into" the methodology. Some of these properties are described below.

The specifications are effective, i.e. the behavior of the specified system may be displayed automatically, and are homogeneous, i.e. the same specification language and methodology may be used in each development step. The designs in each step are automatically forced to be consistent with those of previous steps. Both the current state and previous states of the development process are captured and may be restored for redesign. The decomposition of the development process ensures that a subsequent integration of the sub-design results will display no new errors.

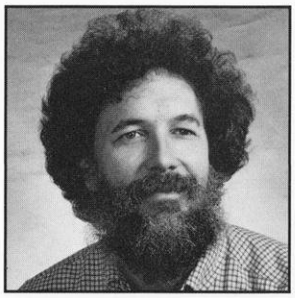
Recent Publications:

The formal design and analysis of distributed data-processing systems, Computer Sciences Department Technical Report 361, University of Wisconsin, 1979.

A decomposition of the complexity of system development processes, *Proc. IEEE Computer Software and Application Conf.,* 1978.

The use of formal asynchronous processes in a system development process (with P. Zave), *Proc. Texas Conf. on Computing Systems,* 1977.

James R. Goodman
Associate Professor of Computer Sciences and Electrical and Computer Engineering
Ph.D., University of California, Berkeley, 1980



Interests: Computer architecture, VLSI design, implementation-specific compiler optimization

The ongoing revolution in semiconductor and related technologies means that many old questions have new answers. I am studying ways to achieve very high computing capabilities at moderate costs. This includes both new techniques for very high speed single processors and multiprocessing.

Decoupled architectures offer a new level of parallelism to be exploited within a single processor. The use of multiple specialized units, communicating through queues, offers the promise of very high performance from a single processor. I am investigating architectures that exploit such methods to produce powerful individual processors for a multiprocessor system.

The memory system seems the key element in achieving robust, high-performance parallel processing. Tightly-coupled multiprocessors have clear advantages if a memory bottleneck can be avoided. I am investigating techniques using memory hierarchies to achieve the appearance of a tightly-coupled multiprocessor without the memory bottleneck.

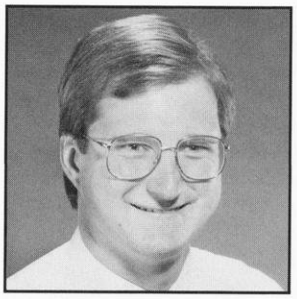
Recent Publications:

Cache memory optimization to reduce processor/memory traffic, *J. VLSI and Computer Systems,* 1987.

Coherency for multiprocessor virtual address caches, *Proc. Second Symp. on Architectural Support for Programming Languages and Operating Systems,* 1987.

WISQ: A restartable architecture using queues (with A. Pleszkun, W-C. Hsu, R. Joersz, G. Bier, P. Woest, and P. Schechter), *Proc. 14th Int. Symp. on Computer Architecture,* 1987.

Mark D. Hill
Assistant Professor
Ph.D., University of California, Berkeley, 1987



Interests: Computer architecture, performance evaluation

I am interested in computer architecture and systems, with an emphasis on the performance of memory systems. My current work has focused on three tasks: development and evaluation of efficient algorithms for simulating direct-mapped and set-associative memories, the quantification of the effect of associativity on the miss ratio and effective access time of CPU cache memories, and the study of instruction memory for single-chip RISC microprocessors.

My future work will focus on hierarchies of caches in shared-memory multiprocessors. I expect the technique I used to study associativity in single-level caches, which exploits trace data of existing systems and considers constraints of real implementation technologies, will continue to be useful.

Recent Publications:

Design decisions in SPUR (with 20 others), *IEEE Computer,* 1986.

An in-cache address translation mechanism (with D. Wood, S. Eggers, G. Gibson, J. Pendleton, S. Ritchie, G. Taylor, R. Katz and D. Patterson), *Proc. 13th Int. Symp. on Computer Architecture,* 1986.

Experimental evaluation of on-chip microprocessor cache memories (with A. Smith), *Proc. 11th Int. Symp. on Computer Architecture,* 1984.

Klaus H. Höllig
Professor of Computer Sciences and Mathematics, and member of the Center for the Mathematical Sciences
Presidential Young Investigator
Ph.D., University of Bonn, 1979

Interests: Computer-aided design and graphics, numerical analysis

I am developing and improving methods for interactive design and geometric processing of surfaces. This involves software for offsets, intersections, blends and highlights. The surface representation is based on a combination of rational Bezier patches and new types of multivariate B-splines which were developed in collaboration with Carl de Boor.

Partial differential equations, in particular free boundary problems and nonlinear hyperbolic conservation laws, continue to interest me. The common feature of both types of problems is the formation and propagation of interfaces which separate smooth parts of the solutions. This lack of regularity causes difficulties in the design of accurate numerical methods.

Recent Publications:

On the mesa problem (with A. Friedman), *J. Mathematical Analysis and Applications,* 1987.

Geometric continuity of spline curves and surfaces, *Proc. ACM SIGGRAPH,* 1986.

Multivariate splines, AMS short course lecture notes, 1986.

Susan Horwitz
Assistant Professor
Ph.D., Cornell University, 1985

Interests: Program development environments, automatic program integration, extending relational databases for use in programming environments

I am interested in the design and implementation of tools to alleviate the problems associated with programming in the large. Thomas Reps, Jan Prins, and I have developed an algorithm for automatic program integration: Given that two sets of changes have been simultaneously introduced into a base version of a program, our algorithm determines whether the changes can be combined without interference, and if so, produces the merged program. The algorithm can also be used to propagate bug fixes through related versions of a program, to undo the effects of an early modification without undoing the effects of all subsequent modifications, and to assist in the development of programs via transformational programming. Future work includes extending the algorithm to handle languages with arrays, pointers, and procedure calls, and continuing development of a prototype implementation.

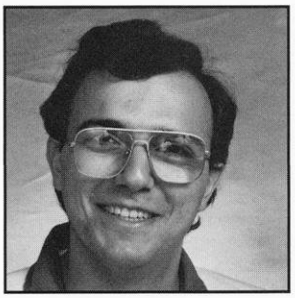
Recent Publications:

Integrating non-interfering versions of programs (with J. Prins and T. Reps), *Conf. Record of the 15th ACM Symp. on Principles of Programming Languages*, 1988.

On the adequacy of program dependence graphs for representing programs (with J. Prins and T. Reps), *Conf. Record of the 15th ACM Symp. on Principles of Programming Languages*, 1988.

Generating editing environments based on relations and attributes (with T. Teitelbaum), *ACM Trans. Programming Languages and Systems*, 1986.

Yannis E. Ioannidis
Assistant Professor
Ph.D., University of California, Berkeley, 1986



Interests: Database management systems, recursion in databases, expert systems, experimental data management, learning in databases

I am investigating several issues that Database Management Systems (DBMSs) have to deal with in order to support new application areas such as artificial intelligence, computer-aided design/manufacturing, decision support, simulation, etc. Specifically, I am studying: (1) the enhancement of query languages with recursion and the ways that recursive queries can be optimized and processed by a DBMS, (2) the modeling capabilities of a DBMS that are necessary to support the efficient storage and retrieval of data derived from experiments with discrete event systems, (3) techniques for the development of adaptive DBMSs, i.e., systems that monitor themselves and the environment and, by "gaining experience," change themselves for improved usability and performance, and (4) the efficient interface of logic-based languages, like Prolog, to existing DBMSs as front-ends.

Recent Publications:

Query optimization by simulated annealing (with E. Wong), *Proc. 1987 Int. ACM SIGMOD Conf.*, 1987.

A time bound on the materialization of some recursively defined views, *Algorithmica*, 1986.

On the computation of the transitive closure of relational operators, *Proc. 12th Int. Conf. on Very Large Data Bases*, 1986.

Deborah A. Joseph
Associate Professor of Computer Sciences and Mathematics
Presidential Young Investigator
Ph.D., Purdue University, 1981

Interests: Complexity theory, computational geometry, mathematical logic

My research concerns two areas of theoretical computer science: 1) the study of structural properties of complexity classes, and 2) the design and analysis of algorithms for geometric problems.

A great deal of work has gone into studying the properties of sets that are decidable in deterministic and nondeterministic polynomial time. Despite this effort we still know very little about these classes. Recently some computer scientists have questioned the adequacy of known proof techniques for resolving questions such as whether P =?NP. My research uses techniques drawn from recursion theory and the theory of nonstandard models to explore in a formal way the types of proof techniques necessary to resolve problems concerning complexity classes.

In computational geometry, experimentation plays a key role in the design of practical algorithms. An algorithm designer often wants to test an algorithm on several data sets, and, after seeing its performance, make modifications. This process is greatly aided by the availability of a geometric editor, for designing and editing input data; graphics display tools, for visualizing input and output data; and a library of common geometric algorithms and data structures. My recent work has been oriented toward the development of such a tool.

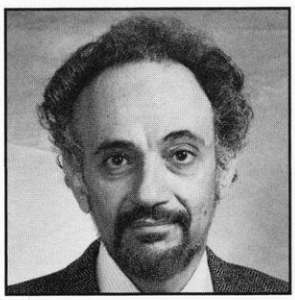
Recent Publications:

Self-reducible, p-selective, near-testable, and p-cheatable sets: The effect of internal structure on the complexity of a set (with J. Goldsmith and P. Young), *Proc. 2nd Structure in Complexity Theory Conf.*, 1987.

Three results on the polynomial isomorphism of complete sets (with J. Goldsmith), *Proc. 27th Annual Symp. on the Foundations of Computer Science*, 1986.

On the complexity of reachability and motion planning questions (with H. Plantinga), *Proc. ACM SIGACT/SIGGRAPH Conf. on Computational Geometry*, 1985.

Sheldon Klein
Professor of Computer Sciences and Linguistics
Ph.D., University of California, Berkeley, 1963



Interests: Computational linguistics, cognitive-symbolic anthropology

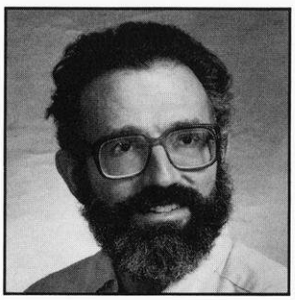
Recent Publications:

Narrative style in variants of a Kawaiisu myth text, to appear in *Selected Papers from the Mary R. Haas Festival Conference 1986,* Mouton–de Gruyter, New York, 1988.

The invention of computationally plausible world knowledge systems in the Upper Paleolithic, to appear in *The Pleistocene Perspective: Hominid Evolution,* M. Day, R. Foley and W. Rukang, eds., Allen and Unwin, London, 1988.

Analogy and mysticism and the structure of culture, *Current Anthropology,* 1983.

Kenneth Kunen
Professor of Computer Sciences and Mathematics
Ph.D., Stanford University, 1968



Interests: Mathematical logic, logic programming, automated deduction

I am currently studying logic programming languages such as Prolog. In these languages, one constructs a database containing logical rules of inference as well as simple facts, and the system answers the user's queries via a form of automated deduction. The original goal of such languages is that the answers obtained be dependent only upon the logical meaning of the database, and not upon the particular order in which the inference is executed, or upon whether this execution is sequential or parallel. This goal is not met in current logic programming languages, which contain many features which influence the outcome of queries but do not have a clear logical semantics. In my research, I am examining these features in an attempt to either give them a sound semantics as they stand now, or to replace them with constructs which can be given such a semantics. Specific topics I am considering are the Prolog use of negation-as-failure and semantic questions involving the order in which answers to a query are returned.

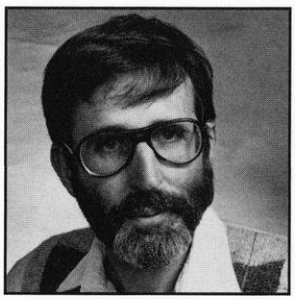
Recent Publications:

Negation in logic programming, *J. Logic Programming,* 1987.

Answer sets and negation as failure, *Proc. Fourth Int. Conf. on Logic Programming,* 1987.

Partitioning Euclidean space, *Math. Proc. Cambridge Philosophical Society,* 1987.

Lawrence H. Landweber
Professor and Chairman
Ph.D., Purdue University, 1967



Interests: Computer networks and protocols, electronic mail

My research program focuses on two areas of computer networking: the OSI/ISO protocol architecture and high speed networking.

In the first area, I am involved in a project which has designed and is now building prototype implementations of the full ISO protocol suite for Berkeley UNIX on the IBM RT/PC. This project is also developing gateways for translation between the current internet protocols and the new ISO protocols.

Projects in the second area include use of simulation to better understand the relationships between the various components that make up an end-end communications path. The goal is to determine how to adjust these components (e.g., buffer space, processor bandwidth, dma speed, protocol features) to fully utilize the very high speed, virtually error-free networks that have been made possible by fiber optic technology. A hardware front-end, designed locally, having a very fast path both to a local area network and to host memory, will soon be used to experiment with protocol design issues in this area.

Recent Publications:

Computer networking for scientists (with D. Jennings, I. Fuchs, D. Farber and W. Adrion), *Science,* 1986.

A grammar-based methodology for protocol specification and implementation (with D. Anderson), *Proc. IEEE 9th Data Communications Symp.,* 1985.

The CSNET name server (with M. Solomon and D. Neuhengen), *Computer Networks,* 1982.

Miron Livny
Assistant Professor
Ph.D., Weizmann Institute of Science, Rehovot, Israel, 1984

Interests: Performance management in distributed systems, discrete event simulation

The major emphasis of my research is the area of distributed resource management. I am developing new resource management policies for multi-resource systems and evaluating them. General-purpose as well as real-time distributed systems are being considered. The research involves performance studies of the different policies, with special emphasis on the interplay between the properties of the system and the performance of the policy. Since most of my performance studies employ simulation, I am interested in discrete event modeling and simulation techniques. I am currently in the process of implementing a simulation laboratory that is based on a novel simulation language.

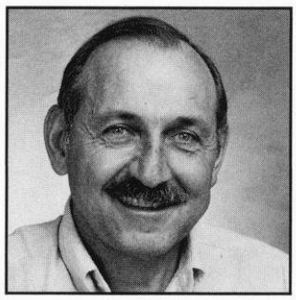
Recent Publications:

Multi-disk management algorithms (with S. Khoshafian and H. Boral), *Proc. ACM SIGMETRICS Conf.*, 1987.

Active channels and their application for parallel processing (with U. Manber), *Proc. Int. Conf. on Parallel Processing*, 1987.

Distributed scheduling under deadline constraints: A comparison of sender-initiated and receiver-initiated approaches (with H. Chang), *Proc. IEEE Real-Time Systems Symp.*, 1986.

Olvi L. Mangasarian
John von Neumann Professor of Mathematics and Computer Sciences, and member of the Center for the Mathematical Sciences
Ph.D., Harvard University, 1959



Interests: Mathematical programming theory, algorithms and applications

A current principal area of my research is the solution of extremely large linear programs by nonpivotal methods on serial and parallel processors. At present I can handle linear programs with up to 500,000 variables, 125,000 constraints and 1,125,000 nonzero matrix elements. I am also interested in obtaining error bounds for approximate solutions of constrained optimization problems in terms of their residuals. This allows the construction of more efficient algorithms and a more accurate analysis of their behavior. Another topic of interest is the complexity analysis of constrained optimization problems. For example, I have shown that finding an element of largest norm in a bounded polyhedral set is NP-complete for all p-norms, $p = 1,2, \ldots$, but is in P for the infinity-norm. A single linear program can be constructed to generate an upper bound for all norms.

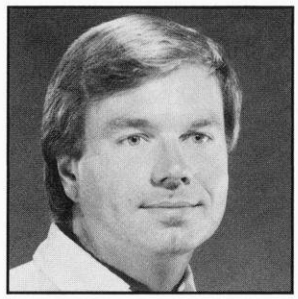
Recent Publications:

Parallel gradient projection successive over-relaxation for symmetric linear complementarity problems and linear programs (with R. De Leone), to appear in *Annals of Operations Research*, 1988.

A simple characterization of solution sets of convex programs, Computer Sciences Technical Report 685, University of Wisconsin, 1987.

Lipschitz continuity of solutions of linear inequalities, programs and complementarity problems (with T.-H. Shiau), *SIAM J. Control and Optimization*, 1987.

Robert N. Mayo
Assistant Professor
Ph.D., University of California, Berkeley, 1987



Interests: Computer-aided design tools for VLSI and electronics, module generators, layout tools, placement and routing

I am interested in tools that aid designers of full-custom VLSI integrated circuits. My work concentrates on two areas: module generators (programs that automatically design common IC building blocks) and full-custom graphical editors, such as the Magic IC layout editor.

As part of my dissertation work at Berkeley, I built a graphical system for building module generators, called Mocha Chip. The main idea is to represent iteration and conditional selection graphically, allowing topological arrangements to be drawn instead of programmed. The system constitutes a graphical programming language for the design of module generators. A generator for Programmable Logic Arrays (PLAs) has been built to prove the practicality of the ideas.

Future work may include the automatic characterization of automatically-produced modules in order to provide rough models for use by high-level synthesis procedures and floorplanning tools. These models will also aid in moving the designs from one technology to another. Other areas to be investigated include placement and routing techniques for building-block layout and for gate-arrays.

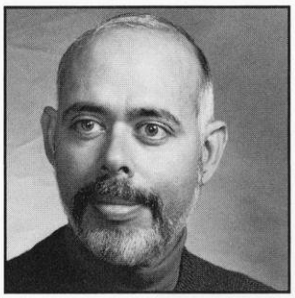
Recent Publications:

Mocha chip: A system for the graphical design of VLSI module generators, *Proc. IEEE Int. Conf. on Computer Aided Design*, 1986.

Magic: A VLSI layout system (with J. Ousterhout, G. Hamachi, W. Scott, and G. Taylor), *IEEE Design and Test*, 1985.

Pictures with parentheses: Combining graphics and procedures in a VLSI layout tool (with J. Ousterhout), *Proc. 20th Design Automation Conf.*, 1983.

Robert R. Meyer
Professor of Computer Sciences and Industrial Engineering, and member of the Center for the Mathematical Sciences
Ph.D., University of Wisconsin, 1968



Interests: Linear and nonlinear network optimization, parallel algorithms for large-scale optimization

Most large-scale optimization problems exhibit substructures that make possible solutions via algorithms with a high degree of parallelism. Such substructures include quasi-independent blocks of constraints for different commodities or time periods or scenarios, and geographically disjoint components in approximating solutions. In the case of network optimization, decomposition into approximating linear network subproblems is particularly attractive because of the corresponding very fast solution techniques. The emphasis of my research has been the development of new parallel optimization algorithms that utilize these and related features in order to take advantage of distributed computing environments to efficiently solve linear and nonlinear network optimization problems containing hundreds of thousands of variables. I have also undertaken a comparison of the relative efficiencies of these decomposition methods on different parallel architectures such as the CRYSTAL multicomputer and the Sequent Balance 21000.

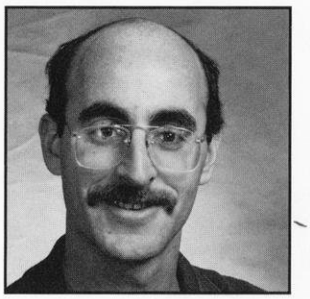
Recent Publications:

A parallel algorithm for generalized networks (with M. Chang, M. Engquist and R. Finkel), to appear in *Parallel Optimization on Novel Computer Architectures,* 1988.

Piecewise-linear approximation methods for nonseparable convex optimization (with B. Feijoo), *Management Science,* 1987.

Optimization on the Crystal multicomputer (with B. Feijoo), in *Computing 85,* G. Bucci and G. Valle, eds., North-Holland, New York, 1985.

Barton P. Miller
Assistant Professor
Ph.D., University of California, Berkeley, 1984



Interests: Distributed systems, parallel and distributed debugging, parallel program performance tools, user interface design

My research interests are realized in several projects. The first is IPS—a system for measuring the performance of loosely-coupled and tightly-coupled parallel programs. This system (currently running on UNIX) allows the programmer interactive access to performance results and provides the programmer guidance in finding performance problems. The second project is CLAM—an extensible object-based, window system. CLAM allows the programmer to dynamically extend the functions of the window system. It also allows a systematic way to layer input abstractions (in addition to traditional output layering). The third project is PPD—a debugger for parallel programs. This debugger allows the programmer to track dependencies in a program's structure to help direct the programmer in finding bugs. An important part of this project is providing the debugging features while minimizing the impact on program performance.

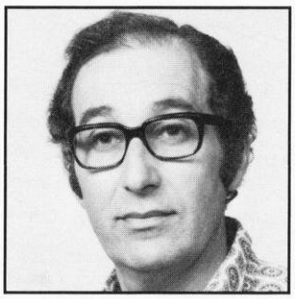
Recent Publications:

DEMOS/MP: The development of a distributed operating system (with D. Presotto and M. Powell), *Software—Practice & Experience,* 1987.

Measuring distributed programs: A hierarchical and interactive approach (with C. Yang), *Proc. 7th Int. Conf. on Distributed Computing Systems,* 1987.

CLAM—An open system for graphical user interfaces (with L. Call and D. Cohrs), *Proc. Object-Oriented Programming Systems, Languages, and Applications Conf.,* 1987.

Seymour V. Parter
Professor of Computer Sciences and Mathematics, and member of the Center for the Mathematical Sciences
Ph.D., New York University, 1958



Interests: Numerical methods for partial differential equations

At this time the major emphasis of my work is on the solution of indefinite, discrete elliptic systems of equations. Classical iterative methods and most multigrid methods only work effectively when the system is positive definite. These methods can also be made effective when the real or symmetric part of an operator is positive definite. On the other hand in the indefinite case direct methods which attempt to preserve the "sparseness" of the system may encounter (very) small "pivots." Thus, this is a challenging problem which effectively mixes concepts and procedures from linear algebra and elliptic partial differential equations. I am now involved in several projects which attack this class of problems. These include preconditioning studies and research on special multigrid methods.

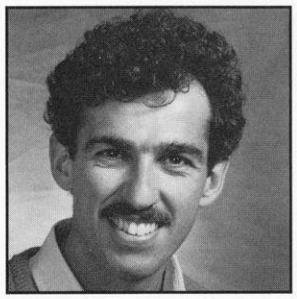
Recent Publications:

Iterative methods for elliptic problems and the discovery of "q," *SIAM Review,* 1986.

On distribution of the singular values of Toeplitz matrices, *J. Linear Algebra and Appl.,* 1986.

A note on convergence of the multigrid V-cycle, *Appl. Math. Computation,* 1985.

Andrew R. Pleszkun
Assistant Professor of Computer Sciences and Electrical and Computer Engineering
Ph.D., University of Illinois, Urbana, 1982



Interests: Computer architecture and VLSI design

I am interested in understanding the issues involved in high performance computing and their impact on VLSI design. To this end, I have been studying a decoupled access/execute architecture called PIPE. This architecture uses tightly-coupled pipelined processors communicating via explicit queues to communicate with one another and to interact with main memory. An outgrowth of the PIPE project is the WISQ architecture. The WISQ architecture attempts to expose the pipelined structure of a machine to the programmer. By doing this, I believe that a pipelined machine can be built with very small latency between stages and yet maintain a high throughput.

I am also interested in high performance symbolic processors, in particular processors that support Lisp. My studies in this area have concentrated on the main memory structure of a machine, and the best way to support a high bandwidth, low-latency path to main memory.

Finally, I have been supervising VLSI implementation efforts which have produced a number of working chips through the MOSIS fabrication facility. These implementation efforts have mainly been directed at implementation of the PIPE processor.

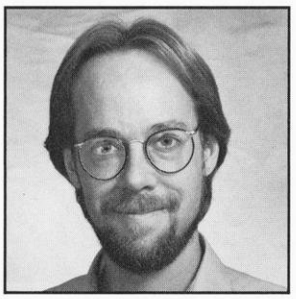
Recent Publications:

WISQ: A restartable architecture using queues (with G. Bier, J. Goodman, W. Hsu, R. Joersz, A. Pal, P. Schechter, and P. Woest), *Proc. 14th Annual Computer Architecture Symp.*, 1987.

The architecture of Lisp machines (with M. Thazhuthaveetil), *IEEE Computer,* 1987.

An instruction cache design for use with a delayed branch (with M. Farrens), *Advanced Research in VLSI: The 4th MIT Conf.*, 1986.

Bradley J. Plohr
Assistant Professor and member of the Center for the Mathematical Sciences
Ph.D., Princeton University, 1980



Interests: Numerical methods for scientific computing and applied mathematics, especially fluid dynamics

The main directions in my current research are:

(1) Three-phase flow in porous media. In collaboration with E. Isaacson and D. Marchesin, the structure of nonlinear waves that arise in multi-phase flow in petroleum reservoirs is being studied. The analysis of a family of model problems has been completed, and a computer program that uses interactive graphics to aid the investigation of realistic flow models has been developed.

(2) Fluid dynamics of real materials. This research, in collaboration with R. Menikoff, focuses on the theoretical and practical issues of calculating the nonlinear wave structure in real fluid materials. It combines physical understanding of gas dynamics with the insights gained through my research in three-phase flow.

(3) Viscoelasticity. Analytical and computational methods for conservation laws are being applied to flows of viscoelastic fluids with fading memory, in collaboration with D. Malkus and J. Nohel. The wave structures for three disparate physical systems (a viscoelastic solid, shear flow of viscoelastic fluid, and elongational flow of a viscoelastic fluid) have been shown to be similar, and computational methods for solving model flow problems have been developed.

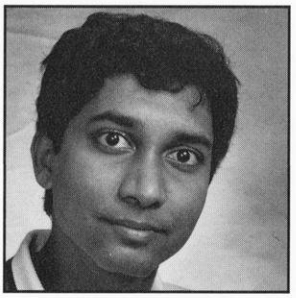
Recent Publications:

Modeling of shockless acceleration of thin plates using a tracked random choice method, to appear in *American Institute for Aeronautics and Astronautics Journal,* 1988.

Riemann problems and their application to ultra-relativistic heavy ion collisions (with D. Sharp), *Proc. 8th Int. Congress of Mathematical Physicists,* 1986.

Front tracking and two-dimensional Riemann problems (with J. Glimm, C. Klingenberg, O. McBryan, D. Sharp and S. Yaniv), *Adv. Appl. Math.*, 1985.

Raghu Ramakrishnan
Assistant Professor
Ph.D., University of Texas, Austin, 1987



Interests: Logic programming and database systems

There has been much interest in extending the power of traditional database query languages based on relational algebra. This has been motivated by the observation that database systems are being increasingly used in non-traditional applications such as expert systems and object-based computer-aided design systems.

Logic programming is based on a computation model which is very similar to that of relational algebra, with the primary difference being that logic programs allow the use of function symbols (to construct complex arguments, such as lists) and recursion. Thus, it is attractive to consider the use of logic programs to write database queries. From an implementation standpoint, however, the standard implementation of logic programming, the language Prolog, is unsatisfactory for database applications. A major research goal is the design of alternative evaluation strategies for database queries presented as logic programs. This includes performance evaluation of such strategies and testing finiteness of answer sets and termination.

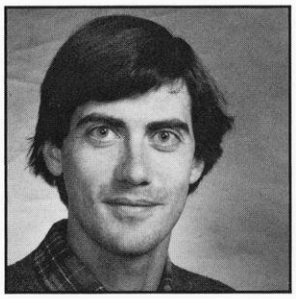
Recent Publications:

On the power of magic (with C. Beeri), *Proc. 6th Symp. on Principles of Database Systems*, 1987.

Safety of Horn clauses with infinite relations (with F. Bancilhon and A. Silberschatz), *Proc. 6th Symp. on Principles of Database Systems*, 1987.

Performance evaluation of data intensive logic programs (with F. Bancilhon), in *Foundations of Deductive Databases and Logic Programming*, J. Minker, ed., Morgan Kaufmann, Los Altos, CA 1987.

Thomas Reps
Assistant Professor
Presidential Young Investigator
Ph.D., Cornell University, 1982



Interests: Programming languages, language-based programming environments

My concern is the design and implementation of interactive environments for computer programming. My current goal is the development of a language-based tool for integrating program variants. By this, I mean a tool for automatically combining several related, but different variants of a base program, or determining that they incorporate interfering changes.

The cornerstone of my work is a new algorithm for program integration recently developed with S. Horwitz and J. Prins. The integration algorithm takes as input three programs, *A*, *B*, and *Base*, where *A* and *B* are two variants of *Base*; whenever the changes made to *Base* to create *A* and *B* do not "interfere" in a certain sense, the algorithm produces a program *M* that integrates *A* and *B*.

Current work concerns how to extend the set of language constructs to which our program-integration algorithm is applicable, as well as the construction of a prototype integration facility.

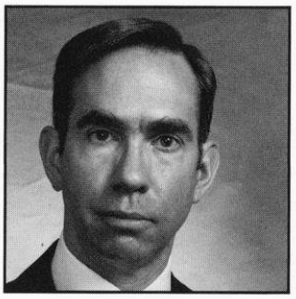
Recent Publications:

Integrating non-interfering versions of programs (with S. Horwitz and J. Prins), *Conf. Record of the 15th ACM Symp. on Principles of Programming Languages*, 1988.

On the adequacy of program dependence graphs for representing programs (with S. Horwitz and J. Prins), *Conf. Record of the 15th ACM Symp. on Principles of Programming Languages*, 1988.

Sublinear-space evaluation algorithms for attribute grammars (with A. Demers), *ACM Trans. Programming Languages and Systems*, 1987.

Stephen M. Robinson
Professor of Computer Sciences and Industrial Engineering
Ph.D., University of Wisconsin, 1971



Interests: Operations research, management science

The fundamental aim of my research program is to construct a base of theoretical and algorithmic knowledge needed for solving a class of large modular optimization and equilibrium problems. One can visualize problems of this class as networks whose nodes are individual, semi-independent optimization or equilibrium problems which may not be entirely under our control, and whose internal structure we may not know in detail. Even if we do know their structure, we assume that we cannot make complete use of this information because of the system's size. However, we can exchange information of various specified types with these decentralized problems, and we wish to know how best to attempt operations such as:

(1) Decentralized optimization: We may wish to use an iterative exchange of information to optimize or to equilibrate the overall system according to some criterion.

(2) Decentralized control: We may want to generate stimuli that will cause some or all of the nodes to respond in certain specified ways.

(3) System approximation: We may desire to build a model of the overall system that is sufficiently simpler than the system itself so that we can optimize or control it directly, yet at the same time accurate enough to yield a useful approximation of the system's behavior under various conditions.

Recent Publications:

Local structure of feasible sets in nonlinear programming, Part III: Stability and sensitivity, *Math. Programming Studies 30,* 1987.

Local epi-continuity and local optimization, *Math. Programming,* 1987.

Stability in two-stage stochastic programming (with R. J.-B. Wets), *SIAM J. Control and Optimization,* 1987.

Jude W. Shavlik
Assistant Professor
Ph.D., University of Illinois, Urbana, 1987

Interests: Machine learning, artificial intelligence, cognitive science, automatic programming

Explanation-based learning is a recently developed approach to concept acquisition by computer. In this type of machine learning, a specific problem's solution is generalized into a form that can be later used to solve conceptually similar problems. A number of explanation-based generalization algorithms have been designed. Most do not alter the structure of the explanation of the specific problem—no additional objects nor inference rules are incorporated. However, learning many important concepts requires generalizing the structure of the explanation. Domain-independent theories of how this should be accomplished are being developed. These techniques are also being applied to the problem of automatic programming.

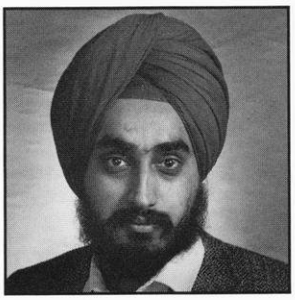
Recent Publications:

Acquiring general iterative concepts by reformulating explanations of observed examples (with G. DeJong), to appear in *Machine Learning: An Artificial Intelligence Approach, Vol. III*, 1988.

BAGGER: An EBL system that extends and generalizes explanations (with G. DeJong), *Proc. National Conf. on Artificial Intelligence*, 1987.

Acquiring special case schemata in explanation-based learning (with G. DeJong and B. Ross), *Proc. 9th Annual Conf. of the Cognitive Science Society*, 1987.

Gurindar S. Sohi
Assistant Professor of Computer Sciences and Electrical and Computer Engineering
Ph.D., University of Illinois, Urbana, 1985



Interests: Computer architecture, parallel processing and pipelining, fault-tolerant computing, VLSI design, non-numeric processing

I am interested in designing high performance computer systems. My work is focused mainly on the design of pipelined systems and the design of high-performance memory systems to support high-performance CPUs. I am studying such techniques both for numeric processors and for nonnumeric processors. For numeric processing, I am studying the design of high-performance scalar units for supercomputers; for nonnumeric processing, I am studying the design of Lisp and Prolog machines.

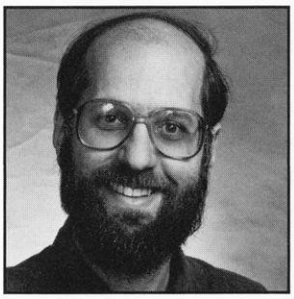
Recent Publications:

Instruction issue logic for high-performance, interruptable pipelined processors (with S. Vajapeyam), *14th Int. Symp. on Computer Architecture*, 1987.

Organization and analysis of a gracefully-degrading interleaved memory system (with K. Cheung, K. Saluja and D. Pradhan) *14th Int. Symp. on Computer Architecture*, 1987.

An efficient LISP-execution architecture with a new representation for list structures (with E. Davidson and J. Patel), *Proc. 12th Int. Symp. on Computer Architecture,* 1985.

Marvin H. Solomon
Associate Professor
Ph.D., Cornell University, 1977



Interests: Distributed operating systems, computer networks, program development systems, programming languages

Programming in the large differs from programming in the small in two dimensions. On one hand, attention necessarily shifts from individual program modules to the problem of organizing a multitude of relations among specifications, implementations, releases, and versions. These interrelations constantly change as development proceeds, and previous relations, comprising the design history, must not be lost. On the other hand, as many people work on one project, their actions must be synchronized and coordinated, just as the processes in a parallel program must be controlled.

The value of language-based tools for programming in the small is well established. These benefits can be extended to programming in the large. Tools that guide the transformation of specifications to implementations can verify the correctness of transformations. They can also track the sometimes complex relationships among related specifications and alternative implementations of a specification.

Recent Publications:

The Crystal multicomputer: Design and implementation experience (with D. DeWitt and R. Finkel), *IEEE Trans. Software Engineering,* 1987.

Hardware support for interprocess communication (with U. Ramachandran and M. Vernon), *Proc. 14th Int. Symp. on Computer Architecture,* 1987.

Dost: An environment to support automatic generation of user interfaces (with P. Dewan), *Proc. 2nd ACM Symp. on Practical Software Development Environments,* 1987.

John C. Strikwerda
Associate Professor and member of the Center for the Mathematical Sciences
Ph.D., Stanford University, 1976

Interests: Numerical analysis

I am interested in several aspects of scientific computing, especially those related to computational fluid dynamics. Much of my recent research has been with partial differential equations describing incompressible viscous fluid flow, examples of which are water, oil, and air at low speeds. I am interested both in mathematical questions about the equations and numerical methods, and also in the practical application of these methods to solve problems in fluid dynamics.

There are several topics in this area that I am currently investigating. I am interested in using several simple overlapping grid systems to compute flows in regions with non-simple geometric shapes. This method has greater flexibility than using only one grid system, but also has greater complexity due to the interpolation relating the flow variables on the different grid systems. Another topic has to do with accurately computing flows in domains that have an infinite extent in some direction. Using some knowledge of how the flow behaves far away from the region of interest, one can impose conditions on the flow at a computational boundary that simulate the effect of an unbounded region on the other side of the computational boundary. Several applications of these methods are being tested.

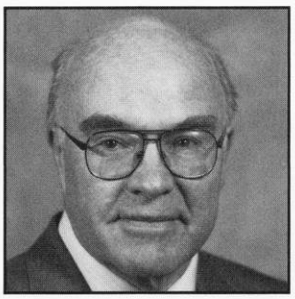
Recent Publications:

Regularity estimates up to the boundary for elliptic systems of difference equations (with B. Wade and K. Bube), to appear in *SIAM J. Numerical Analysis*, 1988.

A numerical method for the incompressible Navier-Stokes equations in three-dimensional cylindrical geometry (with Y. Nagel), to appear in *J. Computational Physics*, 1988.

An extension of the Kreiss matrix theorem (with B. Wade), to appear in *SIAM J. Numerical Analysis*, 1988.

Larry E. Travis
Professor
Ph.D., University of California, Los Angeles, 1966



Interests: Mechanization of deduction, expert systems, non-procedural knowledge representation, logical foundations of artificial intelligence, computing management, social implications of computing

My research centers around using logic as a basis for knowledge formalization in expert systems and for deductive augmentation of data base systems. Recent work has focused on non-procedural control of automatic deduction, on extending traditional logic to enable abstraction over complex descriptions as well as over complex assertions, on developing logic-based generic expert system kernels, and on developing inference engines for expert systems that enable the knowledge bases for such systems to be truly non-procedural. I am also actively involved with several expert system development projects, and with managerial, economic, and social issues associated with the introduction and use of expert system technology.

Recent Publications:

Trends in information technologies, in *Research in Mental Health Computer Applications,* J. Greist et al., eds., National Institutes of Mental Health, 1987.

Optimizing the rule-data interface in a knowledge management system (with C. Kellogg and A. O'Hare), *Proc. 12th Conf. on Very Large Data Bases,* 1986.

Reasoning with data in a deductively augmented data base system (with C. Kellogg), in *Advances in Data Base Theory, Vol. I,* H. Gallaire and J. Minker, eds., Plenum Press, New York, 1981.

Leonard M. Uhr
Professor
Ph.D., University of Michigan, 1957

Interests: Pattern perception, learning, integrated wholistic systems, models of intelligence, algorithm-structured multicomputer architectures

My research centers around the long-term goal of developing precise, testable theoretical models of perceptual and cognitive processes and structures, focusing on the following problems: visual perception of ordinary real-world scenes of objects; perception (in real time) of objects in motion; learning by inductive inference, hypothesis-formation and discovery; development of simple systems that cycle through the whole perceptual-cognitive-motor loop; software/hardware information-processing structures that model the mind/brain; general-purpose and specialized multicomputer architectures; the design and programming of large parallel-serial arrays, pyramids, appropriately augmented pyramids, and other appropriate networks, structured into "anatomies" that efficiently execute their algorithms; and the development of parallel network architectures for artificial intelligence. These entail the development of highly parallel, hierarchical, brain-like structures of micro-modular processes that transform information flowing through them.

Recent Publications:

Multi-Computer Architectures for Artificial Intelligence: Toward Fast, Robust, Parallel Systems, Wiley, New York, 1987.

Highly parallel, hierarchical, recognition cone perceptual structures, in *Parallel Computer Vision,* L. Uhr, ed., Academic Press, New York, 1987.

Pyramid vision using key features to integrate image-driven bottom-up and model-driven top-down processes (with Z. Li), *IEEE Trans. Systems, Man, and Cybernetics,* 1987.

Mary K. Vernon
Assistant Professor
Presidential Young Investigator
Ph.D., University of California, Los Angeles, 1983

Interests: Computer systems performance modeling and analysis, multiprocessor system design and measurement, multiprocessor operating system issues, parallel software performance

I am interested in the application of analytic modeling techniques to the study of computer system performance issues. In particular, I'm interested in analytic models that can be used to study performance trade-offs in the design of multiprocessor systems at the levels of machine organization, operating system design, and parallel software design. These models include Generalized Timed Petri Nets, which can represent dynamic synchronization and priority service precisely, and mean value models, which can capture the effects of contention for resources in large and complex parallel systems.

Current research projects include analysis of performance and fairness of multiprocessor bus arbiters, design of new bus arbiters for multiprocessor systems, analysis of new memory and bus organizations for large-scale multiprocessors with snooping cache protocols, analysis of operating systems issues for high-performance scientific multiprocessors, and development of a comprehensive model for multiprocessor system performance analysis.

Recent Publications:

A generalized timed Petri net model for performance analysis (with M. Holliday), *IEEE Trans. Software Engineering,* 1987.

Hardware support for interprocessor communication (with U. Ramachandran and M. Solomon), *Proc. 14th Int. Symp. on Computer Architecture,* 1987.

Performance analysis of multiprocessor cache consistency protocols using generalized timed Petri nets (with M. Holliday), *Proc. Performance '86 and ACM SIGMETRICS '86 Joint Conf. on Computer Performance Modeling, Measurement, and Evaluation,* 1986.

EMERITUS FACULTY

Charles H. Davidson
Emeritus Professor of Computer Sciences and Electrical and Computer Engineering
Ph.D., University of Wisconsin, 1952

Stephen C. Kleene
Emeritus Professor of Computer Sciences and Mathematics
Ph.D., Princeton University, 1934

J. Barkley Rosser
Emeritus Professor of Computer Sciences and Mathematics
Ph.D., Princeton University, 1934

AFFILIATED FACULTY

The following faculty members have appointments in the Department but are primarily affiliated with another department or organization.

John Beetem
Assistant Professor of Electrical and Computer Engineering and Computer Sciences
Ph.D., Stanford University, 1981
Computer-aided design, computer architecture

Roland T. Chin
Associate Professor of Electrical and Computer Engineering and Computer Sciences
Ph.D., University of Missouri, 1979
Digital image processing, pattern recognition, computer vision, advanced automation

Robert S. Fenchel
Adjunct Assistant Professor of Computer Sciences
Ph.D., University of California, Los Angeles, 1980
User interfaces, user assistance, software development environments, techniques for improving and evaluating the usability of computing systems

Charles R. Kime
Professor of Electrical and Computer Engineering and Computer Sciences
Ph.D., University of Iowa, 1966
Self-testing VLSI circuits, fault-tolerant computing, digital systems design

Rachel Manber
Assistant Professor of Computer Sciences (on leave 1987–88)
Ph.D., University of Washington, 1982
Combinatorial algorithms, parallel algorithms, geometric algorithms, graph theory

Udi Manber
Associate Professor of Computer Sciences (on leave 1987–88)
Ph.D., University of Washington, 1982
Distributed computing, design of algorithms, computational complexity

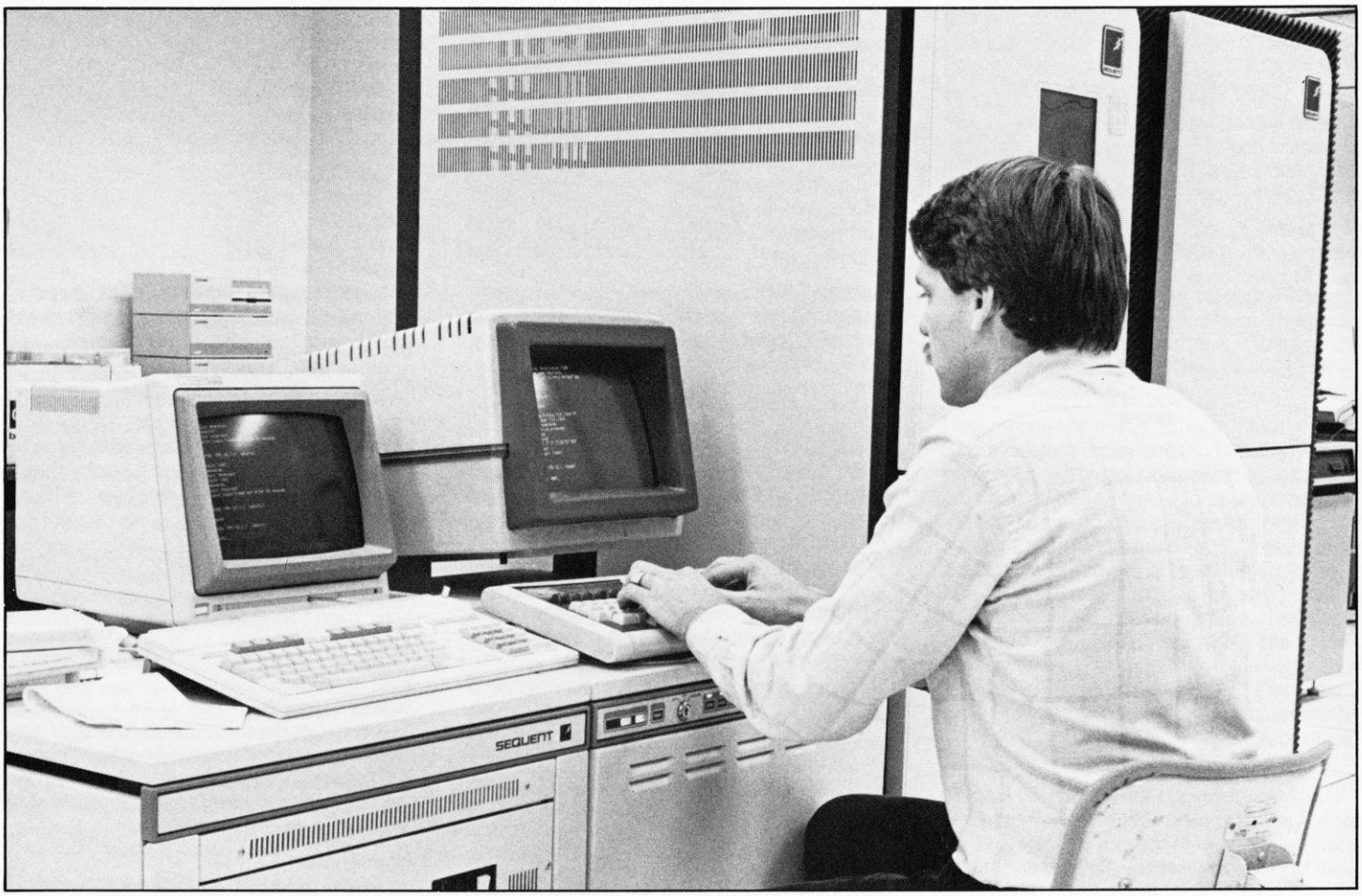
Gregg C. Oden
Professor of Psychology and Computer Sciences
Ph.D., University of California, San Diego, 1974
Natural language comprehension, pattern recognition, knowledge representation

Tad B. Pinkerton
Director of the Office of Information Technology and Professor of Computer Sciences
Ph.D., University of Michigan, 1968
Programming languages and compilers, operating system algorithms, performance measurement, system evaluation

Kewal K. Saluja
Associate Professor of Electrical and Computer Engineering and Computer Sciences
Ph.D., University of Iowa, 1973
Fault tolerant computing, VLSI design, design for testability, testing and diagnosis, systolic architectures

James E. Smith
Associate Professor of Electrical and Computer Engineering and Computer Sciences
Ph.D., University of Illinois, Urbana, 1976
Computer architecture, parallel processing, large-scale scientific computers

Arne Thesen
Professor of Industrial Engineering and Computer Sciences
Ph.D., University of Illinois, Urbana, 1972
Information systems design, analysis and implementation


SEQUENT

Project Title: **Computational Number Theory**
Principal Investigator: **E. Bach**
Funding Source: National Science Foundation, 9/85–2/88

Project Description: We are investigating the computational complexity of number-theoretic problems. In particular, we are interested in problems such as primality testing and factoring whose precise computational difficulty is still unknown. We are focusing on three subareas: (1) applications of analytic number theory to the design and analysis of algorithms, (2) probabilistic aspects of arithmetic algorithms, (3) relative computational complexity relations among number-theoretic problems.

Project Title: **Presidential Young Investigator Award: Design and Analysis of Arithmetic Algorithms**
Principal Investigator: **E. Bach**
Funding Sources: National Science Foundation, 7/86–12/91, Digital Equipment Corporation

Project Description: This research investigates efficient algorithms for number-theoretic problems, especially those such as primality testing and factoring whose true complexity is still unknown. Our work has concentrated on three subareas within computational number theory: applications of analytic number theory to algorithms, probabilistic aspects of arithmetic algorithms, and the relative computational complexity of number-theoretic problems. We plan to develop methods to analyze some problems in algebraic number theory. The results would apply (at least) to the Schnorr-Lenstra factoring method, the Cohen-Lenstra primality test, and Huang's algorithm for factoring Abelian polynomials over finite fields. Another technique invokes probabilistic methods in the creation and evaluation of algorithms. One aspect of this technique is distribution synthesis: given a distribution, what is the algorithm? Our interest here is in quickly generating random numbers with known multiplicative properties; this would provide a sound theoretical basis for recent proposals in cryptography. Finally, we are interested in the relative complexity of number-theoretic functions, especially factoring methods.

Project Title: **Spline Functions and Surfaces**
Principal Investigators: **C. W. R. de Boor and K. Höllig**
Funding Source: Army Research Office, 6/87–6/90

Project Description: We are continuing our research in approximation theory and the application of results to questions in computer-aided geometric design. With our earlier work on multivariate B-splines as a starting point, we are investigating smooth piecewise polynomial spaces on arbitrary (triangular) meshes, in particular their approximation order and the construction of approximations from such spaces, by interpolation and other means. We hope to understand better the construction of local bases for (the essential part of) such spaces.

We are making use of our past and current work on approximation by (spline) functions to begin to develop a theory for approximation and design of parametric surfaces. For example, we are studying C^2 geometric continuity in terms of the representation and think that this will lead to a generalization of beta-splines to triangular meshes. As another example, we are developing local schemes for smooth approximation or interpolation of 3-dimensional data via suitable local representations of parametric surfaces. We expect our research to lead to the development of a program package for computer-aided geometric design comparable to the standard univariate B-spline software.

Project Title: **Smooth Multivariate Piecewise Polynomials; Subdivision Algorithms**
Principal Investigator: **C. W. R. de Boor**
Funding Source: National Science Foundation, 6/87–11/90

Project Description: The approximation power and local structure of spaces of smooth piecewise polynomial functions of two and three variables are being considered. The goal is to make precise the limitations put on approximation power by smoothness demands and choice of the underlying partition or mesh of the approximating pp space. Assertions being considered include: (1) the approximation power of such a space is already provided by its local part, i.e., by the linear span of its "locally supported" elements, and (2) the approximation power is always realizable by some local and stable quasi-interpolant.

In the search for approximation schemes to surfaces in R^3, subdivision algorithms are being explored. While specific instances of such algorithms are widely used in Computer-Aided Geometric Design as a fast means for rendering spline curves, questions concerning the general nature of the limiting curves and surfaces as well as the steering of the subdivision process to guarantee that the limit match certain information, are not yet answered.

Project Title: **Presidential Young Investigator Award: Research in Database System Performance and Extensibility**
Principal Investigator: **M. J. Carey**
Funding Sources: National Science Foundation, 6/86–11/91, Digital Equipment Corporation, International Business Machines

Project Description: The research being carried out under this project is in two areas, database system performance and extensible database systems. In the performance area, topics under investigation include (1) the design of a dynamic load control mechanism for a DBMS, (2) approaches to handling real-time constraints in a DBMS, and (3) the effects of concurrency control, data distribution, and transaction structure on distributed DBMS performance. In the area of extensible database systems, the focus of this project is on the design and implementation of EXODUS, a system intended to support the rapid implementation of database management facilities for database applications that are poorly served by current relational database systems. The EXODUS project is building "database system generator" software, including a set of versatile kernel database facilities and software tools to simplify the construction of customized database management systems.

Project Title: **HiPAC—A High Performance Active Data Manager for Time-Constrained Knowledge Processing**
Principal Investigators: **M. J. Carey and M. Livny**
Funding Source: Computer Corporation of America, 5/87–4/89

Project Description: In this project, we are investigating the design of HiPAC, an "active" DBMS being developed at the Computer Corporation of America. In contrast to a conventional passive DBMS, an active DBMS continually monitors the state of the database; it reports significant state changes that occur and adjusts its workload as necessary to satisfy real-time scheduling constraints. The UW–Madison HiPAC effort is concentrating on scheduling issues and the performance evaluation of system design alternatives. Issues to be studied include the performance of alternative condition monitoring techniques and their interaction with transaction management, approaches to dealing with soft real-time constraints in a DBMS, and how the functions of HiPAC should be distributed (statically and/or dynamically) in a distributed host/workstation environment.

arrays and pyramids, (2) intermediate-level processing on multichannel images, (3) intermediate- and high-level algorithms for 2D and 3D model-based object recognition and scene analysis, and (4) simulation of alternative architectures such as pyramid machines and augmented pyramid machines for vision.

Project Title: **Operating Systems for Ring-Based Multiprocessors**
Principal Investigators: **R. A. Finkel and M. H. Solomon**
Funding Source: Defense Advanced Research Projects Agency, 9/85–1/88

Project Description: Our goal is to characterize the algorithms for which very large multicomputers are appropriate. To achieve this goal we have a three-pronged attack: tools for developing distributed algorithms, development work on Charlotte, and experimentation. We are developing and analyzing algorithms for a wide range of applications, enhancing Charlotte to support migration and effective resource management, and measuring the performance of the algorithms and the effect of process migration. At the end of this effort, we will have elucidated the strengths and weaknesses of multicomputer-based distributed computing.

Project Title: **The Design and Automatic Generation of Modern Program Development Environments**
Principal Investigator: **C. N. Fischer**
Funding Source: National Science Foundation, 7/87–7/89

Project Description: This project is addressing problems in the design and implementation of interactive program development environments for modern programming languages. These environments are specially designed to aid both novice and experienced programmers in the creation of correct and reliable programs. Particular topics being studied include: (1) automatic generation of programming language interpreters from formal specifications, (2) inference of properties of a program, including variable and type declarations, from the body of a program, and (3) extension of interactive programming support tools to the realm of language design, supporting interactive programming language design and evaluation.

Project Title: **High Performance Computing in VLSI/ULSI**
Principal Investigators: **J. R. Goodman and A. R. Pleszkun**
Funding Source: National Science Foundation, 6/86–11/88

Project Description: As the processing speed of single-chip processors has increased, the rate at which data can be transferred on and off chip has not grown as rapidly. The result is that single-chip processors are coming to be pin-bandwidth limited. We are investigating a single-chip architecture called PIPE that can be combined to build machines with performance comparable to supercomputers. Single-chip processors will soon have more gates than the CPU of a modern supercomputer. Comparable performance, however, will not be achieved unless ways are found to improve CPU performance without increasing off-chip communication. Our approach has been guided by the following philosophy: maximize average bandwidth, maximize the period between which a data item is requested and used, maximize on-chip use of data before returning it to memory, and do as much as possible at compile time. The PIPE architecture provides a framework for the study of high-performance processors suitable for ULSI implementation.

Project Title: **Presidential Young Investigator Award: Multivariate Approximation and Free Boundary Problems**
Principal Investigator: **K. H. Höllig**
Funding Sources: National Science Foundation, 6/84–12/89, International Business Machines

Project Description: The application of geometric concepts has led to significant improvements in spline theory, in particular to the development of β-splines. Using these new ideas, we are studying the representation and properties of Bezier surfaces and are developing algorithms for rendering and interactive design. We are also studying regularity and numerical approximation of free boundaries for degenerate parabolic problems. Typical examples are gas or fluid flow in porous media and Stefan problems.

Project Title: **Generating Language-Based Programming Environments**
Principal Investigator: **S. Horwitz**
Funding Source: National Science Foundation, 6/86–11/88

Project Description: Language-based environments can enhance all phases of the programming process. Given the large number of programming languages currently in use, generating environments from language specifications is a more appealing prospect than writing each environment entirely by hand. We are working toward the goal of designing and implementing a generator of language-based programming environments based on a combination of relational databases and attribute grammars called a relationally-attributed grammar. We are making progress in the following areas: (1) implementation of an editor generator using relationally-attributed grammars, (2) expansion of the relationally-attributed model to support programming-in-the-large, (3) expansion of the relationally-attributed model to support full programming environments including program execution and debugging, (4) investigation of alternative models for programming environments, (5) further research on implicit relations, new query-evaluation methods, and incremental view updating, both in the context of programming environments and in the context of relational databases in general.

Project Title: **Processing Recursion in Database Management Systems**
Principal Investigator: **Y. E. Ioannidis**
Funding Source: National Science Foundation, 8/87–1/91

Project Description: We are investigating query processing and optimization in a deductive database system. The most important computational challenges that arise in such a system are due to the presence of recursively defined relations, i.e., those defined by recursive Horn clauses. We are extending known algebraic models and using them to study recursion. We are implementing several processing algorithms for recursion and comparing their performance while varying the values of several important database parameters. We are also developing query optimization algorithms that take into account the important processing algorithms and, using realistic estimates for intermediate result sizes, suggest the most effective access plan for the query concerned. Our implementation effort is being supported by the investigation of several theoretical issues that arise regarding recursion in database systems, such as maintaining materialized relations that are defined recursively, characterizing uniformly bounded recursion, and characterizing equivalence of nonlinear and linear Horn clauses.

arrays and pyramids, (2) intermediate-level processing on multichannel images, (3) intermediate- and high-level algorithms for 2D and 3D model-based object recognition and scene analysis, and (4) simulation of alternative architectures such as pyramid machines and augmented pyramid machines for vision.

Project Title: **Operating Systems for Ring-Based Multiprocessors**
Principal Investigators: **R. A. Finkel and M. H. Solomon**
Funding Source: Defense Advanced Research Projects Agency, 9/85–1/88

Project Description: Our goal is to characterize the algorithms for which very large multicomputers are appropriate. To achieve this goal we have a three-pronged attack: tools for developing distributed algorithms, development work on Charlotte, and experimentation. We are developing and analyzing algorithms for a wide range of applications, enhancing Charlotte to support migration and effective resource management, and measuring the performance of the algorithms and the effect of process migration. At the end of this effort, we will have elucidated the strengths and weaknesses of multicomputer-based distributed computing.

Project Title: **The Design and Automatic Generation of Modern Program Development Environments**
Principal Investigator: **C. N. Fischer**
Funding Source: National Science Foundation, 7/87–7/89

Project Description: This project is addressing problems in the design and implementation of interactive program development environments for modern programming languages. These environments are specially designed to aid both novice and experienced programmers in the creation of correct and reliable programs. Particular topics being studied include: (1) automatic generation of programming language interpreters from formal specifications, (2) inference of properties of a program, including variable and type declarations, from the body of a program, and (3) extension of interactive programming support tools to the realm of language design, supporting interactive programming language design and evaluation.

Project Title: **High Performance Computing in VLSI/ULSI**
Principal Investigators: **J. R. Goodman and A. R. Pleszkun**
Funding Source: National Science Foundation, 6/86–11/88

Project Description: As the processing speed of single-chip processors has increased, the rate at which data can be transferred on and off chip has not grown as rapidly. The result is that single-chip processors are coming to be pin-bandwidth limited. We are investigating a single-chip architecture called PIPE that can be combined to build machines with performance comparable to supercomputers. Single-chip processors will soon have more gates than the CPU of a modern supercomputer. Comparable performance, however, will not be achieved unless ways are found to improve CPU performance without increasing off-chip communication. Our approach has been guided by the following philosophy: maximize average bandwidth, maximize the period between which a data item is requested and used, maximize on-chip use of data before returning it to memory, and do as much as possible at compile time. The PIPE architecture provides a framework for the study of high-performance processors suitable for ULSI implementation.

Project Title: **Presidential Young Investigator Award: Multivariate Approximation and Free Boundary Problems**
Principal Investigator: **K. H. Höllig**
Funding Sources: National Science Foundation, 6/84–12/89, International Business Machines

Project Description: The application of geometric concepts has led to significant improvements in spline theory, in particular to the development of β-splines. Using these new ideas, we are studying the representation and properties of Bezier surfaces and are developing algorithms for rendering and interactive design. We are also studying regularity and numerical approximation of free boundaries for degenerate parabolic problems. Typical examples are gas or fluid flow in porous media and Stefan problems.

Project Title: **Generating Language-Based Programming Environments**
Principal Investigator: **S. Horwitz**
Funding Source: National Science Foundation, 6/86–11/88

Project Description: Language-based environments can enhance all phases of the programming process. Given the large number of programming languages currently in use, generating environments from language specifications is a more appealing prospect than writing each environment entirely by hand. We are working toward the goal of designing and implementing a generator of language-based programming environments based on a combination of relational databases and attribute grammars called a relationally-attributed grammar. We are making progress in the following areas: (1) implementation of an editor generator using relationally-attributed grammars, (2) expansion of the relationally-attributed model to support programming-in-the-large, (3) expansion of the relationally-attributed model to support full programming environments including program execution and debugging, (4) investigation of alternative models for programming environments, (5) further research on implicit relations, new query-evaluation methods, and incremental view updating, both in the context of programming environments and in the context of relational databases in general.

Project Title: **Processing Recursion in Database Management Systems**
Principal Investigator: **Y. E. Ioannidis**
Funding Source: National Science Foundation, 8/87–1/91

Project Description: We are investigating query processing and optimization in a deductive database system. The most important computational challenges that arise in such a system are due to the presence of recursively defined relations, i.e., those defined by recursive Horn clauses. We are extending known algebraic models and using them to study recursion. We are implementing several processing algorithms for recursion and comparing their performance while varying the values of several important database parameters. We are also developing query optimization algorithms that take into account the important processing algorithms and, using realistic estimates for intermediate result sizes, suggest the most effective access plan for the query concerned. Our implementation effort is being supported by the investigation of several theoretical issues that arise regarding recursion in database systems, such as maintaining materialized relations that are defined recursively, characterizing uniformly bounded recursion, and characterizing equivalence of nonlinear and linear Horn clauses.

Project Title: **Presidential Young Investigator Award: Computational Complexity and Geometric Algorithms**
Principal Investigator: **D. A. Joseph**
Funding Sources: National Science Foundation, 6/85–12/90, AT&T Bell Laboratories

Project Description: The research carried out under this project is in the areas of abstract complexity theory and the design and analysis of algorithms. In abstract complexity theory we are interested in proof techniques for the separation of complexity classes. Much of our work in this area addresses the question of whether certain structural properties of complexity classes may be independent of formal proof systems such as Peano Arithmetic. We have introduced techniques from the theory of nonstandard models to analyze the strength of axioms necessary to resolve questions of program behavior and complexity. In addition, we are investigating proof techniques (e.g., diagonalizations, priority arguments and forcing constructions) that may be useful in resolving structural separation questions.

In the area of design and analysis of algorithms we are interested in geometric algorithms and motion planning algorithms for robotics. Our primary interest in this area is in the development and implementation of efficient algorithms for computing paths of motion for objects (robot arms, manipulators, etc.) moving in a confined workspace. This involves the study of efficient algorithms for 3 and 4-dimensional intersection problems as well as certain 3-dimensional dissection problems, data structures and nearest neighbor problems.

Project Title: **Mathematical Logic and its Applications**
Principal Investigator: **K. Kunen**
Funding Source: National Science Foundation, 5/85–11/88

Project Description: The goal of this research is to design a logic programming language which has a clear declarative semantics, but yet has a flexible enough control structure to be a useful programming language. This foundation would tell a programmer what a database says without reference to the order of execution, or to whether that execution is sequential or parallel. To achieve this goal, we are examining the various useful Prolog constructs, and attempting to either give them a sound semantics as they stand now or to replace them with constructs which can be given such a semantics. Specifically, we are extending our earlier work on negation as failure semantics in an attempt to make the set of supported queries coincide with what a practical interpreter can actually compute. We are also considering modifying the standard model-theoretic semantics so that the notion of program correctness can include the order in which the answers to a query are returned.

Project Title: **Experiments with TCP/IP and Related Protocols in BITNET**
Principal Investigator: **L. Landweber**
Funding Source: National Science Foundation, 1/86–10/87

Project Description: The following tasks are being performed as part of this project: (1) implementation of a bisynchronous driver to enable direct connection of a VM host running WISCNET and an IMPLET running the BSD IP, (2) other WISCNET enhancements as may be required, (3) WISCNET maintenance, consulting and distribution in support of the Princeton and Delaware project components and of network test sites, and (4) participation in the analysis of network topology and in the formulation and testing of strategies for routing and congestion control.

Project Title: **Computational Optimization and Large Scale Systems**
Principal Investigator: **O. L. Mangasarian**
Funding Source: National Science Foundation, 7/85–1/89

Projection Description: The investigator is conducting research in the computational areas of successive overrelaxation (SOR) methods for large scale mathematical programs, normal solution of mathematical programs, penalty functions in optimization, solution bounds for optimization problems and condition numbers for linear and convex inequalities. Emphasis is on computationally-oriented theory and effective algorithms for the solution of large scale problems.

Project Title: **Parallel Solution of Very Large Sparse Linear Programs**
Principal Investigator: **O. L. Mangasarian**
Funding Source: Air Force Office of Scientific Research, 6/86–5/89

Project Description: A novel parallelization of a serial successive overrelaxation algorithm is being studied for the solution of very large sparse linear programs. The serial version of the algorithm has been successfully tested on sparse linear programs (with as many as 40,000 variables and 10,000 constraints) which could not be solved by a revised simplex code. The parallel procedure has been successfully simulated on a serial machine and is to being implemented on the Crystal multiprocessor. We are also planning an implementation on the Topaz shared-memory multiprocessor.

Project Title: **Symposium on Parallel Optimization**
Principal Investigators: **O. L. Mangasarian and R. R. Meyer**
Funding Source: Air Force Office of Scientific Research, 7/87–6/88

Project Description: A symposium was held in Madison, Wisconsin, August 10–12, 1987 entitled "Symposium on Parallel Optimization." Eighteen international speakers were invited to participate. The proceedings will be published as a volume of the Mathematical Programming Studies.

Project Title: **Large-Scale Optimization via Distributed Systems**
Principal Investigator: **R. R. Meyer**
Funding Source: Air Force Office of Scientific Research, 7/86–6/88

Project Description: Most large-scale optimization problems exhibit structures that allow the possibility of attack via algorithms that exhibit a high level of parallelism. The emphases of this research are on the development of new optimization algorithms suited to distributed computing, and the comparison of the relative efficiencies of these algorithms on different architectures such as CRYSTAL, the medium-power shared-memory multiprocessors now coming on the market, and class VI multiprocessors such the Cray X-MP. The approaches being investigated, including decomposition and branch-and-bound, are applicable to a wide variety of large-scale optimization problems and have the high granularity and relatively low data exchange that are ideal for distributed computing. It is expected that this research will also lead to the development of distributed software tools that will be useful in other areas of large-scale scientific computing.

Project Title: **Parallel Computing for Large-Scale Optimization**
Principal Investigator: **R. R. Meyer**
Funding Source: National Science Foundation, 8/87–1/90

Project Description: Large-scale optimization problems arise in a great variety of important scientific, engineering, and economic applications, and exhibit structures that allow solution via algorithms that possess a high degree of parallelism. We are continuing our research in the development of decomposition algorithms appropriate for the distributed solution of such problems and in the implementation and testing of these methods on a variety of parallel architectures including the multicomputers and multiprocessors available at the Computer Sciences Department and those available elsewhere via ARPANET. Such algorithms have the large granularity and low date transfer properties that are ideally suited to parallel architectures. Particular emphasis is being given to network optimization problems, since a large proportion of the most difficult real-world applications of mathematical programming fall into this category, and since such problems also cover a broad spectrum of mathematical classes (from linear to nonlinear, from convex to nonconvex, from deterministic to stochastic). The development of parallel algorithms for these problems is also requiring the development of scheduling and load-balancing techniques that will be useful in the study of distributed techniques for other areas of large-scale scientific computation.

Project Title: **Performance Measurement and Analysis Tools for Parallel and Distributed Programs**
Principal Investigator: **B. P. Miller**
Funding Source: National Science Foundation, 7/87–6/89

Project Description: We are developing tools and methods for performance measurement and analysis of parallel and distributed programs. The research is based on two main principles. First, programmers should be supplied with the maximum information about their program. This information should be available from all levels of abstraction. The second principle is that programmers should be supplied with answers, not numbers. The performance tool should be able to guide the programmer to the location of the performance problem, and describe the problem in terms of the source program.

Our research studies techniques for automatically guiding the programmer to performance problems. We are exploring techniques for identifying critical resource utilization, determining interaction and scheduling affects, and detecting program time phase behavior. We are also investigating user interface issues in order to relate performance results and measurement specification to the program source code. The combination of these techniques will provide programmers with information needed to more easily make significant improvements in their programs.

Project Title: **Numerical Analysis**
Principal Investigator: **S. V. Parter**
Funding Source: Air Force Office of Scientific Research, 6/86–6/88

Project Description: We are studying methods for the approximate solution of elliptic and parabolic partial differential equations. This research is concentrating on the questions which arise in the effective implementation of parallel computers and/or multiprocessor array computers for the algebraic equations which arise in the numerical solution of these differential equations. The immediate emphasis is on the study of multi-grid methods while the long range goals include integration of the earlier results and multi-grid results into a study of multi-computer systems.

Project Title: **Investigation of Architectures for High-Speed List Processing**
Principal Investigators: **A. R. Pleszkun and G. S. Sohi**
Funding Source: National Science Foundation, 6/87–5/90

Project Description: With the recent interest in artificial intelligence, nonnumeric (especially list) processing has been brought to the forefront. This has led to a demand for computer architectures that are suited to non-numeric processing tasks. In this research we are studying four major areas in the list processing paradigm, namely: (1) function calls, (2) environment maintenance, (3) data structure access and (4) garbage collection. We are investigating methods that allow fast and efficient implementations of function call and environment maintenance mechanisms, allow streamed access to data structures, and reduce the burden on the garbage collection process.

Project Title: **Computational and Theoretical Aspects of Discontinuous Solutions of Nonlinear Partial Differential Equations**
Principal Investigator: **B. J. Plohr**
Funding Source: National Science Foundation, 6/86–11/87

Project Description: Many important problems in continuum mechanics are modeled by discontinuous solutions of nonlinear partial differential equations, but such solutions are difficult to compute using standard numerical methods. The accuracy of computational solutions may be improved by utilizing knowledge of the structure of prototypical discontinuous solutions in designing numerical algorithms. We are studying the construction of these solutions for certain systems of conservation laws and employing them in numerical methods that provide high computational resolutions. Applications include petroleum reservoir simulation, combustion and detonation theory, shock wave reflection, and relativistic hydrodynamics in high energy nuclear collisions.

Project Title: **Presidential Young Investigator Award: Language-Based Program Development Tools**
Principal Investigator: **T. Reps**
Funding Sources: National Science Foundation, 7/86–12/91, International Business Machines, Siemens Corporate Research, Digital Equipment Corporation, Xerox Corporation

Project Description: The aim of this research is to learn how to create more powerful interactive systems. The goal is to be able to perform more ambitious sorts of processing and analysis than is done in current systems. We are interested in developing algorithms to achieve this goal, and creating prototype systems to illustrate their effectiveness. A major focus of this work is to support interactive program development with tools that incorporate knowledge of the programming language. Our plan for the future is to do research on a variety of topics related to interactive computing systems. In many cases, the problem will be one of designing data structures and algorithms for incremental graph problems. We expect that an important concept in such work will be the analysis of algorithms under amortized cost measures, reflecting an emphasis on algorithms that perform well over a sequence of operations.

Project Title: **Computational Approximation of Optimization Problems**
Principal Investigator: **S. M. Robinson**
Funding Source: National Science Foundation, 6/85–6/88

Project Description: The investigator is conducting research in efficient methods for approximating optimization problems, with applications to computational solution methods for large-scale problems encountered in resource allocation applications of both deterministic and stochastic type.

Project Title: **Computational and Theoretical Aspects of Nonlinear Partial Differential Equations**
Principal Investigators: **J. C. Strikwerda and B. J. Plohr**
Funding Source: Army Research Office, 2/87–2/88

Project Description: This research is concerned with the development of accurate and efficient numerical methods for nonlinear, multi-dimensional systems of partial differential equations. Such systems arise in the description of many complex physical phenomena. One important class of nonlinear partial differential equations are those arising from systems of conservation laws, whose solutions may be discontinuous. Two examples of this type of behavior are the propagation of shock waves in air and the evolution of oil and water interfaces in oil recovery processes. A second class comprises elliptic and elliptic-parabolic systems of equations which arise in various areas of continuum mechanics, especially incompressible viscous fluid flow. For these equations the solutions are smooth, but the incompressibility constraint causes computational difficulties. The research involves both theoretical investigations of the partial differential equations and numerical methods, as well as applications of the numerical methods to problems of significance in the physical sciences.

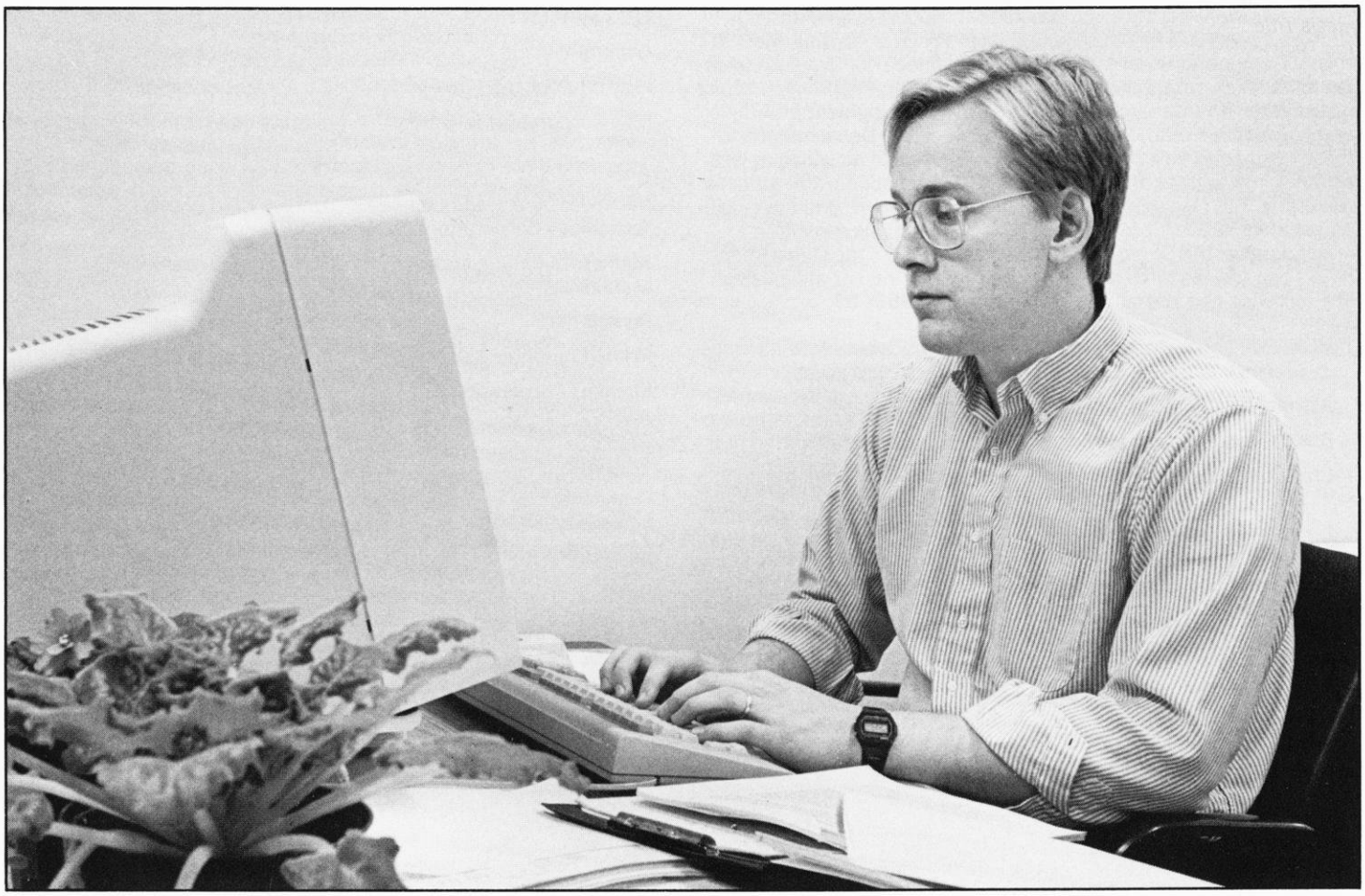
Project Title: **Presidential Young Investigator Award: Performance Analysis of Multicomputer and Multiprocessor-Based Systems**
Principal Investigator: **M. K. Vernon**
Funding Sources: National Science Foundation, 6/85–11/90, Cray Computer, International Business Machines

Project Description: The goal of this research is to apply and extend modeling techniques for analyzing the performance of distributed systems. We are studying distributed systems which are based on multicomputers (i.e. machines that are interconnected by a local area network), and systems which are based on multiprocessors (i.e. machines that share memory). One aspect of this work involves applying our recent work on graph models and timed Petri nets to the analysis of system performance. Another aspect of this work involves applying queueing network models to these problems. Performance problems of interest include evaluation of distributed algorithms, operating system algorithms for resource sharing, and advanced multiprocessor architectures for high-speed numeric and symbolic computation.

INDUSTRIAL AFFILIATES

The Department has received substantial support from industrial sources as part of our Industrial Affiliates Program. During 1986–87 corporate donations were received from eighteen companies, including fellowships, research/instructional equipment, Presidential Young Investigator Award matching grants, faculty development grants, and unrestricted cash. Relationships between the Department and these companies include a variety of joint research activities as well as other interactions of mutual interest, such as support for student recruiting. The research and instructional equipment, and the faculty and student support provided by these corporations constitute a major asset of the Department. In December 1987 the Department held a two day research review seminar for our industrial affiliates. The following lists the support we received in 1986–87:

AT&T Bell Laboratories	Equipment donation, fellowship and unrestricted grant
Astronautics Corporation	Unrestricted grant
Bell Communications Research	Unrestricted grant
Cray Computer	Scholarship and unrestricted grant
Digital Equipment Corporation	Equipment donation, unrestricted grant, and faculty development grant
EPIC Systems	Unrestricted grant
General Electric	Forgivable loans
Hewlett-Packard	Equipment donation
IBM Corporation	Faculty development grants, fellowships and equipment donation
Microelectronics and Computer Technology Corporation	Unrestricted grant
Minnesota Mining and Manufacturing	Unrestricted grant
Persoft, Inc.	Unrestricted grant
Prime Computer	Unrestricted grant
Siemens Corporation	Unrestricted grant
SUN Microsystems	Equipment donation
Tektronix, Inc.	Graduate assistantship maintenance grant
Unisys Corporation	Scholarships
Xerox Corporation	Equipment donation



Ph.D. STUDENTS 1986–87 Ph.D. DEGREES GRANTED

Robert Acar
Thesis Title: Identification of Coefficients in Elliptic Systems, *Completion Date:* July 1987, *Adviser:* Professor S. Parter, *Current Employment:* Assistant Professor, University of Oklahoma.

Hung-Yang Chang
Thesis Title: Dynamic Scheduling Algorithms for Distributed Soft Real Time Systems, *Completion Date:* August 1987, *Adviser:* Professor M. Livny, *Current Employment:* Research Scientist, IBM Watson Research Center, Yorktown Heights, NY.

Rong-Jaye Chen
Thesis Title: Parallel Algorithms for a Class of Convex Optimization Problems, *Completion Date:* June 1987, *Adviser:* Professor R. Meyer, *Current Employment:* Associate Professor, National Chiau-Tung University, Taiwan, R.O.C.

William Cox
Thesis Title: The Performance of Disk Servers, *Completion Date:* October 1986, *Adviser:* Professor J. Goodman, *Current Employment:* Research Scientist, AT&T, Summit, NJ.

Goetz Graefe
Thesis Title: Rule-Based Query Optimization in Extensible Database Systems, *Completion Date:* August 1987, *Adviser:* Professor D. DeWitt, *Current Employment:* Assistant Professor, Oregon Graduate Center.

Wei Chung Hsu
Thesis Title: Register Allocation and Code Scheduling for Load/Store Architectures, *Completion Date:* July 1987, *Adviser:* Professor J. Goodman, *Current Employment:* Senior Software Engineer, Cray Research, Chippewa Falls, WI.

Jeffrey A. Jackson
Thesis Title: Logic-Based Knowledge Representation Languages can Represent Complex Objects and Hierarchical Structure in a Natural Manner, *Completion Date:* May 1987, *Adviser:* Professor L. Travis, *Current Employment:* Assistant Professor, University of Maryland–Baltimore.

Deepankar Medhi
Thesis Title: Decomposition of Structured Large-Scale Optimization Problems and Parallel Optimization, *Completion Date:* July 1987, *Adviser:* Professor S. Robinson, *Current Employment:* Research Scientist, AT&T Bell Laboratories, Holmdel, NJ.

Mosur Mohan
Thesis Title: Greedy Algorithms for VLSI Module Placement and Routing, *Completion Date:* August 1987, *Adviser:* Professor A. Pleszkun, *Current Employment:* Research Scientist, Mentor Graphics, Beaverton, OR.

Anthony B. O'Hare
Thesis Title: Towards Declarative Control of Computational Deduction, *Completion Date:* June 1987, *Adviser:* Professor L. Travis, *Current Employment:* Research Scientist, Microelectronics and Computer Technology Corporation, Austin, TX.

Anil Pal
Thesis Title: Generating Execution Facilities for Integrated Programming Environments, *Completion Date:* October 1986, *Adviser:* Professor C. Fischer, *Current Employment:* Research Scientist, AT&T Bell Laboratories, Naperville, IL.

Peter Sandon
Thesis Title: Learning Object-Centered Representations, *Completion Date:* July 1987, *Adviser:* Professor L. Uhr, *Current Employment:* Assistant Professor, Dartmouth College.

Cui-Qing Yang
Thesis Title: A Structured and Automatic Approach to the Performance Measurement of Parallel and Distributed Programs, *Completion Date:* August 1987, *Adviser:* Professor B. Miller, *Current Employment:* Assistant Professor, North Texas State University.

Yeshayahu Artsy
Thesis Title: A Study of Fully Open Operating Systems, *Completion Date:* December 1987, *Adviser:* Professor M. Livny, *Interests:* Operating system design, distributed systems, database management systems.

George Bier
Thesis Title: Code Generation for a Pipelined, Restartable Architecture, *Completion Date:* May 1988, *Adviser:* Professor J. Goodman, *Interests:* Computer architecture, VLSI design tools.

John Boyer
Thesis Title: A Robot Mobility Aid for the Severely Disabled, *Completion Date:* 1988, *Adviser:* Professor L. Uhr, *Interests:* Machine perception, human-computer interaction, robotics, AI architectures.

Lois Brady
Thesis Title: Condition of Systems of Convex Inequalities and Linear Equations, *Completion Date:* May 1988, *Adviser:* Professor O. Mangasarian, *Interests:* Math programming, theoretical foundations of computer science.

Lisa A. Call
Completion Date: 1989, *Adviser:* Professor B. Miller, *Interests:* Distributed systems, operating systems, database systems.

Men-Chow Chiang
Thesis Title: Memory System Design for a Multiprocessor Computer, *Completion Date:* 1988, *Adviser:* Professor J. Goodman, *Interests:* Computer architecture.

Jong-Deok Choi
Thesis Title: Debugging Distributed and Parallel Programs, *Completion Date:* August 1988, *Adviser:* Professor B. Miller, *Interests:* Operating systems, distributed systems and debugging.

Robert H. Clark
Thesis Title: Distributed Algorithms for Generalized Network Flow Programming, *Completion Date:* 1988, *Adviser:* Professor R. Meyer, *Interests:* Numerical analysis, math programming, distributed algorithms.

David L. Cohrs
Completion Date: 1989, *Adviser:* Professor B. Miller, *Interests:* Distributed systems, networking and protocols, user interface design.

Gautam Das
Completion Date: 1989, *Adviser:* Professor D. Joseph, *Interests:* Computational geometry, motion planning in robotics, complexity theory.

Matthew Farrens
Thesis Title: Implementation of the PIPE Architecture, *Completion Date:* December 1987, *Adviser:* Professor A. Pleszkun, *Interests:* VLSI layout and design, computer architecture.

Michael Ferris
Thesis Title: Linear and Nonlinear Programming, *Completion Date:* September 1988, *Adviser:* Professor O. Mangasarian, *Interests:* Large scale linear and non-linear programming, convex analysis.

David Finton
Thesis Title: A Rule-Based Network which Learns to Play Go, *Completion Date:* 1989, *Adviser:* Professor G. Oden, *Interests:* Distributed representations of memory, learning.

Dan Frank
Thesis Title: Generating Data Models and Query Language Interfaces, *Completion Date:* August 1988, *Advisers:* Professors M. Carey and D. DeWitt, *Interests:* Database systems, programming languages.

Judy Goldsmith
Thesis Title: Some Results in Structural Complexity, *Completion Date:* May 1988, *Adviser:* Professor D. Joseph, *Interests:* Theoretical computer science, complexity theory, mathematical logic.

Seng-Beng Ho
Thesis Title: Representing and Using Functional Definitions for Visual Recognition, *Completion Date:* December 1987, *Adviser:* Professor L. Uhr, *Interests:* Concept representation, computer vision, learning, connectionism, cognitive science.

Michael Inners
Completion Date: 1989, *Interests:* Distributed systems, computer architecture, programming tools.

Rajiv Jauhari
Completion Date: 1989, *Adviser:* Professor M. Carey, *Interests:* Performance evaluation of databases, active and real-time database systems.

Robert A. Kabler
Completion Date: 1989, *Adviser:* Professor Y. Ioannidis, *Interests:* Database system, recursive queries.

Matt Korn
Thesis Title: 3D Model-Based Object Recognition Strategies for Multiprocessor Systems, *Completion Date:* 1988, *Adviser:* Professor C. Dyer, *Interests:* Computer vision, artificial intelligence, 3D representation, system performance analysis, operating systems.

Phillip Krueger
Thesis Title: Distributed Scheduling for a Changing Environment, *Completion Date:* December 1987, *Adviser:* Professor M. Livny, *Interests:* Distributed systems, operating systems, performance, distributed databases.

Eric Lewis
Thesis Title: A Differential File System for Large (Optical-Disk Based) Bibliographical Databases to be used with Personal Computers, *Completion Date:* May 1988, *Adviser:* Professor L. Travis, *Interests:* Library automation, data-base semantics, design and development of sophisticated personal-computer systems.

David Luner
Thesis Title: Database Support for Image Processing Systems, *Completion Date:* May 1989, *Adviser:* Professor C. Dyer, *Interests:* Concurrent algorithms, computer vision systems, theoretical computer science.

Viranjit Madan
Completion Date: 1988, *Adviser:* Professor G. Sohi, *Interests:* Architectures for efficient Prolog execution.

Mitchell Medow
Thesis Title: Knowledge Acquisition for Heuristic Classification: Learning from Prototypes, *Completion Date:* 1989, *Adviser:* Professor L. Travis, *Interests:* Expert systems for medical applications, knowledge representation.

Amarnath Mukherjee
Completion Date: 1989, *Adviser:* Professor L. Landweber, *Interests:* Computer networks, operating systems, modeling.

M. Muralikrishna
Thesis Title: Optimization of Multiple, Disjunctive Queries in a Relational Database System, *Completion Date:* December 1987, *Adviser:* Professor D. DeWitt, *Interests:* Distributed databases, database machines, extensible databases.

Matt W. Mutka
Thesis Title: Long Term Scheduling in a Network of Workstations, *Completion Date:* May 1988, *Adviser:* Professor M. Livny, *Interests:* Operating systems, distributed systems, resource management, system performance.

Giri Narasimhan
Completion Date: 1988, *Interests:* Graph theory, randomized algorithms, approximation algorithms, distributed algorithms.

Charles O'Hare
Thesis Title: Representation of Time in a Logic-Based Expert System, *Completion Date:* May 1988, *Adviser:* Professor L. Travis, *Interests:* Specification and implementation of distributed real-time systems, logic programming, expert systems, artificial intelligence.

Chih-Jui Peng
Completion Date: December 1989, *Adviser:* Professor G. Sohi, *Interests:* Lisp machines, Lisp compilers, pipeline architecture.

Jorg Peters
Completion Date: 1988, *Adviser:* Professor C. de Boor, *Interests:* Splines, approximation theory, optimization, partial differential equations.

Thomas B. Peterson
Adviser: Professor A. Pleszkun, *Interests:* Architecture, performance, databases.

Phil Pfeiffer
Completion Date: 1989, *Adviser:* Professor T. Reps, *Interests:* Programming languages.

W. Harry Plantinga
Thesis Title: Representing and using Occlusion in Computer Vision, *Completion Date:* May 1988, *Adviser:* Professor C. Dyer, *Interests:* Computer vision, computational geometry, motion planning.

Kirk Pruhs
Completion Date: 1988, *Interests:* Algorithms, complexity theory.

Joel Richardson
Thesis Title: E: A Language for Implementing Database Systems, *Completion Date:* August 1988, *Adviser:* Professor M. Carey, *Interests:* Database systems, persistent programming languages.

Carolyn Rosner
Completion Date: August 1989, *Adviser:* Professor S. Horwitz, *Interests:* Programming environments, databases for software engineering.

Carl Scarbnick
Thesis Title: Numerical Methods for Solving Fluid Mechanics Problems, *Completion Date:* 1988, *Adviser:* Professor J. Strikwerda, *Interests:* Numerical methods for solving partial differential equations.

Eugene Shekita
Thesis Title: The EXODUS Storage Manager: Design and Performance Evaluation, *Completion Date:* August 1988, *Adviser:* Professor M. Carey, *Interests:* Database systems.

Victor J. Shoup
Thesis Title: Some Results in Probabilistic Algebraic Algorithms, *Completion Date:* 1989, *Adviser:* Professor E. Bach, *Interests:* Complexity theory, algorithms, programming languages.

Meera Sitharam
Completion Date: 1988, *Adviser:* Professor D. Joseph, *Interests:* Logic methods in complexity theory, Kolmogorov complexity.

Cheng Song
Thesis Title: Supporting High Speed Bulk Data Transfer on LAN's, *Completion Date:* August 1988, *Adviser:* Professor L. Landweber, *Interests:* Computer networks.

Charles Stewart
Thesis Title: Connectionist Models for Stereo Vision, *Completion Date:* January 1988, *Adviser:* Professor C. Dyer, *Interests:* Computer vision, connectionist models, artificial intelligence.

Thin-Fong Tsuei
Completion Date: 1988, *Adviser:* Professor M. Vernon, *Interests:* Performance evaluation, architecture, databases.

Ayse Unat
Thesis Title: Motion Understanding in a Multi-Resolution Framework, *Completion Date:* 1988, *Adviser:* Professor L. Uhr, *Interests:* Artificial intelligence, computer vision, cognitive science.

G. A. Venkatesh
Thesis Title: Incremental Type Inferencing in Programming Environments, *Completion Date:* 1988, *Adviser:* Professor C. Fischer, *Interests:* Programming languages and environments, abstract data types, type inferencing, program synthesizers.

William Winsborough
Thesis Title: Optimization of AND-Parallel Logic Program Interpreters, *Completion Date:* August 1988, *Adviser:* Professor C. Fischer, *Interests:* Programming languages, logic programming, abstract interpretation, program analysis for restructuring control.

Philip Woest
Completion Date: 1988, *Adviser:* Professor J. Goodman, *Interests:* Computer architecture, restartable architectures.

Felix Sun-Tsyr Wu
Thesis Title: Towards an Environment for Experimenting with Programming Language Semantics, *Completion Date:* May 1988, *Adviser:* Professor C. Fischer, *Interests:* Programming languages, functional and logic programming, programming environments.

663 **D. Kamowitz.** Experimental results for multigrid and transport problems, September 1986.

664 **C. V. Stewart and C. R. Dyer.** A scheduling algorithm for the pipelined image-processing engine, September 1986.

665 **Z. Li and L. Uhr.** Comparative timings for a neuron recognition program on serial and pyramid computers, September 1986.

666 **P. Dewan.** Automatic generation of user interfaces, September 1986.

667 **U. Ramachandran.** Hardware support for interprocess communication, September 1986.

668 **G. Verghese, S. Mehta, and C. R. Dyer.** Image processing algorithms for the pipelined image-processing engine, September 1986.

669 **M. Vernon, J. Zahorjan, and E. D. Lazowska.** A comparison of performance Petri nets and queueing network models, September 1986.

670 **B. S. Rosenburg.** Automatic generation of communication protocols, October 1986.

671 **T. Reps.** Incremental evaluation for attribute grammars with unrestricted movement between tree modifications, October 1986.

672 **R. H. Gerber.** Dataflow query processing using multiprocessor hash-partitioned algorithms, October 1986.

673 **R. Finkel, G. Das, D. Ghoshal, K. Gupta, G. Jayaraman, M. Kacker, J. Kohli, V. Mani, A. Raghaven, M. Tsang, and S. Vajapeyam.** Experience with Crystal, Charlotte and Lynx—Third report, November 1986.

674 **S. Horwitz.** Adding relational databases to existing software systems: Implicit relations and a new relational query evaluation method, November 1986.

675 **R. J. Chen and R. R. Meyer.** A scaled trust region method for a class of convex optimization problems, December 1986.

676 **A. A. Pal.** Generating execution facilities for integrated programming environments, November 1986.

677 **M. Bhattacharyya, D. Cohrs, and B. Miller.** Implementation of a visual Unix process connector, December 1986.

678 **Z. Li and L. Uhr.** Pyramid vision using key features to integrate image-driven bottom-up and model-driven top-down processes, December 1986.

679 **C. R. Dyer.** Multiscale image understanding, December 1986.

680 **J. E. Richardson and M. J. Carey.** Programming constructs for database system implementation in Exodus, January 1987.

681 **B. P. Miller and C-Q. Yang.** Experiences with distributed longest path algorithms, January 1987.

682 **H. Plantinga and C. Dyer.** The ASP: A continuous viewer-centered representation for 3D object recognition, January 1987.

683 **H. Plantinga and C. Dyer.** The aspect representation, January 1987.

684 **W. Winsborough.** Selective reset in the AND process, February 1987.

685 **O. L. Mangasarian.** A simple characterization of solution sets of convex programs, February 1987.

686 **O. L. Mangasarian.** Least norm solution of non-monotone linear complementarity problems, February 1987.

687 **G. Graefe and D. J. DeWitt.** The EXODUS optimizer generator, February 1987.

688 **L. Uhr.** Highly parallel, hierarchical, recognition cone perceptual structures, February 1987.

689 **Y. Artsy and M. Livny.** An approach to the design of fully open computing systems, March 1987.

690 **S. Horwitz, J. Prins and T. Reps.** Integrating non-interfering versions of programs, March 1987.

691 **B. Miller, L. Call and D. Cohrs.** CLAM—An open system for graphical user interfaces, April 1987.

692 **C. de Boor, K. Höllig and M. Sabin.** High accuracy geometric hermite interpolation, May 1987.

693 **Y. E. Ioannidis and E. Wong.** Query optimization by simulated annealing, April 1987.

694 **P. Krueger and M. Livny.** When is the best load sharing algorithm a load balancing algorithm? April 1987.

695 **C. I. Goldstein and S. V. Parter.** On the norm equivalence of singularly perturbed elliptic difference operators, April 1987.

696 **R. Manber and G. Narasimhan.** Algorithms for the maximum induced bipartite subgraph problem on interval and circular-arc graphs, April 1987.

697 **M. W. Mutka and M. Livny.** Profiling workstation's available capacity for remote execution, May 1987.

698 **M. J. Wolf.** Nondeterministic circuits, August 1987.

699 **S. Horwitz, J. Prins and T. Reps.** On the adequacy of program dependence graphs for representing programs, June 1987.

700 **P. Krueger and M. Livny.** Local balancing, local sharing and performance in distributed systems, August 1987.

701 **R. De Leone and O. L. Mangasarian.** Serial and parallel solution of large scale linear programs by augmented Lagrangian successive overrelaxation, June 1987.

703 **N. H. Decker.** The K-grid Fourier analysis of multigrid-type iterative methods, July 1987.

704 **G. S. Sohi.** Instruction issue logic for high-performance, interruptible, multiple functional unit, pipelined computers, July 1987.

705 **K. M. Thompson.** A parallel asynchronous successive overrelaxation algorithm, July 1987.

706 **K. M. Thompson.** A two-stage successive overrelaxation algorithm for solving the linear complementarity problem, July 1987.

707 **K. M. Thompson.** A parallel pivotal algorithm for solving the linear complementarity problem, July 1987.

708 **R. H. Gerber and D. J. DeWitt.** The impact of hardware and software alternatives on the performance of the Gamma database machine, July 1987.

709 **G. Verghese and C. R. Dyer.** NP-completeness of linearly-connected multiprocessor scheduling, August 1987.

710 **K. Höllig.** Algorithms for rational spline curves, August 1987.

711 **W. Winsborough.** A minimal function graph semantics for logic programs, August 1987.

712 **D. DeWitt, S. Ghandeharizadeh, D. Schneider, R. Jauhair, M. Muralikrishna, and A. Sharma.** A single user evaluation of the Gamma database machine, August 1987.

713 **C-Q. Yang.** A structured and automatic approach to the performance measurement of parallel and distributed programs, August 1987.

714 **K. M. Thompson.** Parallel and serial solution of large-scale linear complementarity problems, August 1987.

Don Coppersmith, IBM T. J. Watson Research Center
New Results in Matrix Multiplication

Margaret H. Wright, Stanford University
Linear Programming: Old Truths and New Directions

William H. Harrison, IBM T. J. Watson Research Center
Issues in the Construction of Development Environments

Craig Wassenberg, Hewlett-Packard
Implementing a Network Architecture

James Archibald, University of Washington
The Cache Coherence Problem in Shared-Memory Multiprocessors

Raghu Ramakrishnan, University of Texas, Austin
On the Power of Magic

Raghu Ramakrishnan, University of Texas, Austin
Evaluating Data Intensive Logic Programs

Joel Friedman, University of California, Berkeley
On Newton's Method

Anant Agarwal, Stanford University
Analysis of Cache Performance for Operating Systems and Multiprogramming

John Gilbert, Cornell University
Graph Algorithms and Sparse Matrices: Efficient Partial Pivoting

Michael Schwartz, University of Washington
Naming in Large Heterogeneous Systems

Fran Allen, IBM T. J. Watson Research Center
Compiling for Parallelism

Chua-Huang Huang, University of Texas, Austin
Introduction to the Boyer and Moore Theorem Prover

Russell Sandberg, Sun Microsystems
Making UNIX Diskless

Rod Burstall, Edinburgh University
Pebble: A Functional Language with Dependent Types

Rod Burstall, Edinburgh University
The Logical Framework

Hui Hu, Stanford University
An Algorithm for Rescaling a Matrix Positive Definite

Bruce R. Donald, Massachusetts Institute of Technology
Error Detection and Recovery for Robot Motion Planning with Uncertainty

Michael Blasgen, IBM T. J. Watson Research Center
The 801 System

Ray Mooney, University of Illinois, Urbana–Champaign
Explanation-Based Learning in Narrative Understanding: An Application of a General Learning Mechanism

Tomlinson G. Rauscher, Xerox Corporation
Software Management Lessons: Some Industry Experience

Anne Condon, University of Washington
Computational Models of Games

Jude Shavlik, University of Illinois, Urbana–Champaign
Augmenting and Generalizing Explanations in Explanation-Based Learning

Josh Benolah, Yale University

Matthias Felleisen, Indiana University
The Calculi of Lambda-CS–Conversion: A Syntactic Theory of Control and State in Higher-Order Languages

Ravi Janardan, Purdue University
Separator-Based Strategies for Efficient Message Routing

Vijay Vazirani, Cornell University
Matching is as Easy as Matrix Inversion

Tom Lyche, University of Oslo, Norway
Free Knot Spline Approximation of Knot Removal

Jan Prins, University of Wisconsin and Cornell University
Partial Implementations in Program Derivation

Songnian Zhou, University of California, Berkeley
Dynamic Load Balancing in Distributed Systems

Joe Pasquale, University of California, Berkeley
Knowledge-Based Distributed Systems Management

Jim Gray, Tandem Computers
The Case for Multiprocessors

Eli Shamir, Hebrew University and University of Chicago
The Subdominant Eigenvalues of Markov Chains Obtained from Random Regular Graphs

Sandy Fraser, AT&T Bell Laboratories
Datakit: A Simpler Approach to Networking

Alan Demers, Xerox Palo Alto Research Center
Epidemic Algorithms for Replicated Database Maintenance

Jaroslav Nesetril, Charles University and University of Waterloo
Effective Representations of Partially Ordered Sets

Dave Presotto, AT&T Bell Laboratories
Plan 9—A New Computing Environment

David S. Wile, University of Southern California
Maintaining Object Persistence in the Common Lisp Framework

Jerry Huck, Hewlett-Packard Research Laboratories
Hewlett-Packard Precision Architecture: The Processor

John Zahorjan, University of Washington
Speedup Versus Efficiency in Parallel Systems

Robert Constable, Cornell University
Implementing Mathematics

Robert Constable, Cornell University
The Semantics of Evidence

Christian Klingenberg, University of Heidelberg
Hyperbolic Conversation Laws in Two Space Dimensions

Ramon Sarraga, General Motors Research
G^1 Interpolation of Generally Unrestricted Cubic Bezier Curves

David Oran, Digital Equipment Corporation
Global Naming and Authentication in Large Computer Networks

Hartmut Prautsch, IBM T. J. Watson Research Center
Constructing Curves that are Invariant under Halving

Olavi Navanlinna, IMA Minneapolis and Helsinki University of Technology
What is Wave Form Relaxation?

J. A. Robinson, Syracuse University
The Future of Logic Programming

Bob Balzer, University of Southern California
Living in the Next-Generation Operating System

Bob Balzer, University of Southern California
A 15-Year Perspective on Automatic Programming

Tony DeRose, University of Washington
A Multiprocessor Architecture for Fast Generation of Curves and Surfaces

Bertil Gustavson, Uppsala University
Farfield for Steady State Solutions for Hyperbolic Equations

Cynthia Dwork, IBM Almaden Research Center

Ron Goldman, Control Data Corporation
An Urnful of Blending Functions

John Guttag, Massachusetts Institute of Technology
The Larch Style of Specification and the Larch Family of Specification Languages

John Guttag, Massachusetts Institute of Technology
Specifying Concurrent Programs

Jan Mandel, University of Colorado, Denver
A Theoretical Foundation for the Computation of Transonic Potential Flows

Ken Kennedy, Rice University
Interactive Transformation of Programs for Execution on Parallel Machines

Ken Kennedy, Rice University
Interprocedural Analysis and Optimization in the R^1 Programming Environment

Jeff Naughton, Stanford University
Optimization of Recursive Logic-Based Languages

Avi Silbershatz, University of Texas, Austin
A User–Friendly Operating System Interface Based on the Relational Data Model

Alexei Gaivoronski, IIASA, Laxenburg, Austria

Jean-Loup Baer, University of Washington
A Petri Net Model for a Minimal State Solution to the Cache Coherence Problem

William A. Hoff, University of Illinois, Urbana–Champaign
Surfaces from Stereo: An Integrated Approach

Lawrence A. Rowe, University of California, Berkeley
Object FADS: An Object-Oriented Programming Environment for POSTGRES

Since 1979 the Department has sponsored an annual series of lectures by distinguished scholars in various areas of computer science, including databases, operating systems, artificial intelligence, programming languages and theory. This year's series is supported in part by the Microelectronics and Computer Technology Corporation.

Carlo Zaniolo, Microelectronics and Computer Technology Corporation
Design and Implementation of a Logic Based Language for Knowledge and Data Intensive Applications

Francois Bancilhon, Altair
Multilanguage and Object Orientation: Keywords to Future Database Systems?

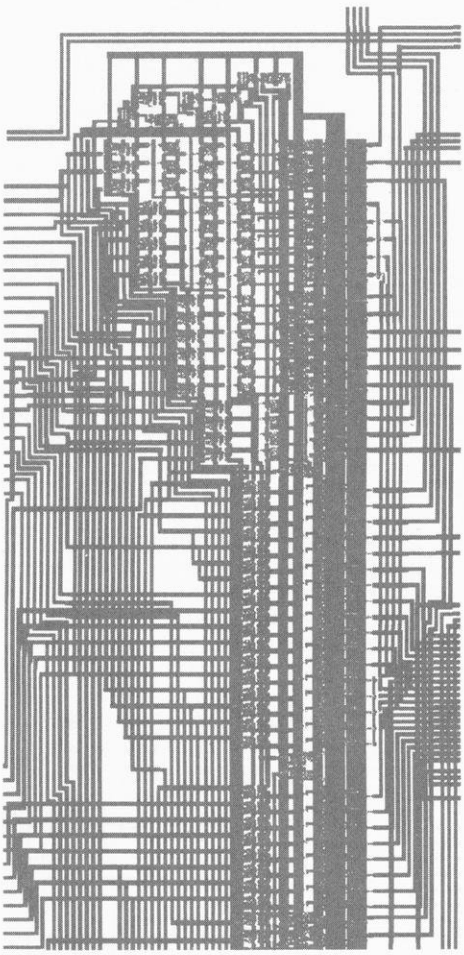
Michael Stonebraker, University of California, Berkeley
Future Trends in the Data Base Marketplace

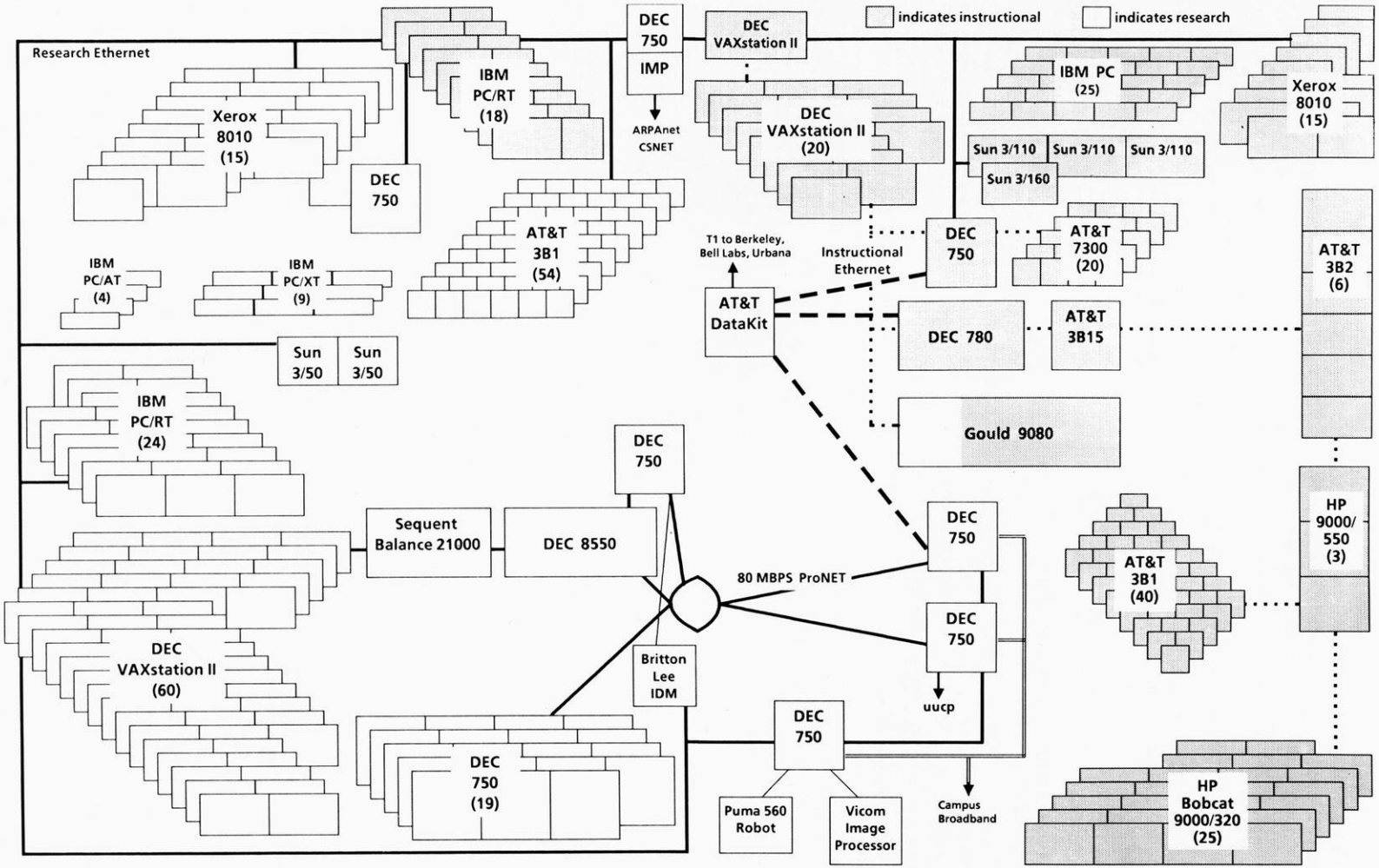
Won Kim, Microelectronics and Computer Technology Corporation
ORION: An Object-Oriented Database System

David Maier, Oregon Graduate Center
Design and Implementation of an Object-Oriented DBMS

Randy Katz, University of California, Berkeley
A Version Server for Computer-Aided Design Data

Bruce Lindsay, IBM Almaden Research Center
Presentations of Data: Past Progress and Current Directions




indicates instructional
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Research Ethernet
Xerox 8010 (15)
IBM PC/RT (18)
DEC 750
IMP
ARPAnet CSNET
DEC VAXstation II
DEC VAXstation II (20)
IBM PC (25)
Xerox 8010 (15)
Sun 3/110
Sun 3/110
Sun 3/110
Sun 3/160
AT&T 3B1 (54)
IBM PC/AT (4)
IBM PC/XT (9)
T1 to Berkeley, Bell Labs, Urbana
Instructional Ethernet
DEC 750
AT&T 7300 (20)
AT&T 3B2 (6)
AT&T DataKit
DEC 780
AT&T 3B15
Sun 3/50
Sun 3/50
IBM PC/RT (24)
Gould 9080
DEC 750
Sequent Balance 21000
DEC 8550
80 MBPS ProNET
DEC 750
AT&T 3B1 (40)
HP 9000/ 550 (3)
DEC VAXstation II (60)
Britton Lee IDM
DEC 750
uucp
DEC 750 (19)
DEC 750
Puma 560 Robot
Vicom Image Processor
Campus Broadband
HP Bobcat 9000/320 (25)

LABORATORY FACILITIES

The Computer Sciences Department operates the Computer Systems Laboratory which supports both research and teaching. The figure on the opposite page shows the current configuration of hardware in the Department. Much of the hardware was donated by our industrial affiliates. Their support has been instrumental in enabling us to provide first rate facilities for instruction.

Instructional equipment includes a Gould 9080, a VAX-11/780, a VAX-11/750, fourteen IBM RT/PC's, fifteen VAXstation II's, twenty-two HP9000/320 and /330 Bobcats with a /350 file server, three HP9000/550 Phoenix systems, three color Sun 3/110's, an AT&T 3B15, twenty AT&T 7300 Unix PC's, and three AT&T 3B2's, all running the UNIX operating system. Additional instructional equipment includes fifteen Xerox 8010 Dandelion workstations, one hundred Apple Macintosh Plus computers, approximately thirty IBM personal computers plus a variety of output and display devices including laser printers, color graphics terminals and plotters. The HP9000/500's remotely control three HP64000 microprocessor development stations, and also drive five HP98782A high resolution color graphics terminals.

The Department also runs the Undergraduate Projects Laboratory which allows students to do independent study projects on small UNIX machines. The equipment currently consists of two HP900/320 Bobcats, three HP9826 systems with monochrome graphics consoles and color graphics displays, HP pen plotter and graphics printer, an IBM 3270 PC, and three AT&T 3B2 systems.

General research equipment includes a VAX 8550, two ten-processor Sequent Balance 21000's, the Crystal multicomputer (described below), six VAX 11/750's, twenty-eight IBM PC/RT's, fifty-five VAXstation II workstations, ninety-four AT&T 3B1 Unix PC's, three Sun 3's, five IBM PC/AT's, two IBM PC XT's, fifteen Xerox 8010 Dandelion workstations, a Britton-Lee IDM-500 database machine plus a variety of output and display devices including laser printers, color graphics terminals, color printers and pen plotters. The Department recently received an IBM Datakit to support research in virtual circuit communications and connection to XUNET.

With the exception of the HP9000/550 machines and the Undergraduate Projects Laboratory equipment, all research and instructional equipment is interconnected by several 10 megabit/sec local area networks which are in turn connected by bridges or gateways. The local network has interfaces to Arpanet, CSNET, Bitnet, Usenet, XUNET (an experimental network connecting AT&T Bell Laboratories and three universities) and several campus networks.

Research in parallel and distributed computing is supported by the Crystal multicomputer, currently containing twenty VAX 11/750's connected by an 80 megabit/sec token ring, and a ten-processor Sequent Balance 21000. A variety of software services are available on Crystal, ranging in functionality from a simple communications kernel without processes to a complete distributed operating system called Charlotte. Using this facility we are conducting experimental distributed computing research in such areas as operating systems, database systems, distributed algorithms, mathematical programming, and numerical analysis. One of the Sequent Balance 21000's supports research on parallel algorithms for shared-memory multiprocessor systems. This ten-processor Sequent Balance will be replaced by a twenty processor Sequent Symmetry later this academic year.

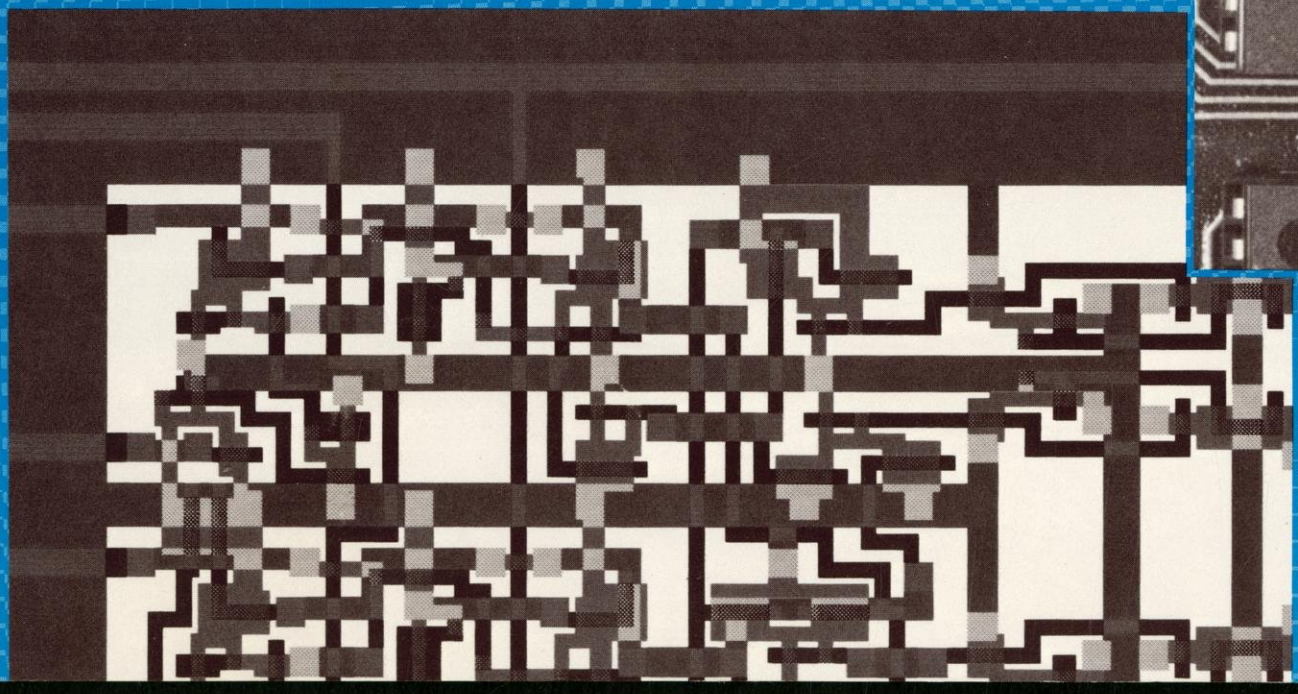
The VLSI Laboratory, jointly operated with the Department of Electrical and Computer Engineering, has three AED color graphics terminals, several VAXstations, an HP pen plotter and a Tektronix color printer connected to a dedicated VAX 11/750 for VLSI design and layout. Access to the MOSIS VLSI fabrication facility is available via the Arpanet. Facilities for testing VLSI circuits are currently being developed.

The Artificial Intelligence Laboratory includes a VAX 11/750, a Vicom image processor, a Unimation Puma 560 robot arm, and an Aspex PIPE 1/800 image processor with eight processors and interfaced to the Sequent 21000. Several cameras, monitors and VAXstations are also available.

Research Review
December 1987

Charles R. Dyer, *Editor*
Gabrielle Cooke, *Production Editor*
Kevin Grohskopf, *Designer*

University of
Wisconsin-Madison



uw news

From the University of Wisconsin-Madison / News Service, Bascom Hall, 500 Lincoln Drive, Madison 53706 / Telephone: 608/262-3571

Computer Sciences Dept

Release: Immediately 2/3/88

CONTACT: Lawrence Landweber (608) 262-1204

INSTRUCTIONAL EQUIPMENT GRANT ANNOUNCED AT UW-MADISON

MADISON--Hewlett Packard Corp. has announced a year-long, $580,000 grant to UW-Madison's department of computer sciences.

Lawrence H. Landweber, computer sciences department chairman, said the grant would be used for instructional equipment.

"As a result of this and previous donations, most computer science classes will be using HP equipment in one year," Landweber said. "Given the very limited availability of state funds for instructional equipment, the support of Hewlett Packard has been essential to our ability to provide a first-rate computing environment for our students."

The grant was presented to Landweber and to UW-Madison Chancellor Donna E. Shalala by John R. Bugarin, software productivity manager for Hewlett Packard in Fort Collins, Co.; and Robert F. Schwehr, of Hewlett Packard's high-performance systems operation information technology group in Cupertino, Calif. Both are graduates of UW-Madison.

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--Barbara Wolff (608) 262-8292

uw news

From the University of Wisconsin-Madison / News Service, Bascom Hall, 500 Lincoln Drive, Madison 53706 / Telephone: 608/262-3571

Release: Immediately 1/8/87

CONTACT: Robert M. Bock (608) 262-1044

SIX UW-MADISON FACULTY MEMBERS RECEIVE YOUNG INVESTIGATOR AWARDS

MADISON--Six University of Wisconsin-Madison faculty members are among 200 engineers and scientists in the country selected to receive Presidential Young Investigator Awards for 1987, the National Science Foundation has announced.

The awards are intended to help universities attract and retain outstanding young Ph.D.s for academic careers. Each recipient can receive up to $100,000 per year for five years in a combination of federal and matching private funds.

UW-Madison recipients are: Akif Baha Balantekin, nuclear physics; Michael J. Carey, computer sciences; Reid F. Cooper, metallurgical and mineral engineering; Jonathan M. Kenoyer, anthropology; Marshall Onellion, physics; and Thatcher W. Root, chemical engineering.

The latest awards bring the total of Presidential Young Investigators at UW-Madison to 22, according to Graduate School Dean Robert M. Bock.

Seven of UW-Madison's young investigators are in computer sciences, putting UW-Madison among the leader in the nation in the number of computer scientists so honored.

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-- Steve Schumacher (608) 262-8289

Computer Sciences

Young talent shines in computer science

WI. Week 12/17/86
by William J. Ebot

If computer science is the wave of the future in education, the UW–Madison community should be looking ahead eagerly.

UW–Madison's computer science department is brimming with young talent. In fact, six of its faculty members have won prestigious Presidential Young Investigator (PYI) awards in the past three years. That's almost 20 percent of all such awards given nationwide and more than any other computer science department in the nation, according to Harry Hedges, PYI program coordinator in Washington, D.C.

"It's a good department. Good people too," Hedges said.

The PYI grants, from the National Science Foundation, can mean as much as $100,000 a year in research support for five years. Only 33 such awards have gone to computer scientists nationwide since the program began in January, 1984, Hedges said.

David J. DeWitt, associate chairman of computer science at UW–Madison, cited two reasons for his department's success.

"The university administration has been very supportive in making positions available," he said. "And, for our part, we haven't hired just anybody. We have hired the best."

Mary K. Vernon, an assistant professor in computer science, was a PYI award recipient in 1985.

"It's an honor to receive one of these awards," she said.

Vernon's research, in computer systems performance modeling and analysis, focuses on developing mathematical models of computer systems.

"One goal of the models is to predict how some modification to a computer system will impact the performance of the system," she said. "The other goal is to predict—before we build the system—which of two different designs would give better performance or reliability."

Vernon teaches a sequence of courses designed to provide students with the math tools they need. She used her PYI award to support three research assistants and to complete a new computer system model.

Vernon earned her doctorate in computer science from UCLA and joined UW–Madison in 1983. She said she chose this university because of the department's growing reputation and because young faculty can get started in a research area with support from senior faculty members.

"The department works hard to attract outstanding new people and see them through their various research goals," she said.

Thomas W. Reps, another assistant professor, is a 1986 PYI recipient. The award was especially significant to him because of the research benefits and because the selection process included a panel of computer scientists, he said.

Reps used the award money to hire a research associate and a research assistant. He also plans to buy a more powerful computer with which he can track down errors, since his research involves a lot of computation.

Reps graduated from Harvard in applied mathematics and went on to get master's and doctoral degrees in computer science from Cornell University in 1982. He worked at Cornell and spent a year doing research in France before joining the UW–Madison faculty in 1985.

At Cornell, Reps helped design and implement the Cornell Program Synthesizer and the Synthesizer Generator, two innovative systems in computer science research. His current work centers around the Synthesizer Generator.

"The aim of my research is to create more powerful interactive systems to support computer programming; the goal is the development of language-specific tools that support incremental program development, testing, and debugging, and exploit state-of-the-art personal computing hardware," Reps said.

He chose UW–Madison because he was impressed with the department and its faculty, because of the opportunity to do graduate teaching and because he likes the city.

Other PYI award recipients are Klaus Hollig (1984), Udi Manber (1985), Debra Joseph (1985), and Eric Bach (1986). To be eligible for a PYI award, faculty members must be nominated by their institution and must have earned their doctorates no more than seven years prior to the time of nomination. ■

uw news

From the University of Wisconsin-Madison / News Service, Bascom Hall, 500 Lincoln Drive, Madison 53706 / Telephone: 608/262-3571

Release: Immediately 2/20/86

CONTACT: Judy Craig (608) 263-2301/263-7221, R. Booth Fowler (608) 263-1878

FACULTY MEMBERS COPE WITH INCREASED CLASS SIZES

By MARY ELLEN BELL
University News Service

MADISON--Some University of Wisconsin-Madison students in Political Science 104 may have been surprised this semester when they walked into their small-group discussion section. They expected a teaching assistant to lead the class; instead they came face-to-face with the professor.

Because this professor took on one of the discussion sections for the American Government course, 30 more students could be admitted to the class.

Many academic departments have had to raise class sizes to serve a growing number of students with a budget that has not kept pace with enrollment. The university has found some innovative ways to deal with the problem, but many faculty members have helped out in an old-fashioned way: they've just worked harder. They have accepted more students, moved classes to larger rooms, and taken additional teaching assignments.

Faculty and administrators worry about the educational effects of overcrowding classrooms and spreading themselves too thin. But with student demand so high, they've had little choice.

"Faculty might think a smaller size would be ideal, but they would not put more students in a class than they can manage," said Judy Craig, associate dean of the College of Letters and Science.

"It is more work," she added. "more grading, more preparation for a

-more-

different type of teaching when the class is significantly larger, and there are more students to see during office hours."

In the political science department, for example, faculty teaching duties have been shifted to let 600 more students enroll in 100-level courses than could be accommodated two years ago. Chairman Crawford Young says all the professors are teaching much larger classes.

Young pointed to Professor John Armstrong, for example, who will be grading 250 more term papers this semester. He has two teaching assistants for his course in Soviet politics, but their appointments only cover the time they spend leading discussion sections.

Associate Chairman R. Booth Fowler said political science faculty members routinely lead a discussion section to allow more students to register for large lecture classes. Discussion sections taught by teaching assistants are limited to 21 students, Fowler said, while professors often will take up to 30.

"These extra discussion sections make a big difference," he said. "Those extra students would be the ones on the waiting lists."

In the sociology department, Chairman Hal Winsborough said it so common for professors to take on extra discussion sections of popular lectures, "it doesn't even come to my attention."

"We're bursting at the seams, though," Winsborough said. "Our lecture halls are filled to capacity, and professors are pushed to the limit."

Professors in small departments also take on overload teaching assignments by accepting one or two students in "conference courses," said Tom Shaw, who heads the department of Slavic languages and literature.

"There may be just one or two students who need to learn scientific Russian, or second-year Croatian. The department cannot afford to offer these as regular courses, but professors teach students individually or in small groups.

"One or two students require just as much preparation and teaching time as

a class of thirty, and the faculty does it in addition to their regular teaching assignments," he said.

In other small departments such as classics and African languages and literature, faculty members teach one or two classes more than a "normal" teaching load to broaden the department's curriculum.

A few years ago 300 to 500 students were turned away from introductory courses in computer science every semester. Department administrator Bob Holloway said the university responded to the demand by adding enough new sections that there were still scattered openings in the course during the first week of classes. A shortage of computer science professors means majors still have trouble getting into upper level courses, but Holloway says most are almost assured now of being able to graduate in four years.

"We have set our policy so that students who need a course to graduate are guaranteed a spot in the class," Holloway said. "That means, of course, that the classes are very crowded."

Despite efforts to make more room in classes, closed sections and waiting lists are still a fact of registration, particularly for freshmen and sophomores. Departmental undergraduate advisors do all they can to help students get into courses they need, Craig said. They often point out to students that being on a waiting list is not necessarily a dead end.

"If students on a waiting list continue to express interest in a class, departments will really try to create an opening for them," Craig said.

"One thing that may have helped students this spring was a list of alternate courses we distributed to all departments," Craig said. The list included 103 courses open to freshmen and sophomores that have no limit on enrollment or have not been filled to capacity in recent semesters. Since the list noted the requirements each course would fulfill, it helped students find a substitute if their first-choice class had closed.

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--Mary Ellen Bell (608) 262-8287

uw news

From the University of Wisconsin-Madison / News Service, Bascom Hall, 500 Lincoln Drive, Madison 53706 / Telephone: 608/262-3571

Computer Sciences Dept.

Release: Immediately 6/6/85

CONTACT: Lawrence H. Landweber (608) 262-1204/263-7442

PRIME COMPUTER INC. DONATES TO AFFILIATES PROGRAM

MADISON--University of Wisconsin-Madison Chancellor Irving Shain accepted this week (Wednesday, June 5) a $15,000 donation to the university's computer science department from Prime Computer Inc., Framingham, Mass.

The donation adds Prime Computer to the list of firms supporting the Computer Science Industrial Affiliates Program. It was presented by Dick Snyder, the company's vice president for software development, who was a member of the first class of graduates from the department's master's and doctoral programs in 1966.

Snyder said Prime contributed to the program because the department's research interests parallel those of the company.

"A gift like this really makes the difference between an ordinary university and a first class university," Shain said.

###

-- Joseph H. Sayrs (608) 262-8290

uw news

From the University of Wisconsin-Madison / News Service, Bascom Hall, 500 Lincoln Drive, Madison 53706 / Telephone: 608/262-3571

Comp. Sciences Dept

Release: **Immediately** **11/19/84**

CONTACT: Charles N. Fischer (608) 262-1204/7870

UW-MADISON TEACHING, RESEARCH TO BENEFIT FROM $1.2 MILLION XEROX GIFT

MADISON--Xerox Corp.'s $1.2 million gift of 30 advanced computer workstations will boost both teaching and research in computer science at University of Wisconsin-Madison, says department chairman Charles N. Fischer.

Xerox formally announced today (Monday) that UW-Madison was among 13 U.S. and English universities to receive portions of a $12.5 million equipment grant. "By providing these schools with the Xerox Development Environment and its underlying programming technologies, Xerox hopes to advance the schools' research and teaching capabilities," said R. V. Adams, president of Xerox Systems Group, El Segundo, Calif.

The awards represented the company's first large-scale university grant in computer systems and networks. They were made on a competitive basis based on proposals made to Xerox by the universities.

Adams said the grant program also will foster more collaboration between leading university computer science departments and Xerox research centers.

Fischer said about 20 of UW-Madison's workstations will be assigned to faculty members whose proposals won the grant. In addition, "We'll probably be able to put 8 or 10 of them in a lab for student use," he added.

All 30 workstations will be interconnected to communicate and share files.

UW-Madison Chancellor Irving Shain said he was "very proud" the department had won the award. "We were one of the first (universities) to recognize that computers were going to change the world," he noted.

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Add 1--Xerox computer gift

Fischer said the research will involve 13 projects and 15 faculty members, and take advantage of the "next generation" capabilities of the donated "8010 Star" workstations. He said those capabilities include the ability for complex programming, high resolution screens, "windows" for multiple displays, and a "mouse" that can be used to point to "icon" symbols standing for different operations.

Installation of the cables that will tie the system together has already begun, the chairman said. The workstations themselves should arrive next year, he said.

Research projects will range from work on so-called "expert systems" to the integration of language processing and image perceptions. Other proposals include programs that will help write other programs, as well as studies of computer networks, computational geometry, computer communications, and image understanding.

Other universities receiving grants were Brown, California Polytechnic, California-Berkeley, Cambridge, Cornell, Maryland, MIT, New York, Princeton, Rochester, Stanford and Texas-Austin.

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-- Joseph H. Sayrs (608) 262-8290

uw news

From the University of Wisconsin-Madison / News Service, Bascom Hall, 500 Lincoln Drive, Madison 53706 / Telephone: 608/262-3571

Release: Immediately July 1,1983

UW-MADISON NEWSBRIEFS

FOUR UW-MADISON GRADUATE STUDENTS WIN FELLOWSHIPS

Four graduate students in UW-Madison's computer sciences department have received fellowships potentially worth more than $168,000 from four electronics firms.

Bryan Rosenberg, Maryville, Mo,, received a one-year, $16,500 fellowship from Tektronics Corp. that provides a $10,000 living stipend, tuition and a grant to the computer sciences department.

Daniel L. Stock, Fairview Park, Ohio, was awarded a two-year fellowship from International Business Machines that includes an annual $10,000 stipend plus tuition. IBM also awarded $2,000 to the department.

Michael Scott, Wausau, won a four-year fellowship from Bell Laboratories supplying tuition and an $8,400 annual stipend.

Phillip J. Woest, Milwaukee, won a four-year fellowship form Hewlett-Packard worth $48,000, half of which is a "forgiveable" loan. If Woest teaches for three years after receiving his degree, the firm will forgive the loan and provide him with $50,000 worth of computing equipment for research.

"These awards reflect the increasing level of cooperation among high-technology companies and universities," said computer sciences Professor Lawrence H. Landweber, the department's industrial liaison. "Industry recognizes the need to correct the shortage of doctoral students in computer sciences," he said.

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Add 1--Newsbriefs

OPENINGS EXIST IN COLOR XEROGRAPHY ART COURSE

There are still openings in a course entitled "Color Xerography" to be offered July 11-15 by UW-Madison's art department, the department has announced.

Students will use a color copier to create collage images in the medium of their choice, including fabrics and objects as well as paper. The final artwork could be paper, cloth or combinations of flat or three-dimensional media.

The course will be taught by artist and printmaker Fran Myers, and can be taken for one academic credit. More information is available by telephoning Myers at (608) 437-5860 or Cheryl Weber at (608) 262-1662.

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Reinhold Grimm, 3983 Plymouth Circle, a professor of German and of comparative literature, has been appointed to the editorial board of the Publications of the Modern Language Association of America.

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Jon F. Miller, a professor of communicative disorders at the Waisman Center, has been named the 1983 distinguished alumnus of San Diego State University's College of Health and Human Service.

Miller, 4414 Keating Terrace, is a San Diego State alumnus.

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Electrical and computer engineering Professor Richard S. Marleau, 4607 Deerpath, Middleton, has won the 1983-84 Western Electric Fund Award of the American Society of Electrical Engineer's North Midwest Section. The award carries with it a certificate and $1,500 prize

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feature story

From the University of Wisconsin-Madison / News Service, Bascom Hall, 500 Lincoln Drive, Madison 53706 / Telephone: (608) 262-3571

Computer Sciences Dept

Release: **Immediately** 4/21/83 mb

CONTACT: Robert R. Meyer (608) 262-1204

PH.D. SHORTAGE IN COMPUTERS: A PERSISTING DISMAY

By MARK BELLO

MADISON--Two years ago, William Cox completed the requirements for a master's degree in computer science. He contemplated going on for a doctorate but faced a formidable obstacle, a rigorous screening exam.

With a fellow University of Wisconsin-Madison computer science student who was in the same situation, Cox weighed his options.

"We asked ourselves, 'What's the worst that can happen?'" Cox recalled recently. "We concluded that we could flunk and get a fairly interesting job and earn $20,000 a year. If we passed, we faced two to four more years of school and being teaching assistants for about $400 a month. Then, we'd get an interesting job that paid about $30,000."

Cox took the exam, passed it and now is finishing his doctoral dissertation. When he graduates later this year, Cox will enter a job market starved for people with doctoral degrees in computer science.

Depending upon the estimate cited, there are between five and 35 jobs awaiting each of the some 250 people nationwide who will earn computer science doctorates this year. And to the dismay of computer firms and universities alike, the severe shortage of doctoral-degree holders is likely to persist for many years to come.

- more -

Computer manufacturers must tap this small pool of experts to bolster their research and development programs, the source of innovations critical to the firms' long-term health in the competitive computer field.

The 83 doctorate-granting computer science departments in the United States and Canada also must draw on this small pool. Besieged by ever-growing undergraduate enrollments and periodic losses of faculty members to other institutions and industry, the departments continually are wooing prospective assistant professors.

The shortage of doctoral students troubles computer manufacturers, but the dearth of new faculty members for university computer science programs is more disturbing to the profession as a whole. Studies by governmental agencies and professional groups all warn of a crisis in computer education.

"Some people have begun to doubt whether universities can play, in computer science, their traditional role as the supplier of trained professional manpower," Ken Curtis, head of the National Science Foundation's computer science division, said earlier this year.

When William Cox decided to pursue a doctorate, he defied a trend among computer science graduate students. The vast majority forego additional schooling and opt for the high-paying jobs industry offers master's degree holders. Their salaries will match or top the salaries paid to new assistant professors, who have had at least two more years of schooling.

According to NSF, holders of master's degrees in computer science outnumber those with doctorates by 15 to one. In engineering the ratio is six to one and in chemistry 1.1 to one.

And according to the 1981 Snowbird Report, based on interviews with chairmen of departments of computer science, "Many of our institutions have observed a decline in the quality of students applying for the Ph.D. program. Industry skims off the cream before they enter graduate school."

At the UW-Madison computer science department, which has one of the largest doctoral programs in the U.S., between a fourth and a third of the department's 200 graduate students go on for a doctorate after receiving their master's degree, said the department chairman, Robert R. Meyer.

Some students fail the department's tough screening exam, but "many very good students are lured away by high industrial salaries," Meyer said. "We are making an effort to provide a high level of research support to our students, but many people choose to leave."

Meyer, whose department is ranked 10th in the country, pointed to a Catch-22 situation facing all but the top four or five computer science departments. Many departments want to build up their graduate programs, he said, but to do this, the departments "will need good faculty members and there simply aren't enough to go around."

Of this year's class of doctoral graduates, about half are expected to take jobs with computer firms. The other half will become assistant professors and will be paid about $10,000 less than their counterparts in industry.

According to NSF's Curtis and others, the split may change to favor industry. Some graduates are willing to trade high industrial salaries for the flexibility of a university, particularly the opportunity to pursue their own research interests. But they are not willing to take on heavy teaching loads that will smother their research efforts.

Since 1975, undergraduate enrollment in computer science has more than doubled while the number of computer science professors has remained virtually the same.

Nancy F. Jarrell, who will receive her doctorate from UW-Madison in August, is undecided about whether she will work at a computer firm or a university. But Jarrell said she will not take a university job if she must constantly juggle teaching, administrative and research responsibilities.

"That's the main reason why people shy away from teaching," Jarrell said.

However, Jarrell also said it is easier to go from a university job to one in industry than it is to do otherwise. That mobility, she said, may influence her decision.

William Cox acknowledges the dilemma facing computer science departments. "Industry is concerned that it's eating its own seed corn," he said.

But Cox will not become an assistant professor. He fears that his own fondness for teaching would draw him away from his major interest--research. Because he believes "teaching, compared to research, is ill-rewarded at a university," Cox will work in industry.

"My impression is that there are fewer hassles and more support for research in industry," Cox said, adding that he would miss the flexibility of university work.

For Gregory F. Johnson, the advantages of working at a university outweigh the advantages of an industry job. But Johnson, who finishes at UW-Madison this spring, also feels a "social responsibility" to go into academia.

"This country must produce more Ph.D.'s, and it needs more people to conduct long-range research," the kind typically done at universities, Johnson sadd.

Johnson will interview for jobs at eight eastern universities and expects offers from at least four of them. One of the offers he has received so far is competitive with industrial salaries, he said. All the departments have assured Johnson that teaching loads are kept at manageable levels.

Last year, Johnson received a $4,167 "forgivable loan" from the General Electric Corp., one of several firms taking steps to ease the manpower and equipment problems of computer science departments. Johnson does not have to repay the loan if he teaches for three years after graduating.

"The loan helped me clarify my commitment," Johnson said. "But realistically, it would take me about six months to make up the difference if I took a job in industry.

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uw news

From the University of Wisconsin-Madison / News Service, Bascom Hall, 500 Lincoln Drive, Madison 53706 / Telephone: 608/262-3571

Computer Sciences

Release: Immediately 2/28/83 mb

CONTACT: Robert R. Meyer (608) 262-1204

COMPUTER SCIENCES DEPARTMENT DISCOVERS BURDEN OF SUCCESS

MADISON--It's not easy being popular, according to the computer sciences department at the University of Wisconsin-Madison. In fact, it's downright difficult.

With computer experience the closest thing to a job guarantee these days, students are clamoring to enroll in the department's courses. But one out of five--a total of 1,182--had to be placed on waiting lists for classes this semester. Nobody could count those who were too discouraged to add their names to the lengthy lists.

The department's research programs also are growing, drawing more than $2 million in outside funding last year. In the process, they have outgrown the space available.

Faculty members, lured by higher salaries elsewhere and by the amenities of industry, are leaving at the rate of about two a year.

Computer sciences Chairman Robert Meyer doesn't expect the demands on his department to ease in the years ahead.

"For the foreseeable future, we will be in a similar situation," Meyer said. "There is no reason to believe, for example, that demand for computer science courses will not continue to increase at an annual rate of about 10 percent."

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National Science Foundation predictions support Meyer's assessment. According to NSF, the number of computer positions available between 1978 and 1990 will outnumber the supply of computer-science graduates by more than 3 to 1.

NSF projected adequate supplies of scientists and engineers for all other areas except statistics and some engineering fields.

"No other technological advance has been so rapid or compelling," Kent K. Curtis, head of NSF's Computer Sciences Division, recently said of the computer's impact on higher education.

The difficulties in trying to meet the demand for space and faculty members in the rapidly growing computer field are part of the technological fallout.

By its own space-allocation formulas, UW-Madison's computer sciences department should have another 24,000 square feet to accommodate existing teaching and research programs. To meet the demand, the University is seeking a 58,500-square-foot addition to the Computer Sciences Building, of which 24,280 square feet would be assigned to the department.

If the proposed $10.5 million project clears legislative hurdles and is approved by Gov. Tony Earl this year, construction would begin in 1984. It could not be completed until 1986, according to campus architect Gordon Orr.

The extra 24,280 square feet would "meet the department's needs today, but probably won't three-and-a-half years from now," Orr said.

Meyer, using his prediction of an annual 10 percent enrollment growth rate, said his department will need another addition of comparable size by the early 1990s.

Besides space needs, Meyer also must concentrate on maintaining a high-quality faculty, which tied for 10th in a recent national ranking of computer science faculties. This year, Meyer said, as many as four faculty members may opt for jobs in industry or at other universities. One has already told Meyer he will not return from a one-year leave with a computer manufacturer.

"In spring, I spend more time on recruiting faculty than on anything else," Meyer said.

Competition for doctoral graduates to fill the gap is intense, with industry and universities vying for the handful of graduates produced annually. In 1980, the Snowbird Report, based on discussions with the chairmen of U.S. and Canadian computer science departments, estimated the supply of new doctoral graduates at about 20 percent of demand.

For beginning assistant professors, Meyer can offer a starting salary of about $28,000--roughly $12,000 less than recent doctoral graduates receive in industry. And of some 250 doctoral students who graduate each year, only about 30 are of the quality Meyer is seeking.

"Of the 30, half will accept industry offers, and we must compete with other universities for the remainder," Meyer said.

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research news

From the University of Wisconsin-Madison / News Service, Bascom Hall, 500 Lincoln Drive, Madison 53706 / Telephone: 608/262-3571

Release: Immediately 7/13/82 jhs

CONTACT: Robert R. Meyer (608) 262-1204

RESEARCH TO PROBE SHARING OF DESKTOP COMPUTER POWER

MADISON--Research planned at University of Wisconsin-Madison with a network of four donated desktop computers, each as powerful as a mainframe computer of just 10 years ago, may point the way to the future of personal computing, says a computer scientist here.

"I view this system as what personal computers are going to be like in a few years," said Edouard J. Desautels, one of five computer sciences professors whose research will use a $150,000 donation of equipment and computer programs from the Hewlett-Packard company.

The biggest question to be answered by the researchers, said Professor Charles N. Fischer, is "how do you interconnect these machines to do shared or distributed processing."

In shared processing, any computer within a network of computers can call on the calculating power of the entire network when faced with a problem too big to handle alone. Fischer said shared processing could let business and personal computer buyers choose smaller machines because the power of other computers would easily be available for occasional big jobs.

Research on computer programs needed to manage such a network is in its infancy, but drawing increasing attention. UW-Madison has been active in several such projects during the past year, including one funded by a five-year, $4.7 million grant from the National Science Foundation.

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"Hewlett-Packard is very interested" in distributed processing, Fischer said, and that's one reason for the recent equipment grants to UW-Madison and nine other universities.

At Wisconsin, researchers will be using four HP 9836A desktop computers, with screen displays, printers and disk memories holding up to 27 million "bytes"--separate pieces--of information. Each computer will have 1½ million bytes of memory.

The toughest question in shared processing, Fischer said, is telling the computer network how to decide the best way to do a particular computing job: with an individual computer, with a network of connected computers, or with a large mainframe machine called up by the network.

Other research projects by professors and graduate students will study database management, integrated circuit design , program development systems and the programming of computer operating systems. Desautels said he will use the equipment to probe "some areas where the U.S. lags" in computer research, mostly in TV-based information networks such as Great Britain's Prestel system.

Robert R. Meyer, computer sciences department chairman, noted that UW-Madison worked with Hewlett-Packard to decide the best kind of equipment for the research. HP also is a member of the department's Corporate Affiliates Program, Meyer said, and has a long history of supporting UW-Madison computer research.

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uw news

From the University of Wisconsin-Madison / News Service, Bascom Hall, 500 Lincoln Drive, Madison 53706 / Telephone: 608/262-3571

Release: Immediately 12/3/81 jhs

COMPUTER SCIENCE DEPARTMENT NUMBER ONE IN NSF FUNDING

MADISON--The University of Wisconsin-Madison's computer sciences department is first nationally in National Science Foundation funding for the 1981 fiscal year that ended Sept. 30, according to foundation figures.

NSF awarded a total of $1,822,000 to the department, which was founded just 16 years ago. The University of Illinois was second at $1.66 million and only four other universities--Stanford, Washington, MIT and Cornell--received over $1 million.

Department Chairman Robert R. Meyer credited "the quality of our faculty and their access to research equipment" for the ranking and thanked Graduate School officials for support in faculty recruiting and research funding.

Nearly $700,000 of the NSF total was the first installment of a five-year, $4.7 million grant to establish a distributed processing computer network called "Crystal." Eventually, the system could link more than 50 normal-sized computers into a system that could rival today's better supercomputers in processing power.

Meyer said the ranking "will make it possible for us to continue to recruit and retain outstanding students and faculty."

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uw news

From the University of Wisconsin-Madison / News Service, Bascom Hall, 500 Lincoln Drive, Madison 53706 / Telephone: 608/262-3571

Computer Science

Release: Immediately 9/1/81 jhs

CONTACT: Mohan R. Tanniru (608) 263-2085

STUDENT GROUP SPONSORS SPEAKER SERIES ON COMPUTERS

MADISON--Six programs on computers, with topics including careers, word processing, microcomputers and fraud, will be sponsored this fall at University of Wisconsin-Madison by the campus chapter of the Data Processing Management Association, the group has announced.

Free and open to the public, the series will feature speakers from state and federal government, private industry in Milwaukee and Madison, and the University, said faculty adviser Mohan R. Tanniru. Each program is scheduled from 7:10-8:30 p.m. Locations will be announced later.

The schedule of programs is:

--Sept. 17, "Careers in Data Processing." Speakers are Stew Miller, state Department of Transportation; Chuck Grant, Wisconsin Physicians Service; and Herbert Desch, Arthur Andersen and Co.

--Oct. 7, "Evaluation of Data Processing Options." Scott Dryburg, A.O. Smith Corp., and Glenn Timmerman, Andersen and Co.

--Oct. 22, "Selection of Computer Vendors--Hardware and Software." Mike Bacon, Department of Transportation; Timothy Orr, state Division of Health and Social Services; and Pat O'Brien, W. T. Rogers and Co.

--Nov. 4, "Word Processing." Roger Hanson, UW-Madison's Administrative Data Processing.

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--Nov. 19, "Microcomputers--Users' Perspective." John Mason, Wisconsin Office Supply; Ron Myren, UW-Madison's Vocational Studies Center; and Glenn Jacobson, Professional Data Processing.

--Dec. 3, "Computer Fraud." Hank Curran, Federal Bureau of Investigation, and Felix Richgels, U.S. Department of Health and Social Services. A member of the Internal Revenue Service's criminal investigation staff is also expected to speak.

Additional information on session content and locations is available by telephoning Professor Tanniru, (608) 263-2085, or the student chapter president of the Data Processing Management Association, Carter Lusher, (608) 257-5450.

Locations of the various sessions also will be posed on the association's bulletin board in the Commerce Building, 1155 Observatory Drive.

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research news

From the University of Wisconsin-Madison / News Service, Bascom Hall, 500 Lincoln Drive, Madison 53706 / Telephone: 608/262-3571

Release: Immediately 7/8/81 jhs

CONTACT: Lawrence H. Landweber (608) 263-7442/262-1204

NSF APPROVES $4.7 MILLION RESEARCH 'MULTICOMPUTER' AT UW-MADISON

MADISON--A new kind of supercomputer that links the calculating and memory power of 50 to 100 normal-sized computers will be assembled by the computer science department at University of Wisconsin-Madison during the next five years, the department has announced.

Winner of a $4.7 million National Science Foundation grant, the project calls for buying "off-the-shelf" computers, linking them with coaxial cable, and creating the computer programs that let them work together.

Research on how well the system works could point the way to a persistent dream of many computer scientist: large networks of linked computers which distribute the processing over as many machines as needed. The UW-Madison researchers say the multicomputer will provide "a unique testbed" for studying a wide range of problems associated with distributed computing.

Computer science Professor Lawrence H. Landweber, one of four principal investigators, said the project will test the idea of a multicomputer system that uses special computer programs to recognize a job's requirement for computing resources and then to divide, or partition, the system to meet the need.

This partitioning of the system by computer programs, or "software," gave the project its formal name, the "Software-Partitionable Multicomputer." Landweber said that researchers have nicknamed the project "Crystal," however, "because of its many facets."

Crystal should turn out to be as powerful as a giant supercomputer, said Professor David DeWitt, project coordinator and another of the principal investigators.

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But it may be cheaper than a single, giant machine with a giant pricetag. "The technology has reached the point where it might be more economic to build a super-computer out of smaller computers," DeWitt said.

The lure of the project itself also may help UW-Madison endure what many are calling "the crisis in computer science," in which high industry salaries are attracting professors and graduate students away from academia. The multicomputer is expected to attract other research grants for professors and supply academic research jobs for graduate students.

Crystal even has the potential, say the researchers, of drawing leading-edge technology firms to Madison to benefit from the growing expertise here in distributed processing. "It's bringing this young department to national prominence in experimental computor science," Landweber said.

Housing for Crystal will be a problem, however, if a planned addition to the Computer Sciences and Statistics Building isn't completed within the next few years. Work can start in the department's present System Laboratory, DeWitt said, but the space requirements for Crystal will quickly outgrow the already crowded building.

Under NSF's five-year grant, Crystal will be used solely as a computer science research tool. One group of UW-Madison researchers, led by the other two principal investigators, Professors Robert Cook and Raphael Finkel, will develop the software systems. DeWitt will coordinate getting the equipment and linking it together. Another group will be using the multicomputer's strength to study the kinds of instructions needed to apply distributed computing to a wide variety of applications, including industrial robotics, number-crunching mathematics problems, pattern recognition and database management systems.

In all, more than half of the department's 33 faculty members are expected to participate in the project.

DeWitt said the project's first year will be used to evaluate various computer models and communications technologies, hire a manager and begin the basic programming. Later, work will start on higher-level computer languages and programs for applications tests. Engineers, programmers and project assistants will be hired.

Plans call for starting to buy the individual computers within about a year. Each will have between 500,000 and one million "bytes" of memory, execute about a million instructions a second, and have associated "peripherals" such as mass storage disc units. More computers will be added over the following four years, leading to a combined memory of perhaps 50 million bytes plus billions of bytes of mass storage.

To transfer instructions and information between the computers, the researchers will borrow cable television technology to carry different channels on different frequencies. The cable will carry 100 million bits of information a second at first, but within three to five years, the researchers hope, fiber optics technology will become available to carry 5 billion bits a second.

The first version of Crystal should be running in about 2½ years, DeWitt said. When completed, it will represent more computing power than the next two largest computers on campus combined.

The NSF grant was among three awarded among 24 competing universities under the foundation's Coordinated Experimental Facilities Program in computer science. At $4.7 million, UW-Madison's award was the largest. The University of Illinois-Urbana received about $4 million and Cornell University, about $2.6 million for other projects.

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uw news

From the University of Wisconsin-Madison / News Service, Bascom Hall, 500 Lincoln Drive, Madison 53706 / Telephone: 608/262-3571

Computer Sciences Dept.

Release: Immediately 3/9/81 jhs

CONTACT: Lawrence H. Landweber (608) 262-1204

COMPUTER SCIENCE DEPARTMENT IN A PINCH

MADISON--Jammed with students, pinched for space and feeling industry pressure to hire away its professors, the computer science department at University of Wisconsin-Madison is taking its first look at the possibility of limiting enrollment.

So far, said department Chairman Lawrence H. Landweber, limits have been set in only a few courses. "A number of students" were turned away from a basic introductory course for the first time this year, some students who didn't show up were "disenrolled," and several graduate courses were closed before class size got out of hand. "We don't think you should have 80 people in a (graduate) course," he said.

Landweber said he foresees further limits on more graduate and upper-level undergraduate classes, however. The department also is keeping an eye on the possibility of an overall limit on graduate enrollment, he said.

The problem stems from a full-fledged boom in computer science.

Jobs in all categories of computer science are expected to double in a decade, according to the U.S. Bureau of Labor Statistics. UW-Madison is among those schools where enrollment is going up 15 to 20 percent a year. The Chronicle of Higher Education says the demand for computer scientists is 40 percent greater than the supply and that salary offers have gone up nearly 40 percent in three years.

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Add one--computer pinch

The number of students taking computer science courses at UW-Madison has doubled in six years, Landweber said. In just three years, undergraduate enrollment has gone from 2,539 to 3,846 as more and more academic departments--mostly in business, engineering and the sciences--require their students to become familiar with computers.

In some ways, Landweber said, "the University (administration) has been very generous." There are enough teaching assistant positions, he noted, although sometimes there are not enough people to fill them. There also is enough computer power available for teaching, although "we tend to lag one or two semesters behind" the equipment demand. That means students find themselves lining up at 2 a.m. to gain access to a computer terminal late in the semester.

"We haven't been denied any resources," the chairman said, but adequate space has been slow in coming. A planned Computer Science and Statistics Building addition, ninth-highest building priority on the Campus Planning Committee list for 1981-83, didn't survive a State Building Commission subcommittee. Advance planning money is expected, however, and the project is likely to be high on the list for 1983-85.

In the meantime, "unless we are given an emergency allocation (of space) in the fall, we will either have to curtail enrollment or we will have to go back to students using punched cards," Landweber said. Punched cards, historically the first way devised to get information into a computer, would be a distasteful step backward in an age of video terminals and "interactive" computing, Landweber feels.

On the faculty front, there's a double crunch.

First, too few graduates are entering the academic world. Only two of 20 recent UW-Madison doctoral graduates went to universities, Landweber said. "There's a tremendous national shortage of Ph.D.s in computer science."

The reason, of course, is salaries. A new doctoral graduate may be offered up to $40,000 a year--one-third more than the academic world offers. Even a bachelor's degree graduate may be making more than his college advisor in just a few years. "That creates a tremendous morale problem for our faculty," Landweber noted.

In the second place, faculty members themselves are not immune from industry offers, either. Landweber said some have been promised $60,000 a year to forego the classroom for the commercial lab.

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research news

From the University of Wisconsin-Madison / News Service, Bascom Hall, 500 Lincoln Drive, Madison 53706 / Telephone 608/262-3571

Release: **Immediately** 3/9/81 jhs

CONTACT: Lawrence H. Landweber (608) 262-1204 or
NSF's Ralph Kazarian (202) 357-9498

NATIONAL COMPUTER NET TO CONNECT COMPUTER RESEARCHERS

MADISON--A network connecting computer researchers nationwide will be shuttling information, computing power and even electronic mail from border to border within five years, according to the National Science Foundation (NSF).

University of Wisconsin-Madison, among four universities and one corporate "think tank" involved in the NSF-funded network, will be providing technical support and developing computer systems that will act as a "gateway" to other networks.

"We're very heavily involved and central to the project," said Lawrence H. Landweber, chairman of UW-Madison's computer science department and head of the NSF committee organizing the project. Landweber will be working with computer science Professor Marvin H. Solomon on Wisconsin's part of the contract, $1.8 million over three years; NSF has committed $4.96 million to the program over the next five years.

Landweber predicted the difficult part of the project will be developing the software "protocols" needed to allow communication between the many different computers in use nationwide. Without such protocols, the computers cannot "talk" to one another even if connected.

Others involved in the program, named CSNET, for Computer Science Research Network, are Purdue University and the universities of Delaware and Utah, and Rand Corp. Limited service to academic and industrial research groups is expected within a year, with self-sustaining service within five years.

All equipment and computer programs developed will be in the public domain.

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feature story

From the University of Wisconsin-Madison / News Service, Bascom Hall, 500 Lincoln Drive, Madison 53706 / Telephone: (608) 262-3571

Release: Immediately 3/13/79 jph

CONTACT: Edouard Desautels (608) 262-0620

HOME COMPUTERS MAY NOT WORK THE MIRACLES YOU EXPECT

MADISON--Have they gotten to you yet?--glowing screens on television monitors and small typewriter keyboards that only need to be plugged in to free you of the time-consuming chores of the householder. With certain instructions or programs they promise to balance your checkbook, teach math to your kids, adjust recipes to handle a dinner for 12 persons--thanks to magic of the newest computer chip technology.

The integrated circuit chip--the size of a fingernail--can do the work of 5,400 transistors. The transistor itself was a revolutionary development over the vacuum tubes of an earlier generation.

The new micro-computers designed for home use offer these and other alluring promises. Some can be misleading, according to University of Wisconsin-Madison professor of computer sciences Edouard Desautels. The claims reflect fierce competition for the new home computer market.

"Although the small computers have come down considerably in price, there is still a lack of adequate pre-packaged programs," notes Desautels, who is an associate chairman of the computer science department. "This forces many people to face the agony of creating their own programs. The problem with programming your own computer is that with one mistake you're wiped out."

Games have been an important feature in marketing the new small computers. Blinking, colored figures of planes, cars, rockets, and game boards accompanied by assorted beeps and boops have attracted customers who have enjoyed the television games that have been around for several years.

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Tennis, hockey, and other contests can be played in the home by attaching a small device to the television set. Desautels predicts that in a few years people will grow tired of these games.

Promises of cutting heating bills by programming a small home computer to monitor temperatures and adjust thermostats accordingly may provide no real savings to homeowners at the present level of development.

"The computer used in this system would cost around $1,000, but the real problem is that the sensing devices needed to read the temperatures would cost more than the computer," notes Desautels. "At present you can't beat manually turning your thermostat up or down to save money."

Some computer companies have tried to show the more serious benefits of the new affordable computers.

One such company donated one of their products to a social agency in Coral Gables, Fla., to compare food prices for elderly and low-income households. The price comparisons were then published in a local newspaper for shoppers.

Desautels feels these donations are "sales gimmicks" to entice cost-conscious consumers to buy the products.

"The cost of the fuel used to go from store to store to pick out sale items would be prohibitive," he observes.

Desautels has been involved with computers since 1960. He has worked at the International Business Machines branch in Canada, the staff of the Cooperative Computing Laboratory at the Massachusetts Institute of Technology and was an IBM fellow at the Systems Research Institute in New York City.

He earned his Ph.D. at Purdue University and has been on the UW-Madison faculty since 1969.

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NARRATIVE File

uw cutlines

From the University of Wisconsin-Madison / University News and Publications Service, Bascom Hall, Madison 53706 / Telephone: 608/262-3571

Release: Immediately 6/8/78 jhs

CONTACT: Prof. Lawrence H. Landweber (608) 262-5385

SPERRY RAND DONATES TO COMPUTER SCIENCES DEPARTMENT

A $10,000 grant from Sperry Rand Corp. for the University of Wisconsin-Madison's computer sciences department is accepted Thursday (June 1) by Chancellor Irving Shain, left. Dr. Val E. Herzfeld, vice president of business planning and development for Sperry Rand's Univac Division, Blue Bell, Pa., makes the presentation while Prof. Lawrence H. Landweber, chairman of the computer sciences department, observes. Shain told Herzfeld, who received his engineering degrees from UW, that grants such as the Sperry Rand donation let UW-Madison reach beyond basic college instruction and "are what make this a great university." Also representing the computer manufacturer were its Wisconsin branch manager, Joseph Schweiker, and Madison branch manager Robert Zerneke. The unrestricted grant was made through the UW Foundation.

#8259-M

--Gary Schulz Photo

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feature story

TEMPORARY NEWS SERVICE LOCATION:
115 Science Hall
550 North Park Street
From The University of Wisconsin-Madison / University News and Publications Service, Bascom Hall, Madison 53706 / Telephone: (608) 262-3571

Computer Sciences

Release: Immediately 9/19/75 gf

MADISON--Sports fans, Star Trek fans, and scholars are living it up on the University of Wisconsin-Madison campus--with a computer.

A new service begun by the computer science department to acquaint students, staff members, and faculty with computers is responsible.

Known as ACCESS (All-Campus Computing Educational Support Service), it is provided without charge.

Funds for the service are donated by various UW-Madison schools and colleges and the chancellor's office.

The philosophy behind ACCESS is to provide a resource similar to a library. Operators can choose from 300 programs contained in the computer's memory.

These include a wide variety of games, learning drills, and tutorial services. ACCESS representative Albert Roberts said one program simulates a pocket calculator. Others provide help in languages, business, and the sciences. The games include football, black jack, and Star Trek.

Operators use punched cards to run programs at any of 14 stations located in various schools and departments on campus. These stations are linked by cables to the main computer, housed in the Computer Science Building.

Roberts hopes the games will attract students to the computer but only as an introduction, and not as a goal in itself.

The programs were acquired from the University of Utah and Dartmouth College. Other campuses which use games of this sort include UW-LaCrosse and UW-Platteville.

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uw news

From The University of Wisconsin-Madison / University News and Publications Service, Bascom Hall, Madison 53706 / Telephone: (608) 262-3571

TEMPORARY NEWS SERVICE LOCATION:
115 Science Hall
550 North Park Street

Release:

Immediately

9/18/75 gf

Computer Sciences

MADISON--The "mystery" of computers will be revealed Sept. 24-26 as part of the fourth annual Computer Terminal Fair on the University of Wisconsin-Madison campus.

The fair will be held in Union South, and open to the public from Wednesday noon until 5 p.m., Thursday from 10 a.m. to 5 p.m., and Friday from 10 a.m. to 1 p.m. Admission is free.

A wide variety of games and learning drills will be available to visitors who wish to operate the computer terminals in Room 109. Explanations of the equipment and the demonstrations also will be available.

Use of computers by the University, state agencies, and commercial organizations will be demonstrated in Room 302 and a new addition to the fair, an applications symposium, will be held in Room 215. The symposium will feature a series of half-hour presentations concerning new applications of computers in society. These include the use of computers in the classroom and laboratory and a voice response medical education system.

Those wishing to attend may park in Lot 60 and take a bus to the Union, take a city bus directly to the fair, park on the street in two-hour spaces, or order a parking permit in advance by calling 262-3771.

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uw news

From The University of Wisconsin-Madison / University News and Publications Service, Bascom Hall, Madison 53706 / Telephone: (608) 262-3571

Computer Sciences Dept. 61

Release: Immediately 8/16/73

NEWS BRIEFS FROM THE MADISON CAMPUS

MADISON--Zunilda Gertel and Oswaldino Marques, both visiting professors in the department of Spanish and Portuguese last year, have joined the permanent faculty, University of Wisconsin-Madison.

Prof. Marques, a native of Brazil, will teach Portuguese and Brazilian literature. He is a member of the Instituto Nacional do Livro, a national university press.

Prof. Gertel will teach Spanish American poetry and literature. Born in Argentina, she has taught in American universities since 1968.

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MADISON--Prof. Bernard Galler, University of Michigan, will be the key-noter for the third National Conference of the Datacraft Users Organization on the Madison campus of the University of Wisconsin Sept. 23-25.

Chairman of the department of computer and communication science at Michigan, Prof. Galler is a past president of the Association for Computing Machinery.

His topic will be "Virtual Memories-Maxi-Performance for Mini-Computers."

Prof. Tad B. Pinkerton of the UW-Madison department of computer science is scheduled to speak on "Measuring Computer Performance."

Sessions will be held at Union South, but there will be demonstrations and site visits to various computer installations in the area.

Host for the conference is the Madison chapter of the organization.

Local chairmen include Profs. Clifford B. Gillman, psychology; Charles H. Davidson, director of the Engineering Computer Laboratory; David J. Lapin, research and development educational sciences; and Verlyn B. Erickson, engineering computing.

- more -

MADISON--Two members of the men's physical education faculty, University of Wisconsin-Madison, have been named to offices of the American College of Sports Medicine.

Prof. J. Grove Wolf was appointed acting executive secretary to succeed Don Herrmann of the Madison campus faculty who has accepted a position as assistant secretary of the Wisconsin Interscholastic Athletic Association.

William G. Reddan, professor of physical education and preventive medicine, was appointed acting executive treasurer of the college.

- o -

MADISON--Andre L. Delbecq, professor of business on the Madison campus of the University of Wisconsin, has been elected to the Academy of Management Board of Directors for a one-year term.

Another member of the faculty here, Alan C. Filley, business, was named chairman-elect of the academy's organizational behavior division.

- o -

MADISON--Dr. R. S. Claassen, visiting scientist in the University of Wisconsin-Madison College of Engineering, has been appointed to the National Materials Advisory Board for a three-year term.

Affiliated with Sandia Laboratories Inc., Albuquerque, N.M., Dr. Claassen will teach in the department of metallurgical and mineral engineering during the fall semester.

The board is under auspices of the National Research Council in the National Academy of Sciences and the National Academy of Engineering.

- o -

MADISON--Two students closed out their undergraduate years at the University of Wisconsin-Madison with the end of the second semester with perfect grades.

They received their bachelor's degrees with a straight 4.0 grade point average during their undergraduate years.

They are Steven N. Bertz, Fond du Lac; and Arthur S. Keene, Madison.

Bertz majored in chemistry and received the bachelor of science-chemistry course degree with honors.

Keene majored in anthropology and received the bachelor of arts degree with honors.

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uw news

From The University of Wisconsin-Madison / University News and Publications Service, Bascom Hall, Madison 53706 / Telephone: (608) 262-3571

Release: Immediately 4/12/73 dh

COMPUTER AGE HITS UW-MADISON CAMPUS STUDENTS

MADISON--The computer age is reaching students at the University of Wisconsin-Madison more than ever.

About 590 courses used a computer as part of the teaching process in the last academic year, and the number is increasing. Prof. Larry E. Travis, director of the Academic Computing Center says these figures mean that about 18 per cent of the UW student body use computers each year.

Courses from the College of Letters and Science are the heaviest users. Last year, 294 L&S courses used the computer. This year the number is up to 312.

The College of Engineering has its own computer, and last year, 241 courses involving 1,672 students used it. The School of Business' computer helps about 40 courses a year.

The departments of physics, economics, mathematics, sociology, and computer sciences are the heaviest L&S users. In addition, 75 courses from other UW System campuses use the center here, led by 64 courses from UW-Milwaukee.

Travis feels more students should be using computers, and he blames faculty for holding students back in the area.

"Our main problem to wider usage is faculty resistance and conservatism," Travis says. "Some faculty members feel that to go to a computer is to be replaced instead of enhanced. We have to make it clear that the computer can help them as a teacher.

"In the long run, there has to be a rapid expansion of computer use by students," Travis continues. "The figure of 18 per cent of the students using a computer each year is too low. Unused capacity and decreasing costs mean that more usage doesn't necessarily mean more costs."

Student uses for the computers vary. Last semester, a geography class re-apportioned the state using a computer, and the result was superior to the legislative redistricting agreed upon last year. Some political science students have simulated social problems on the computer trying to find solutions.

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uw news

From The University of Wisconsin-Madison / University News and Publications Service, Bascom Hall, Madison 53706 / Telephone: (608) 262-3571

Computer Sciences Dept.

Release: Immediately 3/6/73 dh

MADISON--"Solar Flares: Explosions on the Surface of the Sun" will be the topic of a free lecture-demonstration by the University of Wisconsin-Madison astronomy department Friday at 7:30 p.m.

It will be held at the planetarium on top of Sterling Hall. Groups planning to attend are asked to give advance notice by calling the department at 262-3071.

- o -

MADISON--"What a Picture Looks Like" will be the title of a paper to be read by Prof. Herbert B. Cole of the University of Wisconsin-Madison philosophy department this Friday at 3:30 p.m. in 4281 Helen White Hall.

Cole will discuss how a picture becomes a symbol of reality and what this means to humans. The reading, which is open to the public, is the second of a semester-long series given by the department.

- o -

MADISON--Prof. Gordon Bell of Carnegie-Mellon University will speak about interconnected computer systems in a special colloquium given by the University of Wisconsin-Madison computer sciences department.

The colloquium will be held Friday at 3 p.m. in room B214 of the computer sciences building. Past applications and present work in interconnected systems will be discussed.

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uw news

From The University of Wisconsin-Madison / University News and Publications Service, Bascom Hall, Madison 53706 / Telephone: (608) 262-3571

Computer Sciences

Release: Immediately 1/15/73 dh

MADISON--The first in a semester-long series of symposia given by the computer sciences department of the University of Wisconsin-Madison will be held Thursday, Jan. 18, at 4 p.m.

The speaker of the first colloquium will be visiting Prof. David J. Rees, who will speak about the computer system at his home University, Edinburgh.

According to Prof. Donald Greenspan, colloquium chairman, the purpose of the meetings is to "present new ideas that haven't been heard before. Each speaker is supposed to bring something new."

Other speakers are: Feb. 1, Prof. Jack Schwartz, New York University; Feb. 15, UW Prof. Vincent Rideout; March 1, UW Prof. George W. Petznick jr.; March 15, UW Prof. Robert E. Kling; April 5, Prof. Alan Perlis, Yale University; and May 3, UW Prof. Olvi L. Mangasarian.

All meetings will be held at 4 p.m. in room B-214 of the Computer Sciences building and are open to the public. Coffee will be served at 3:30 p.m. preceding each meeting.

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feature story

From The University of Wisconsin-Madison / University News and Publications Service, Bascom Hall, Madison 53706 / Telephone: (608) 262-3571

Release: Immediately 8/2/72

By TOM MENZEL

MADISON, Wis.--"Mechanical monsters," "electric brains," "miracle calculators," "electronic brains," and "electric hands." Sounds like the cast of characters on a late movie, but that's hardly the case.

They actually are imaginative names given by area newspapers in 1951 to the University of Wisconsin-Madison card programmed electronic calculator (CPC)--a forerunner of today's computer.

The news media covered the CPC like some kind of monster. The Wisconsin State Journal (Madison) headlined one story "MACHINES AT UW OUTSMART MATHEMATICIANS." Later in the story it reassured, "However, these machines don't think for themselves--they do what they are told to do."

A UW-Madison News Service release in December, 1952, asserted human superiority over the machine: "There may be some hope for the standard model, non-electronic, human-type being after all...the UW's new fashioned card programmed calculator is as hapless as a babe without the guidance of that old-fashioned creature...Man. Far from being a 'brain,' the calculator does no thinking and simply takes its orders from its human masters."

The campus computing service began in 1929 when Prof. Mark H. Ingraham appointed a student part-time for $750 a year. With a hand-operated desk calculator and a couple of slide rules, the "University Computer" handled a total of nine projects for members of the faculty the first year.

- more -

With increased demand, the CPC was added in 1951, rented for $17,000 a year. But it had drawbacks in spite of its amazing capacity to do 2,000 additions per second. Before each project a control panel had to be wired, and on one occasion it took two professors three weeks to wire the panel for one project.

But Wisconsin was one of only five universities in the world to have such facilities at the time--and the first to introduce a computing service.

Shortly after acquiring the CPC, the service was renamed the Numerical Analysis Laboratory. In 1955 NAL installed a new IBM 650 computer--the first of its kind at any university anywhere. It had a "memory" and checked the accuracy of its own answers. Its access time (time it takes to retrieve a figure from memory to use in calculation) was three-thousandths of a second.

This amazing speed prompted some more fearful predictions. "What one of us has not visualized a factory run completely by mechanical robots?" said a Wisconsin Alumnus magazine story in December, 1955. "Uses of computing machines would stagger the imagination of a science fiction writer."

Speeches were made all over the country about the UW computing facility. One UW conference was reproduced in a 236-page book called "The Computing Laboratory in the University." In 1956 WHA-TV produced a show on the workings of the Madison campus "electronic brain." For a "hapless babe" it was getting a great deal of attention.

In 1959 NAL moved to Sterling Hall, and two years later purchased a $1 millior CDC 1604 computer to replace the outdated IBM 650. It was 100 times faster than the 650 and operated 24 hours a day.

In the same year the computer science Ph.D. program began, with 15 awarded the first year and 35 the next. The UW was one of the first universities to offer a degree in this area. Now the department has one of the finest university faculties in the country. With continued expansion and expertise, the computing center was opened up to industry and government, and any citizen of the state.

In 1964 NAL was split into the UW Computing Center and the computer sciences department. In the 1960s computer technology produced new machines almost every two years. The UWCC installed a new CDC 3600, five times faster than the 1604, which had done in an hour what the IBM 650 could do in a week. And the 650 could do in an hour what a skilled operator with a desk calculator could do by hand in 30 years.

The UWCC was the most powerful computing complex in Wisconsin at this time. Adding to that power in 1969 was the new UNIVAC 1108--the latest major development in computer technology. It makes 1.3 million additions per second, compared with the CPC of 20 years ago which made 2,000.

Other comparisons showing the growth of the computer in Madison are the following:

The CPC completed 60 projects in 1951. During the 1971-72 academic year the 1108 had 14,600 users.

Twenty years ago the service had four full-time mathematicians and three graduate students to help with projects. Today there are 69 full-time equivalents, 17 classified employees and student help.

Sixty students a year were trained on the CPC in 1951. Last year the computer sciences department had 2,897 students in 68 courses.

In 1929 paper volume was hardly worth measuring. In six months of operation last year, the center used 61 tons of paper, most of it recycled.

Improvements have been many since Prof. Ingraham started the computing service 42 years ago with one employee, a desk calculator, and a couple of slide rules. Today the newly-named Madison Academic Computing Center is an accepted and integral part of the University.

It is estimated there are about 100,000 computers in the country--every one of them with 100 times the capacity of the old CPC of 20 years ago.

"People's fears were radically exaggerated 20 years ago," said Prof. Larry Travis, center director. "These machines are now performing routine tasks. And there is no miracle about them.

"In the 1950s they were very conservative about recognizing the impact of the computer. Now we realize the possibilities which weren't anticipated 20 years ago. Now we have hopes for their potential. I would say the worries and fears of yesterday have become the hopes of today and tomorrow."

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research news

Computer System

From the University of Wisconsin-Madison / University News and Publications Service, Bascom Hall, Madison 53706 / Telephone (608) 262-3571

Release: Immediately 5/15/72

UIR SCIENCE WRITING DIVISION
University-Industry Research Program (608--263-2811, 263-2876)

By HELY JANIS
UW Science Writer

MADISON, Wis.--Computers have been used to solve numerical problems for a number of years but until recently computer utilization for algebraic computation has been slight.

A number of computer algebra systems have now been devised, including one by Prof. George E. Collins of the University of Wisconsin-Madison's computer sciences department.

Collins' system is extremely popular because it is easily adapted to any computer. It is already in use at more than 40 universities and industrial research centers.

One of the original pioneers of computer algebra, Collins first became interested in its possibilities while studying for his doctorate in mathematical logic at Cornell. Collins read a paper by Alfred Tarski, the mathematical genius at Berkeley, outlining a method for determining whether any mathematical sentence of "elementary algebra" is true or false--a method which potentially could be programmed for computer calculation.

"Like Tarski, I was very much interested in trying to implement this method for a computer," Collins said. However, the task was a lot harder than it looked.

"The computer needed to be programmed for calculations of arbitrarily large polynomials containing several variables and large coefficients." He added that existing computers could not readily manipulate such polynomials.

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Upon completion of his doctoral work, Collins went to work for IBM and devised a method by which some simple algebraic operations could be performed by computers. He presented his method before a meeting of the Association for Computing Machinery (ACM) in 1956.

"However, we still had to have an efficient method for computing Sturm sequences, an operation closely related to finding the greatest common divisor of two polynomials, in order to implement Tarski's method," Collins said.

In 1965, while at the IBM Research Center in Yorktown Heights, N.Y., Collins devised a new and faster method for computing polynomial remainder sequences, thus making it easier to calculate Sturm sequences and greatest common divisors. Recognizing its potential for implementing Tarski's method, he presented it before the first meeting of a special interest group of the ACM in 1966. Known as SIGSAM, the group was comprised of individuals interested in the still unnamed field of computer algebra.

At that meeting, a number of other new and significant findings were reported, and computer algebra was on its way.

Collins, together with W. S. Brown of the Bell Telephone Laboratories in Murray Hill, N.J., has since devised another method of finding greatest common divisors based on the use of modular arithmetic, which is even faster than Collins' previous method. This method was presented at the second SIGSAM meeting in Los Angeles in 1971.

But since 1966, when he moved to Wisconsin shortly after the first SIGSAM meeting, Collins has been working to devise a new computer algebra system. Called SAC-1 (for symbolic and algebraic calculation), it now is a very large and complex system containing nearly 300 subprograms. In addition to its versatility and efficiency, it is an especially important system because it can be easily adapted to any make of computer.

At the present time, the SAC-1 system is in use at universities and industrial computing centers in the United States, Canada, Europe, and Australia. Anumongkol Sirivedhin, a Wisconsin computer sciences doctoral candidate from Thailand will soon implement SAC-1 in his country.

Collins said there are a number of other computer algebra systems now in use, including: IBM's FORMAC; MACSYMA, developed at the Massachusetts Institute of Technology; CAMAL, developed at the University of Cambridge, England; ALTRAN, a Bell Telephone Laboratories system, and REDUCE, developed by Anthony Hearn of the University of Utah for use in theoretical physics.

Collins, his graduate students, and Prof. B. F. Caviness currently are working under a grant from the National Science Foundation to expand SAC-1. However, Collins realizes that it will never be able to perform all of the operations mathematicians might desire.

Despite the fact that we have such sophisticated equipment, a computer can easily become overwhelmed, Collins said, and powerful computers are often needed for what might seem to be relatively simple algebraic operations.

"There are some operations," Collins explained, "that we know computers will never be able to do, for example, in the field of calculus. This impossibility was established in 1966 by Daniel Richardson and has subsequently been elaborated by Prof. Caviness."

However, Collins said, computer algebra will be extremely useful in the work applied and pure mathematicians and scientists do. While it will never wholly replace traditional numerical methods, it is an excellent supplementary tool.

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uw news

From The University of Wisconsin News and Publications Service, Bascom Hall, Madison 53706 • Telephone: (608) 262-3571

Computer Sciences

Release: Immediately 6/26/70 jb

MADISON--New chairmen for 15 departments in the University of Wisconsin College of Letters and Science were announced Friday by Dean Stephen C. Kleene.

The following will assume their new offices next September:

Profs. A. Neil Skinner, African languages and literature; Grant Cottam, botany; John E. Willard, chemistry; Vernon Hall, comparative literature; George E. Collins, computer sciences; Edwin Black, communication arts;

Charles T. Scott, English; Louis Rossi, French and Italian; Robert E. Frykenberg, Indian studies; Robert A. Kimbrough, Integrated Liberal Studies;

Wolfgang R. Wasow, mathematics; Eberhard W. Wahl, meteorology; Gerald C. MacCallum, philosophy; William Epstein, psychology; and Karl E. Taeuber, sociology.

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NEWS OF THE UNIVERSITY OF WISCONSIN

From the University's Statewide Communications Service, 1752 Van Hise Hall, Madison 53706

Release **Immediately** **2/6/70 jb**

BUILDINGS

MADISON--Authority to proceed with final plans for the second unit of the Madison campus Computer Sciences and Statistics Building was granted by University of Wisconsin regents Friday.

The facility will be joined to the existing structure on the north side of W. Dayton street between N. Orchard and N. Charter streets. To cost $2,471,000, the addition will provide office space, instructional areas, and service units.

The space will aid the expanding undergraduate programs of the departments of computer science and statistics, both growing rapidly because of enrollment increases and new course offerings.

The regents also approved final plans and specifications for the Eagle Heights Community Building on the west edge of the Madison campus. To serve a variety of needs for married students residing in the area, the building will house a large, all-purpose activity room, a day-care center, kitchen, hobby room, offices, meeting rooms, lobby, storage and custodial areas.

The total project cost, $300,000, will be financed solely from rents paid to the University.

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uw news

From The University of Wisconsin News and Publications Service, Bascom Hall, Madison 53706 • Telephone: (608) 262-3571

Computer Science

Release: Immediately 1/22/70

UIR Science Writing Division (262-5984)

By PAT WATHEN

MADISON, Wis.--Are computers potentially intelligent?

No one yet knows. But a University of Wisconsin scientist says there is a way to find out.

Leonard Uhr, a professor of computer science who was trained as a psychologist, says research is now under way to discover methods of teaching computers to think.

Uhr is interested primarily in learning how the human brain works. He believes computers can shed light on the actual thinking processes of the mind.

Apparent similarities between brains and properly programmed computers are sufficiently striking so that one can begin to speculate whether computers eventually can be programmed to think.

Uhr's research is described in a recent issue of the "Research Newsletter" of the University of Wisconsin's University-Industry Research Program.

He holds that psychologists who study the brain through rote learning, conditioning, reaction time, and similar techniques are isolating one small part of the thinking process and hence will never be able to understand the brain in all its complexity.

"More often," says Uhr, "these experiments have merely constrained the human subject to the point where he acts like a machine."

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Add one--Artifical Intelligence

Like a number of other psychologist-computer scientists, Uhr is turning to the computer to try to figure out how man does simple things like recognize a familiar face, read handwriting, or play chess.

What he would like to study is the entry and flow of information through the brain, and this flow can be duplicated on a computer.

"The computer's role in such studies is to enable us to write programs--working models of human psychological processes," Uhr explains.

"In a crucial sense, then, computer model building has nothing to do with the computer. The computer is merely a tool, a testing ground for theories."

Uhr and his co-workers have made what he considers real progress in the use of computers for model building. He has taught the computer to read legible handwriting, recognize cartoon faces, and understand spoken speech. Al Zobrist, a graduate student working with Uhr, has programmed a computer to play GO, a Japanese game at least as difficult as chess.

The researchers are now trying to get the computer to interpret language. They want it to learn to understand and use words and phrases, to make transformations of sentences into different tenses and into different languages.

In each of these processes, the computer must look for the meaningful features in input and make rather complex decisions as to the appropriate things to do with the information.

For example, the computer is shown a perfectly printed letter "A" appearing as holes punched on a computer card which is divided into many small squares. The computer examines each square, one at a time, and stores the punched "image" of "A" in its memory.

A computer is so precise that when it is shown another "A" which differs by even a single square, it can recognize it as something different. But Uhr has also "taught" the computer to recognize this modified letter as another "A" and not something entirely different.

But how? What does the computer recognize? Certainly it is not the exact position of the squares, but rather it is the recognition of a similar feature, of interrelations between parts of the picture.

Called "pattern recognition" by computer scientists, this process is not new. What is new is work at Wisconsin which demonstrates that the computer is beginning to decide--by itself--what features of a given pattern appear again and again. In a letter of the alphabet, for example, it may be the slant of a certain line, or the angle at which two lines meet, or some other "characterizer" that appears repeatedly.

It is a relatively easy task for the computer to recognize a face or a letter if it is told what to look for each time. In such a case, the characterizer is simply programmed into the computer. Uhr, however, has taken on a more difficult task. He wants the computer to develop its own charcterizers.

The computer learns the characterizers by trial and error. If the computer makes a mistake, Uhr corrects it by feedback or by giving it the right answer. In this way, the computer can "learn" where it went wrong, modify its characterizers, and even generate new characterizers.

Uhr feels that the computer, which at this stage is learning very simple things, will later progress to more difficult tasks such as understanding human speech. Uhr suggests that this will happen in much the same way that life evolved into intelligent life, responding to the pressures of natural selection, building block by building block.

Will the computer ever evolve emotions and feelings similar to those of man? Uhr comments that speculation at this time would be foolish.

"However," he suggests, "we build a kind of motivation into the computer when we program it to learn.

"This is because every time the computer makes a mistake it is corrected by feedback. This type of motivation does not involve pleasure or pain," he points out," but it may be the basis for feelings in the far more complex computer programs of the new future.

"After all," he adds," we don't really know what feelings are."

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NEWS OF THE UNIVERSITY OF WISCONSIN

From the University's Statewide Communications Service, 1752 Van Hise Hall, Madison 53706

Release **Immediately** **11/14/69 jb**

BUILDING PROJECTS

MADISON--Revised preliminary plans for one construction project and concepts for two others on the Madison campus were approved by the University of Wisconsin regents Friday.

Initial plans for the three-story Zoology Classroom Building were originally approved by the regents more than a year ago. It was redesigned to eliminate a second level approach, part of an overhead pedestrian walkway system linking several facilities in the expansion area south of University ave.

With a budget of $3,442,350, the building will be located at the corner of N. Mills and W. Johnson streets, adjacent to the Zoology Research Building. Federal sources will supply $247,861, state funds the remainder.

Concept drawings for Computer Sciences and Statistics Center-Unit II and stage one of the Pharmacy Building also were approved.

The center addition will be joined to the existing structure on the north side of W. Dayton street between N. Orchard and N. Charter streets. To cost $2,471,000, the facility will provide office space, instructional areas, and service units.

The first phase of the new Pharmacy Building, with a budget of $2,700,000, will be erected in the area bounded by University ave., N. Brooks, W. Johnson, and N. Park streets.

- more -

It will provide teaching and research laboratories, administrative areas, and a lecture-demonstration hall. Stage two will be added at a later date, according to present planning.

The regents also:

Authorized preparation of plans for new recreational facilities on the west end of the Madison campus, near University Bay Drive, at a cost of $173,000. Plans outline 12 outdoor tennis courts, basketball half courts, and grading, top soil, and seeding of the area. This will be financed from State Building Trust funds.

Authorized an increase of $116,434 in the schedule of costs for the Humanities Building and Elvehjem Art Center in Madison to provide additional equipment and services not covered in the original budget.

Asked for plans, specifications, and bids for greenhouse facilities at the Arlington Farms, near Madison, the anticipated budget to be paid out of Hill Farm receipts.

Approved the use of two Madison sites for the placement of three re-locatable buildings to provide additional facilities for the UW Medical Center. The sites are at the proposed Medical Center on the West Campus and at the Neurological Rehabilitation Center on E. Washington Ave.

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uw news

Computer Sciences

From The University of Wisconsin News and Publications Service, Bascom Hall, Madison 53706 • Telephone: (608) 262-3571

Release: Immediately 4/28/69 1b

MADISON--A University of Wisconsin teaching assistant has been named to a national award for getting a computer to play Go.

Albert L. Zobrist of the department of computer sciences at Madison will receive a Prize Paper Award May 15 from the American Federation of Information Processing Societies (AFIPS).

The game of Go, a Japanese version of chess, is played with black and white pebbles upon a board marked into 361 squares. It requires the perception of complex patterns as they emerge according to the disposition of the contrasting colors. Zobrist's computer program simulates a visual response to the arrangement of the colored pebbles.

Zobrist is a member of a research team, headed by Prof. Leonard Uhr, which is investigating problems related to computer pattern-recognition. Sophisticated pattern-recognition programs would enable computers to, for example, recognize faces, identify fingerprints, analyze electrocardiograms, and read handwriting.

Zobrist will accept the Prize Paper Award in Boston at the 1969 Spring Joint Computer Conference. His paper was chosen from several hundred submitted to AFIPS, a federation of a number of societies, including the Institute of Electrical and Electronics Engineers, the Association for Computing Machinery, and the Society for Industrial and Applied Mathematics.

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uw
news

From The University of Wisconsin News and Publications Service, Bascom Hall, Madison 53706 • Telephone: (608) 262-3571

Release: Immediately

5/29/68 hb

MADISON--New chairmen have been named in 15 departments of the Letters and Science College of the University of Wisconsin in Madison, Dean Leon D. Epstein announced Wednesday.

Included are Arnold Strickon, anthropology; Paul Plass, classics; Arthur E. Kunst, comparative literature; Seymour Parter, computer sciences;

Wayne Schlepp, east Asian languages & literature; Gerald G. Somers, economics; Simeon K. Heninger, English; Robert N. Taaffe, geography; Sturges W. Bailey, geology and geophysics;

John A. Nohel, mathematics; Haskell Fain, philosophy; Leonard Berkowitz, psychology; Richard N. Ringler, Scandinavian studies; Lawrence L. Thomas, Slavic languages; and David Mechanic, sociology.

###

Computer Science
Statistics

uw news

From The University of Wisconsin News and Publications Service, Bascom Hall, Madison 53706 • Telephone: (608) 262-3571

Release: **RELEASE: 2 P.M. WEDNESDAY, DEC. 21**

MADISON, Wis.--University of Wisconsin officials signed an agreement today for the acquisition of a Burroughs B8500 Computing System.

The large scale system will provide a considerable increase in the power and capability of the University's computing center and is the first step in the establishment of a computing information utility which will serve more than 700 user stations at various UW campuses in the state. The B8500 will be installed in the new UW Numerical Analysis-Statistic Complex on W. Dayton St.

"This new system will become an integral part of the University in the same sense as are libraries", said Dr. M. E. Muller, UW Computing Center director. "Already we see the importance of computing in many areas of teaching and research. This utility will also open many new avenues in problem solving and education by allowing the user and the machine to work together as a team and will provide for the storage and access of vast amounts of information to authorized users throughout the state. The system will provide the capability of servicing the highly diversified and growing data processing and computing needs of the U.W."

A major area of activity is "number smashing", the high speed computation of numerical data. The U.S. Army Mathematics Research Center, Theoretical Chemistry Institute, Physics Department and others are all involved with heavy computational work loads. Another important area of use is information processing. The utility will make it possible for many on-line users at the same time to perform computation, data manipulation, and data storage and retrieval on the new system. At many remote locations throughout the state, users will have finger tip access to the powerful B8500 central facility and be able to communicate with it via phone lines in simple convenient computer languages.

- more -

In addition to the on-line man-computer interaction, this facility will provide the capability for machine-computer interaction. The on-line connection of medical equipment, the control of a remotely located telescope for space research, psychological response monitoring and the collection of data from high energy physics experiments are all examples of the capabilities provided the researcher to help him carry out his experimentation.

Wisconsin established one of the first departments of computer sciences in the country, and offers both graduate and undergraduate degrees. The department now has 28 faculty members doing research covering a broad spectrum of computer applications, according to Professor J. B. Rosen, chairman of the Computer Sciences Department. It is expected that by 1968 approximately 2,000 students will be enrolled in computer sciences courses.

"When the new B8500 is completely installed, the University will have computing power when and where needed, and in sufficient quantity to meet these needs," Muller said. "It will have a 'fail soft' capability, that is it will continue to provide service even if some of the major components of the system fail."

The existing UW system is widely recognized presently as the largest computer installation in the state.

When the initial portion of this new system is installed in February 1968, and is in operation, Dr. Muller said the Computing Center's power and capability would be increased some 15 times.

The B8500 will be installed in several phases, extending into 1971. The initial system will cost $4.5 million. When fully completed, the high speed centralized computing system is expected to be connected throughout the state, with much of the equipment to be installed on the various campuses of the University. Federal grants are expected to provide a significant portion of the financing, Muller said.

He added that if separate comparable units were set up in Madison, Milwaukee, Marshfield, Menasha, Green Bay, Kenosha, Manitowoc, Marinette, Wausau, Racine, Janesville, Waukesha, and Sheboygan campuses, "the total cost would be two to three times as much."

The decision to acquire the new system was based on 18 months of study and evaluation by the professional staff of the Computing Center and other faculty members, particularly those utilizing computers in teaching and research.

"This will provide every student at the University an opportunity to discover the role of computers, and to understand the significant impact of the new technology on society," Dr. Muller said.

###

[Computer Sciences]

UNDERGRADUATE MAJOR IN COMPUTATIONAL METHODS AND STATISTICS

In recent years a significant advance in human capability has occurred with the introduction of new kinds of quantitative methodology. These have made possible important advances in not only the exact sciences but in such areas as medicine, education, psychology, and biology.

Two parallel developments have brought about this situation

(A) a new understanding of how to generate and analyze data has shown how valid inferences may be drawn in the presence of uncertainty

(B) high speed electronic computation has made it possible to explore stochastic and deterministic mathematical models of sufficient complexity to be realistic.

These two developments are closely related and a body of connected knowledge exists which will provide a valuable intellectual challenge to the student. A curriculum has been prepared which leads the student to an understanding of the uses, possibilities, and interrelationships of these new methods.

In preparing the joint curriculum it has been in mind that some graduates of this major will leave the University to take up occupations where they do not need to apply specifically what they have learned. For these people we believe that the course will have provided an intellectual experience and perhaps a better understanding of the world in which they live. Others will take jobs which directly involve the use of quantitative methods and will find their studies of immediate practical help. Finally, we hope there will be some who will be stimulated to continue in graduate school either in Computer Sciences or Statistics or perhaps to study some subject in the physical, biological, social, or engineering sciences with this quantitative aspect particularly in mind.

Required Courses. The titles of Computer Sciences and Statistics courses to be required for the major are listed below. Other specific requirements are noted too.

Required Courses in Computer Sciences.

- Basic Computer Sciences I and II, C.S. 203 and 204 (Student can also satisfy this requirement by taking Computer Sciences 301 or 315, and 415 and 467.)
- Numerical Analysis I and II, C.S. 413 and 414.
- Introduction to Optimization Methods, C.S. 5XX.

Required Courses in Statistics.

- Introduction to the Theory of Probability, Stat. 431.
- Introduction to Mathematical Statistics, Stat. 309 and 310.
- Statistical Analysis of Data, Stat. ~~XXX.~~ 317
- Statistical Design of Experiments and Surveys, Stat. ~~XXX.~~ 318.

NOTE: The student will also be required to take three semesters of calculus and a course in Linear Algebra. Furthermore, the student must develop a degree of advanced intellectual depth by taking six upper-division credits in some cohesive group of courses which must be approved by both departments. The six units may be satisfied by courses offered by any department and they need not all be from the same department.

A Suggested Typical Course Schedule.

		Freshman		
I - Calculus & Analytic Geometry	4-5	II -	Calculus & Analytic Geometry	4-5
Foreign Language	3-4		Foreign Language	3-4
English	3		English	3
Electives	5-7		Electives	5-7
		Sophomore		
I - Calculus & Analytic Geometry	4-5	II -	Probability (Stat. 431)	3
Basic Comp. Sci., I(C.S.203)	4		Basic Comp.Sci.,II(C.S.204)	4
Electives	8-9		Electives	10
		Junior		
I - Linear Algebra	3	II -	Numerical Analysis I(C.S.413)	3
Math. Statistics I (Stat.309)	4		Math.Statistics II (Stat.310)	4
Specialization	3		Electives	11
Electives	8			
		Senior		
I - Numerical Analysis II(C.S.4XX)	3	II -	Intro.to Optimization Methods (C.S. XXX)	3
Stat. Analysis of Data (Stat. ~~XXX~~ 317)	3		Stat. Experiment & Survey Design (Stat. ~~XXX~~ 318)	3
Specialization	3		Electives	8
Electives	8			

Timetable for Introducing New Courses.

In addition to introduction of the two 4-credit Basic Programming courses, Basic Computer Sciences, 203 and 204 in Fall 1965 and Spring 1966 respectively, the following new courses will be scheduled:

Fall - 1966 : Introduction to Optimization Methods, C.S. 5XX, 3 credits
Statistical Analysis of Data, II Stat. ~~4XX~~ 312, 3 credits

Spring -1967: Statistical Design of Experiments & Surveys, Stat. ~~XXX~~ 318, 3 credits
Numerical Analysis, II C.S. 414, 3 credits

Catalogue Descriptions.

Below are listed the intended catalogue descriptions of the courses cited above.

Required Courses in Computer Sciences

C.S. 203 Basic Computer Sciences, 4 credits
Introduction to the theory and use of computing machines. Algorithms, types of computers, procedure oriented language programming, machine language programming, characterization of digital computers, input-output devices.
Prerequisites: One year of mathematics or advanced pre-university mathematical preparation or consent of instructor.

C.S. 204 Basic Computer Sciences, 4 credits
File organization and processing, processing of non-numeric information, list processing, list processing languages, program planning and implementation.
Prerequisite: Comp. Sci. 203.

C.S. 413-414 Introduction to Numerical Analysis [See Math 413-4(133)]
Yr; 3 credits for each
Iterative procedures, solution of linear and nonlinear equations; finite differences and the approximation of functions; numerical integration and differentiation; numerical solution of differential equations; error analysis and pitfalls in computation.
Prerequisites: Math 233(22) or 222-3(62).

C.S. 5XX Introduction to Optimization Methods, 3 credits
The nature of optimization problems, deterministic and stochastic problems, discrete and continuous problems, computer methods of solution, systematic and random search, linear programming, maximization with side conditions, lagrange multipliers, convex functions and sets, steepest descent and gradient methods, dynamic programming, variational problems and optimal control theory.

Required Courses in Statistics

Stat. 309 (137a) Introduction to Mathematical Statistics. [See Math.309(137a)]
I; 4 credits
Probability and combinatorial methods, discrete and continuous, univariate and multivariate distributions, expected values, moments, normal distribution and derived distributions, estimation, for majors in statistics or mathematics.
Prerequisites: Math 233(22), 222-223 (62), or 302 (101b); or equiv.

Stat. 310 (137b) Introduction to Mathematical Statistics. [See Math.310(137b)]
II; 4 credits
Testing of hypotheses, analysis of variance, including fixed, random and mixed models, comparison of means, method of least squares, orthogonal polynomials, for majors in statistics or mathematics.
Prerequisites: Stat. 309 (137a) or equiv.

Stat. 431 (118a) Introduction to the Theory of Probability. [See Math. 431 (118a)] I; 3 credits
Probability in discrete sample spaces, combinatorial analysis, conditional probabilities, stochastic independence, Laplace limit theorem, Poisson distribution, laws of large numbers, applications to physics and statistics.
Prerequisites: Math 233 (22) or 222-223 (62).

Stat. ~~XXX~~ 317 Statistical Analysis of Data. 3 credits
Revision and expansion of least squares and analysis of variance, missing observations, unequal groups, examples. Analysis of survey data, transformations with examples, discrete data.

Stat. ~~XXX~~ 318 Statistical Design of Experiments and Surveys, 3 credits
Assumptions of least squares and analysis of variance, correlation and causation, happenstance data and design, randomization, replication, orthogonality, internal estimates of error, randomized blocks, latent squares, balanced incomplete blocks, survey designs, stratification, factorials, fractionals, response surface design.

uw news

From The University of Wisconsin News and Publications Service, Bascom Hall, Madison 53706 • Telephone: (608) 262-3571

Release: Immediately 7/29/66 jb

By JACK BURKE

MADISON, Wis.--A busy Madison campus building program is doing its best to keep pace with the mounting registration of University of Wisconsin students.

More than 33,000 are expected to register this fall. To meet this challenge, the University will open the doors to six new structures, together with additons to two others.

There will be more classrooms; lecture, library, and research areas; and offices--as well as 12,700 more seats for football fans at Camp Randall stadium. Classes begin Sept. 12.

Another project, the UW Alumni House on the shore of Lake Mendota, was planned to be ready for homecoming Nov. 5, but construction and design delays forced a change in schedule.

The new projects nearing completion:

Biotron, Social Science Research Center, Molecular Biology and Biophysics, Numerical Analysis-Statistics, Medical Library, heating plant addition, the west classroom wing of Van Hise Hall, and the Camp Randall addition.

The $4.8 million Biotron on Observatory Drive, the only structure of its kind in the world, is a huge computer-controlled environment machine with a three-story building erected around it. In its laboratories, scientists will produce artificially almost any climate known to man. They will study precisely the life processes and behavior of plants and animals under controlled conditions.

-more-

Add one--building

Also on Observatory Drive, the Social Science Research Center, built at a cost of $2 million, will house the departments of anthropology, economics, sociology, and the Wisconsin Survey Research Laboratory. An eight-story unit, it is located just north of the Carillon Tower, on the lakeshore.

Built with $2.2 million in grants and gifts, the Molecular Biology and Biophysics Laboratories on the College of Engineering campus will permit a number of departments--11 at last count--to join in various programs. Administration of the laboratories is under direction of the Graduate School.

The Numerical Analysis-Statistics complex, a $1.6 million project, houses $5 million in computing equipment, and provides offices, classrooms, training and research space, and administrative areas. It is located on West Dayton Street.

The first phase of the new Medical Library on Linden Drive, named in honor of Dr. William S. Middleton, former dean of the UW Medical School, was built for $1.1 million, most of it coming from private and industrial gifts. The second and third phases of the library are planned for the 1969-71 biennium.

The $2 million heating plant addition on North Charter Street will provide a boiler capacity of 200,000 pounds of steam 24 hours a day, sufficient for projected University needs in Madison until 1971.

The west wing of the new Van Hise Hall on Linden Drive and North Charter Street will be opened in time to ease the shortage of classrooms. The five-story section contains 50 classrooms with a capacity for 2,000 students. The hall's 18-story tower will be completed next summer.

In addition to the cantilevered second deck on the Breese Terrace (west) side of the stadium, the University is building a new communications center for press, radio, and television personnel. The $3 million stadium improvement, paid by athletic receipts, will be ready for the season opener against Iowa State Sept. 17.

###

NEWS FROM THE UNIVERSITY OF WISCONSIN

Serving the state through campuses at Madison and Milwaukee, nine University Centers, and a statewide extension system.

7/6/65 rt

RELEASE Immediately

MADISON--The University of Wisconsin has received eight federal grants totalling $3,352,770 under the Higher Education Facilities Act, Pres. Fred Harvey Harrington announced Tuesday.

Four, for classroom buildings under Title I of the act, totalling $2,320,594, were awarded on recommendation of the State Commission for Academic Facilities which was set up by Gov. Warren P. Knowles to guide the allocation of these funds to private and public higher education institutions in the state. Atty. James L. Everson, Green Bay, is commission chairman.

These four include $1,014,821 for Van Hise Hall, the language building now under construction on the Madison campus; $610,677 for the new Waukesha County University Center; $219,330 for the new Rock County University Center; and $475,766 for the new University of Wisconsin-Milwaukee Library.

Four additional federal grants, under Title II of the act to supplement construction support for research facilities, totalling $1,032,176, were made directly to the University by the federal government.

These include an additional $363,000 for Van Hise Hall, $331,660 for the lower campus development, $269,016 for the Chemistry Building, and $68,500 for the Numerical Analysis-Statistics Building, all on the Madison campus.

Both the instructional and research facilities support from the Education Facilities Act are provided to supplement other funds to make possible the increase of enrollments and expansion of research in higher educational institutions throughout the country.

-more-

Add one--federal grants

Criteria for allocation of Wisconsin's share under Title I of the act were developed by the State Commission for Academic Facilities in consultation with the Wisconsin Association of Presidents and Deans of Institutions of Higher Learning.

##

NEWS FROM THE UNIVERSITY OF WISCONSIN

Serving the state through campuses at Madison and Milwaukee, nine University Centers, and a statewide extension system.

8/20/65 jb

RELEASE Immediately

MADISON, Wis.--The University of Wisconsin regents Friday accepted grants and gifts and approved contracts with federal agencies aggregating $16,544,570, including $3,352,770 from the U.S. Office of Education to help defray costs of construction projects on four campuses.

The list--largest and longest in the University's history--also included 105 contributions from Wisconsin sources.

The building projects include the 19-story Charles R. Van Hise (language) Hall in Madison, for which the Office of Education allocated $1,377,821; the nine-story addition to the Chemistry Research Building, Madison, $269,016; History, Music, Art-Art Education, Madison, $331,660; the first segment of the Numerical Analysis-Statistics Building, Madison, $68,500; new library at Milwaukee, $475,766; classroom, laboratory, and library facilities at the new Waukesha Center, $610,677; and the classroom and administration buildings at the new Rock County Center near Janesville, $219,330.

The National Institutes of Health provided $868,221 for continued operation of the Wisconsin Regional Primate Research Center in Madison. National Science Foundation grants included $568,175 for graduate fellowship programs and $550,000 for expansion of facilities at the University Computing Center in Madison.

A half-million dollars was allocated by the Agency for International Development to continue support of the Land Tenure Center at Madison. The Department of Interior Office of Water Resources Research contributed $139,797 for the University's Water Resources Center, newly established at Madison.

-more-

The National Aeronautics and Space Administration provided $900,000 to support space related research in theoretical chemistry, other areas of space science, and engineering under the direction of the Graduate School and the Theoretical Chemistry Institute.

Other allocations include $461,000 from the Ford Foundation for the University of Wisconsin to assist in development of the School of Economics at the University of the Philippines, and $289,468 from the State Conservation Commission to cover cooperative research programs in fishery, wildlife, water, forestry, and related resources.

The contributions from Wisconsin sources included:

The Johnson Foundation, Racine, $1,750; Mrs. Edmund Fitzgerald, Milwaukee, $800; Wisconsin Society for Jewish Learning, Milwaukee, $11,375; A. J. Sweet Inc., Madison, $200;

Mrs. Winifred Woodmansee, Milwaukee, $320; Pelton Foundation, Milwaukee, $1,100; Lee's Drug Store Inc., Menomonie, $250; American Dairy Association of Wisconsin, Madison, $500; Harry J. Grant Foundation, Milwaukee, $4,000; Kohler, Wis., Foundation Inc., $10,000; Wisconsin Valley Traffic Club, $500; Kremers-Urban Co., Milwaukee, $7,500;

Rainbow Lodge Inc., Vilas County, $575; Production Credit Association of Appleton, $400; Fonteine, McCurdy and Co., Milwaukee, $500; National Society of the Colonial Dames of America in Wisconsin, $500; Green Tree Garden Club, Milwaukee, $500; Rock County Bankers' Association, Milton Junction, $400; First National Bank of Ft. Atkinson, $200;

Mr. and Mrs. Thomas A. Ringness, Madison, $250; McKesson and Robbins, Milwaukee, $300; Wisconsin Elks' Association, Green Bay, $1,020; Wisconsin Fertilizer Association, Madison, $200; Wisconsin Rural Rehabilitation Corp., Madison, $2,700; A. O. Smith Corp., Milwaukee, $1,500; American Cancer Society, Wisconsin division, Madison, $800;

Add two--gifts and grants

Oak Electro/Netics Corp., Elkhorn, $15,000; Phi Beta Play Readings, Madison, $700; Wisconsin Canners and Freezers' Association, Madison, $377.50; Reedsburg, Wis., United Fund Inc., $2,000; Wisconsin Dental Association Foundation Inc., Milwaukee, $500; Oscar Mayer and Co., Madison, $4,000; Belle City Malleable Iron Co., Racine, $1,600;

Nekoosa-Edwards Foundation Inc., Port Edwards, $3,500; Sheboygan, Wis., Public Schools, $4,111; Prof. Robert West, Madison, $250; Grafton, Wis., Public Schools, $1,304;

Kraut Foundation Inc., Fond du Lac, $200; Prof. William G. Reeder, Madison, $1,325;

Marathon Electric Mfg. Co., Wausau, $759; Madison Chamber of Commerce, $711; 1965 Senior Class, University of Wisconsin-Milwaukee, $1,936;

Wisconsin Regional Writers' Association Inc., Sheboygan Falls, $1,028; First Wisconsin Trust Co., Milwaukee, $325; Extension Journal Inc., Madison, $5,000; and University Surgical Associates, Madison, $3,000.

##

NEWS FROM THE UNIVERSITY OF WISCONSIN

Serving the state through campuses at Madison and Milwaukee, nine University Centers, and a statewide extension system.

8/20/65 jb

RELEASE Immediately

MADISON, Wis.--The University of Wisconsin regents Friday authorized the Wisconsin State Agencies Corporation to award contracts for construction of the $1.6 million Numerical Analysis-Statistics Building on the Madison campus.

The action is subject to approval of Gov. Warren P. Knowles and the state director of engineering.

Lower bidder on the general construction contract was John Dahl, Madison, at $694,000. Other contracts, authorized on low bids were:

Plumbing--M. J. Thomas Heating Service, Madison, $35,310; heating and air conditioning--C.A. Hooper Co., Madison, $249,942; electrical--Pieper Electric Inc., Milwaukee, $159,000; elevator--Northwestern Elevator Co., Milwaukee, $23,528; and steam service--Welch Plumbing Co., Madison, $42,600.

The three-story building will be erected on the north side of West Dayton St. between Orchard and Charter Sts. For the University Computing Center and the departments of statistics and computer sciences, it will house approximately $5 million in computing equipment, and provide offices, classrooms, training and research space, and administrative areas.

Construction is expected to begin in September and be completed within 18 months. The National Science Foundation allocated $600,000 for the project, the state providing the remainder.

##

Numerical Analysis & Statistics Bldg.
(Computer Science - Statistics)

BUSINESS AND FINANCE COMMITTEE

That, subject to the approval of the Governor and the State Director of Engineering, Wisconsin State Agencies Building Corporation be authorized to award contracts for construction of the Numerical Analysis & Statistics Building (Computer Science - Statistics) on the Madison Campus of the University (Project No. 6406-12) to the low bidder in each division of the work on the basis of the base bids, as follows; and that the following schedule of costs be approved:

General Construction		
John Dahl Madison, Wisconsin	Base Bid No. 1	$694,000.00
Plumbing		
M. J. Thomas Heating Service Madison, Wisconsin	Base Bid No. 2	35,310.00
Heating & Air Conditioning		
C. A. Hooper Company Madison, Wisconsin	Base Bid No. 3	249,942.00
Electrical		
Pieper Electric, Inc. Milwaukee, Wisconsin	Base Bid No. 4	162,500.00
	Alt. Bid No. 4B, deduct	- 3,500.00
	Net Contract Amount	159,000.00
Elevator		
Northwestern Elevator Company Milwaukee, Wisconsin	Base Bid No. 5	23,528.00
Steam Service		
Welch Plumbing Company Madison, Wisconsin	Base Bid	42,600.00

Schedule of Costs

Total Construction Contracts including Fixed Equipment & Site Development (Roads, Walks, Paving, etc.)	$1,204,380.00
Central Chilled Water System	11,500.00
Stainless Steel for 6" Condensate Return	860.00
Design and Supervision	94,000.00
Movable Equipment, Furniture, etc.	65,000.00
Contingencies	50,000.00
Landscaping	8,000.00
Total Construction Budget	$1,433,740.00
Land	196,100.00
Grand Total	$1,629,840.00

(Contd.)

BUSINESS AND FINANCE COMMITTEE RECOMMENDATION (Contd.)

Schedule of Costs (Contd.)

Estimated Source of Funds:		
National Science Foundation Grant GU-602, 144-5125		$ 600,000.00
Wisconsin State Agencies Building Corporation		
Construction	$ 833,740.00	
Less Office of Education Title II	68,500.00	
	$ 765,240.00	
Add Cost of Land	196,100.00	
Total Wisconsin State Agencies Building Corp.		$ 961,340.00
Office of Education - Title II		68,500.00
Grand Total		$1,629,840.00

Item II, 3, f-2

8/20/65

F.C.

THE UNIVERSITY OF WISCONSIN
Computer Sciences Department
311 North Park Street
Madison, Wisconsin 53706

August 27, 1965

Dear Colleague:

In order to more adequately cover the field of Computer Sciences we have recently introduced several new courses and modified the content of some courses previously given. Since not all of these additions and changes appear in the new graduate school catalog I am sending the following information directly to you:

1. A brief description of all courses to be taught by the department during Semester I, 1965-66.
2. A brief comparison of our introductory courses.

I am also enclosing a description of our recently approved program for an Undergraduate Major in Computational Methods and Statistics, a joint major between the Computer Sciences and Statistics departments.

I would appreciate your bringing this information to the attention of interested students.

Sincerely yours,

J. B. Rosen

J. B. Rosen
Chairman

JBR:pr

DESCRIPTION OF COMPUTER SCIENCES COURSES

Fall 1965-66

132. Introduction to Computing Machines. 3 cr. Koenig, Davidson

How computers work; communicating with computers; areas of application and significance; simple FORTRAN programming; elementary data processing and problem solving. Prereq: Intermediate level high school mathematics.

203. Basic Computer Sciences. 4 cr. Travis

Introduction to theory and use of computers. Algorithms, types of computers, procedure oriented language (FORTRAN) programming, machine language programming, characterization of digital computers, input-output devices. Prereq: One year math., or advanced pre-university math. preparation, or consent of instructor.

301. Computer Programming in the Physical Sciences. 2 cr. London

Construction of algorithms, flow charting, and use of procedure-oriented languages (e.g. FORTRAN) in solving problems from the physical sciences; survey of other procedure-oriented languages; advanced programming techniques using FORTRAN. Prereq: Jr. St. Math. 233 or 222-223.

315. Introduction to Data Processing Methods. 3 cr. Travis

Introduction to computers in data processing applications; elementary programming (FORTRAN); elementary information processing and retrieval using digital computers. Prereq: Jr. St. and one semester of mathematics; or consent of instructor.

412. Introduction to Numerical Methods. 3 cr. Cudia - Moore

FORTRAN programming, finite-differences, zeros of polynomials, interpolation and approximation, linear equations, least squares, quadrature, numerical methods for ordinary differential equations. This course is intended for those students who are interested in immediate applications and do not intend to pursue further studies in numerical analysis. Prereq: Math 233 or 222-223.

413. Introduction to Numerical Analysis. 3 cr. Moore - Russell

(Also Math 413) Iterative procedures, finite difference methods, error analysis, zeros of polynomials, polynomail approximation, and numerical quadrature. Methods suitable for digital computers will be emphasized. Prereq: Math 233 or 222-223, Elementary knowledge of FORTRAN.

415. Theory and Operation of Computing Machines. 3 cr. Lovell

(Also Math 415) Programming for digital computers. Number systems, Boolean algebra, machine language programming; design, implementation and use of computer languages. Prereq: Math 233 or 222-223 and elementary knowledge of FORTRAN, or consent of instructor.

425. Linear Programming Methods. 3 cr. Rosen

(Also Math) (Also Stat) Primal and dual formulation of linear programming problems. The simplex method and related primal, dual and parametric methods for efficient computer solution. Special algorithms for transportation and network flow problems. Decomposition and partitioning methods for large problems with block-diagonal structure. Stochastic linear problems. Prereq: Math 443 or consent of instructor.

536. Introduction to Systems Programming. 3 cr. Lovell

An intermediate level survey of systems programming, including: General principles of assemblers and compilers, formal properties of computer languages, metacompilation, comparison of various procedure-oriented languages, and general principles of executive and monitor programs. Implementation techniques will also be considered. Prereq: C.S./Math 415 or consent of instructor.

699. Undergraduate Reading and Research. Consent of Instructor.

717. (813) Advanced Numerical Analysis. 3 cr. Noble

(Also Math 717) The numerical solution of linear systems, eigenvalue problems and polynomial equations, with particular emphasis on rounding errors. Approximation of functions by polynomials, least squares, Tchebyshev methods, etc. Quadrature. Prereq: Math 321, 521 or consent of instructor.

837. Topics in Numerical Analysis and Approximation Theory. 3 cr. Parter

(Also Math 837) Topics in approximation and interpolation theory. We will stress a functional analysis "view" of the problems. However, no previous course in functional analysis is required. The topics will include: (a) Remainder Theory, (b) Uniform Approximation, (c) Least Squares Approximation and (d) Orthogonal Polynomials. Prereq: Consent of instructor.

838. Topics in Computing I. 3 cr. (Also Math 838) Prereq: Consent of instructor.

Section 1. Theorem Proving by Computer London, Travis

A critical and detailed analysis of existing theorem proving and other deductive inference programs, including some whose input is (a subset of) English. Specifically, e.g. the work of Newell-Shaw-Simon, Gelernter, Wang, Davis, Putnam, J. A. Robinson, Raphael, Lindsay.

Section 2. Dynamic Models of Intelligent Processes Uhr

This course will examine the large digital computer as a tool for building theoretical models of the sort of complex information-processing mechanisms that we find in living systems. Problems, experimental findings, and computer-programmed models in pattern recognition, concept formation, problem-solving, theorem-proving, game-playing, language-processing, question-answering, language translation, learning, neural interaction, and group interaction, will be discussed.

Several programmed models will be examined in detail, to give the student an awareness of the organizational and programming problems involved. Several specific problem-areas, such as concept-formation and stochastic learning, will be examined in detail, to see what are the advantages, and the disadvantages, of programmed models.

Students will be expected to complete a term paper that is either: (a) a programmed model, (b) a detailed formulation for a programmed model, or (c) an integrative survey and discussion of some substantive problem, leading in the direction of a theoretical formulation.

Section 3. Introduction to Formal Linguistics Cudia

990. Thesis and Research. Prereq: Consent of instructor.

999. Independent Study and Research. Prereq: Consent of instructor.

Computer Sciences Department

BRIEF COMPARISON OF SOME INTRODUCTORY COURSES

Fall 1965-66

132 Introduction to Computing Machines — Koenig, Davidson

This is a survey course for non-majors who wish an introduction to what a computer is, how one uses a computer and the many possible applications of computers in science, business and industry. The better student may follow this course with CS 415 or 467. Students looking for a basic programming or numerical analysis course should consider CS 301, 315, 412 and 413.

203 Basic computer sciences — Travis

This is the foundational course for the computer sciences undergraduate major. Includes basic (FORTRAN) and advanced (Machine Language, IPL) programming, both numerical and non-numerical. It also introduces basic concepts of theory of computing and mathematical linguistics. Does not include any numerical analysis. This is the first half of a two semester sequence which the student should plan to complete. While open to both majors and non-majors, the non-major should also consider CS 132, 301, 415 and 467.

301 Computer programming in the physical sciences — London

Introductory (FORTRAN) programming, primarily for students in physical sciences. (See CS 315). Does not include any numerical analysis. This is a good course, for example, for the graduate student who needs to learn to use the computer for his thesis research. Possible alternatives are CS 412, short courses (non-credit) offered by the Computing Center, or, if the student's interest is broader and more casual, CS 132.

315 Introduction to data processing methods — Travis

Despite its title this course is quite similar to CS 301 except that it is intended for students not in the physical sciences. In addition to FORTRAN, a language for non-numerical programming is also covered (though more briefly). Remarks about 301 also apply to 315.

412 Introduction to numerical methods — Cudia - Moore

This course covers both programming (FORTRAN) and numerical methods. Excellent course for student wishing to use computer in solving problems arising in his other courses (Engineers - take note). Contains material covered in both CS 301 (or 315) and 413 although obviously not in quite the depth.

413 Introduction to numerical analysis — Moore - Russell

This course is quite well described by its title. Course does not include any programming, it is assumed that the student can write at least simple FORTRAN programs when he enters this course (See CS 132, 301, 315). This is a prerequisite course for all advanced courses in numerical analysis. It is the first half of a two semester sequence.

415 Theory and operation of computing machines — Lovell

This course is mentioned here only to emphasize that it is not an introductory course. A knowledge of FORTRAN is assumed. Would normally be preceded by CS 132 (better students only), 301, 315.

It should be noted that all the above mentioned courses involve computer laboratory work.

Because of overlap in material covered a student may not receive credit for both (132, 301), or both (132, 315) or both (301, 315), or both (412, 413), or both (203, 301), or both (203, 315), or both (203, 415), or both (203, 467).

UNDERGRADUATE MAJOR IN COMPUTATIONAL METHODS AND STATISTICS

In recent years a significant advance in human capability has occurred with the introduction of new kinds of quantitative methodology. These have made possible important advances in not only the exact sciences but in such areas as medicine, education, psychology, and biology.

Two parallel developments have brought about this situation

(A) a new understanding of how to generate and analyze data has shown how valid inferences may be drawn in the presence of uncertainty

(B) high speed electronic computation has made it possible to explore stochastic and deterministic mathematical models of sufficient complexity to be realistic.

These two developments are closely related and a body of connected knowledge exists which will provide a valuable intellectual challenge to the student. A curriculum has been prepared which leads the student to an understanding of the uses, possibilities, and interrelationships of these new methods.

In preparing the joint curriculum it has been in mind that some graduates of this major will leave the University to take up occupations where they do not need to apply specifically what they have learned. For these people we believe that the course will have provided an intellectual experience and perhaps a better understanding of the world in which they live. Others will take jobs which directly involve the use of quantitative methods and will find their studies of immediate practical help. Finally, we hope there will be some who will be stimulated to continue in graduate school either in Computer Sciences or Statistics or perhaps to study some subject in the physical, biological, social, or engineering sciences with this quantitative aspect particularly in mind.

Required Courses. The titles of Computer Sciences and Statistics courses to be required for the major are listed below. Other specific requirements are noted too.

Required Courses in Computer Sciences.

- Basic Computer Sciences I and II, C.S. 203 and 204 (Student can also satisfy this requirement by taking Computer Sciences 301 or 315, and 415 and 467.)
- Numerical Analysis I and II, C.S. 413 and 414.
- Introduction to Optimization Methods, C.S. 5XX.

Required Courses in Statistics.

- Introduction to the Theory of Probability, Stat. 431.
- Introduction to Mathematical Statistics, Stat. 309 and 310.
- Statistical Analysis of Data, Stat. XXX.
- Statistical Design of Experiments and Surveys, Stat. XXX.

NOTE: The student will also be required to take three semesters of calculus and a course in Linear Algebra. Furthermore, the student must develop a degree of advanced intellectual depth by taking six upper-division credits in some cohesive group of courses which must be approved by both departments. The six units may be satisfied by courses offered by any department and they need not all be from the same department.

A Suggested Typical Course Schedule.

	Freshman			
I -	Calculus & Analytic Geometry	4-5	II - Calculus & Analytic Geometry	4-5
	Foreign Language	3-4	Foreign Language	3-4
	English	3	English	3
	Electives	5-7	Electives	5-7
	Sophomore			
I -	Calculus & Analytic Geometry	4-5	II - Probability (Stat. 431)	3
	Basic Comp. Sci., I(C.S.203)	4	Basic Comp.Sci.,II(C.S.204)	4
	Electives	8-9	Electives	10
	Junior			
I -	Linear Algebra	3	II - Numerical Analysis I(C.S.413)	3
	Math. Statistics I (Stat.309)	4	Math.Statistics II (Stat.310)	4
	Specialization	3	Electives	11
	Electives	8		
	Senior			
I -	Numerical Analysis II(C.S.4XX)	3	II - Intro.to Optimization Methods (C.S. XXX)	3
	Stat. Analysis of Data (Stat. XXX)	3	Stat. Experiment & Survey Design (Stat. XXX)	3
	Specialization	3	Electives	8
	Electives	8		

Timetable for Introducing New Courses.

In addition to introduction of the two 4-credit Basic Programming courses, Basic Computer Sciences, 203 and 204 in Fall 1965 and Spring 1966 respectively, the following new courses will be scheduled:

Fall - 1966 : Introduction to Optimization Methods, C.S. 5XX, 3 credits
Statistical Analysis of Data, II Stat. 4XX, 3 credits

Spring -1967: Statistical Design of Experiments & Surveys,Stat.XXX,3 credits
Numerical Analysis, II C.S. 414, 3 credits

Catalogue Descriptions.

Below are listed the intended catalogue descriptions of the courses cited above.

Required Courses in Computer Sciences

C.S. 203 Basic Computer Sciences, 4 credits
Introduction to the theory and use of computing machines. Algorithms, types of computers, procedure oriented language programming, machine language programming, characterization of digital computers, input-output devices.
Prerequisites: One year of mathematics or advanced pre-university mathematical preparation or consent of instructor.

C.S. 204 Basic Computer Sciences, 4 credits
File organization and processing, processing of non-numeric information, list processing, list processing languages, program planning and implementation.
Prerequisite: Comp. Sci. 203.

C.S. 413-414 Introduction to Numerical Analysis [See Math 413-4(133)]
Yr; 3 credits for each
Iterative procedures, solution of linear and nonlinear equations; finite differences and the approximation of functions; numerical integration and differentiation; numerical solution of differential equations; error analysis and pitfalls in computation.
Prerequisites: Math 233(22) or 222-3(62).

C.S. 5XX Introduction to Optimization Methods, 3 credits
The nature of optimization problems, deterministic and stochastic problems, discrete and continuous problems, computer methods of solution, systematic and random search, linear programming, maximization with side conditions, lagrange multipliers, convex functions and sets, steepest descent and gradient methods, dynamic programming, variational problems and optimal control theory.

Required Courses in Statistics

Stat. 309 (137a) Introduction to Mathematical Statistics. [See Math.309(137a)]
I; 4 credits
Probability and combinatorial methods, discrete and continuous, univariate and multivariate distributions, expected values, moments, normal distribution and derived distributions, estimation, for majors in statistics or mathematics.
Prerequisites: Math 233(22), 222-223 (62), or 302 (101b); or equiv.

Stat. 310 (137b) Introduction to Mathematical Statistics. [See Math.310(137b)]
II; 4 credits
Testing of hypotheses, analysis of variance, including fixed, random and mixed models, comparison of means, method of least squares, orthogonal polynomials, for majors in statistics or mathematics.
Prerequisites: Stat. 309 (137a) or equiv.

Stat. 431 (118a) Introduction to the Theory of Probability. [See Math. 431 (118a)] I; 3 credits
Probability in discrete sample spaces, combinatorial analysis, conditional probabilities, stochastic independence, Laplace limit theorem,Poisson distribution, laws of large numbers,applications to physics and statistics.
Prerequisites: Math 233 (22) or 222-223 (62).

Stat. XXX Statistical Analysis of Data. 3 credits
Revision and expansion of least squares and analysis of variance, missing observations, unequal groups,examples. Analysis of survey data, transformations with examples, discrete data.

Stat. XXX Statistical Design of Experiments and Surveys, 3 credits
Assumptions of least squares and analysis of variance,correlation and causation,happenstance data and design, randomization,replication, orthogonality, internal estimates of error, randomized blocks, latent squares, balanced incomplete blocks, survey designs,stratification, factorials, fractionals, response surface design.

NEWS FROM THE UNIVERSITY OF WISCONSIN

Serving the state through campuses at Madison and Milwaukee, nine University Centers, and a statewide extension system.

RELEASE Immediately

9/24/65 mcg

MADISON, Wis.--University of Wisconsin regents Friday approved financing through the Wisconsin State Agencies Building Corp. for $14,717,800 of University construction.

The executive committee of the board was authorized to arrange financing for an additional $8,901,000 in University construction.

The $14,717,800 includes the $9,874,300 in state funds for construction in the South Lower Campus area. This will include the building to house history, art, art education, and music, but not the Elvehjem Art Center, which will be built with gift funds collected from alumni and friends of the University. Also included is $3,811,000 for the addition to the physical education building located on Observatory Drive on the west side of the Madison campus, and $1,032,500 for the computer science-statistics complex to be located on West Dayton St.

Of the $8,901,000, some $2,620,000 is scheduled for construction of a University of Wisconsin-Milwaukee classroom-laboratory building, $2,300,000 for the UWM University School, $1,902,000 for the Madison heating plant addition, $1,198,000 for the Social Science building addition on the Madison campus, and $881,000 for the Unit B addition to the University Hospitals.

# # #

NEWS FROM THE UNIVERSITY OF WISCONSIN

Serving the state through campuses at Madison and Milwaukee, nine University Centers, and a statewide extension system.

5/7/65 jb

Immediately

RELEASE

MADISON, Wis.--Final plans for three Madison campus construction projects including the new Social Science Research Center and the Computer Sciences-Statistics Building, were approved by University of Wisconsin regents Friday.

The third project is an addition to the University's Charmany Farms animal isolation facilities on Mineral Point Road.

The research center will be an addition to the Social Science Building which opened its doors on Observatory Drive three years ago. The state is expected to supply $1,153,800 of its $2,053,800 cost, with the $900,000 balance coming from the National Science Foundation.

The facility will house research functions of the departments of anthropology, economics, and sociology and the Wisconsin Survey Research Laboratory. It will include faculty and graduate offices, computer equipment, laboratories, and conference areas. The eight-story unit will be constructed of materials similar to the adjacent brick and precast concrete structure, which is located just north of the Carillon Tower.

Construction of the addition, anticipated after the first unit was built, is expected to start next September, and be completed within 15 months.

The new Computer Sciences-Statistics Building will be erected on the north side of West Dayton Street between Orchard and Charter streets.

It will house an anticipated $5 million in computing equipment, and provide classrooms, research and training space, offices, and administrative areas for the University Computer Center and the departments of computer science and statistics.

-more-

Add one--Construction

The National Science Foundation has allocated $600,000 toward the center's $1,521,440 cost. State funds will provide the remainder, which includes an additional $166,000 for land. A three-story project, the building is expected to be completed in 18 months.

The animal isolation additions, to be used by the department of veterinary science, will consist of a basement and one floor with 32 animal holding rooms, 16 laboratories, and feed storage areas.

Construction is planned to start this summer and be completed within a year. The building exterior will be concrete block and poured concrete with a red brick veneer fronting on the street.

The total $328,560 cost of the additions will be provided by the National Institutes of Health.

##

NEWS FROM THE UNIVERSITY OF WISCONSIN

Serving the state through campuses at Madison and Milwaukee, nine University Centers, and a statewide extension system.

RELEASE Immediately

5/7/65 jb

MADISON, Wis.--Purchase of property in Madison for three building projects, earlier authorized by the University of Wisconsin regents, was reported in actions taken to the regents Friday.

The purchases are subject to the approval of the governor and the attorney general.

The purchases reported:

Computer Sciences-Statistics Building--from Work of God Inc., a Catholic organization which operates rooming houses for students, 1216-20-24 W. Dayton St., for $87,000; from Mr. and Mrs. Otto K. Kappel, 1208 W. Dayton St., $53,500; Hugh S. Lupton, 1210 W. Dayton St., $18,000; Galen F. Voskuil, 1215 Lee Ct., $8,500; and Mrs. Salome T. Annen, 1212-14 W. Dayton St., $29,000.

Earth and Space Science Complex--Adeline E. Steffen, 1221 W. Dayton St., $23,200.

Chemistry Building--Janet and Nancy Hogan, 309 N. Charter St., $8,400; and Camilla Hayden, 311 N. Charter St., $27,150.

All purchases are chargeable to funds allotted by the State Building Commission in April.

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NEWS FROM THE UNIVERSITY OF WISCONSIN

Serving the state through campuses at Madison and Milwaukee, nine University Centers, and a statewide extension system.

2/5/65 jb

RELEASE Immediately

MILWAUKEE--Preliminary plans and specifications of two new buildings on the Madison campus--the Social Science Research Center and the Computer Sciences and Statistics Building--were approved by the University of Wisconsin regents Friday.

The center is planned as an addition to the Social Science Building which opened its doors on Observatory Drive in 1962. The state is expected to provide $1,153,800 of its $2,053,800 cost, with the $900,000 balance coming from the National Science Foundation.

The facility will house the departments of anthropology, economics, and sociology and the Wisconsin Survey Research Laboratory. It will include faculty and graduate offices, laboratories, computer equipment, and conference areas. The eight-story Unit II will be constructed with materials similar to the adjacent brick and precast concrete structure, which is located just north of the Carillon Tower.

Construction is expected to begin next September, with completion planned for September, 1966.

The new Computer Sciences and Statistics Building will be erected on the north side of West Dayton Street between Orchard and Charter streets.

It is expected to house an anticipated $5 million in computing equipment, and provide classrooms, offices, research and training space, and administrative areas for the University Computer Center and the departments of computer science and statistics.

-more-

Add one--preliminary building plans

The state's share of the estimated $1,521,440 cost was set at $921,440, with the National Science Foundation providing $600,000. The building will be a three-story project, and be completed in 18 months.

Initial plans for a Wisconsin Union boat storage facility, to replace the old boathouse and canoe rental facilities, also were approved by the regents.

It will be erected this summer under the Union's lakefront steps, just north of the Union Theater on Lake Mendota. Its roof will serve as a viewing deck and as a plaza for theater patrons. The lakeshore walkway by the Union will be preserved.

The building, estimated to cost $100,000, will be paid for by Wisconsin Union funds. It will be constructed of poured concrete, with a stone and glass exterior and will house canoes, rowboats, bicycles, sails, life-jackets, and other Union outdoor activities equipment.

##

Computer Science-
Statistics Lab

WEILER, STRANG, MCMULLIN
AND ASSOCIATES, ARCHITECTS
810 UNIVERSITY BAY DRIVE
MADISON, WISCONSIN 53705

PROJECT #6406-12
NUMERICAL ANALYSIS AND STATISTICS
THE UNIVERSITY OF WISCONSIN, MADISON CAMPUS

January 25, 1965

Source of Funds - (original funding)
State $721,440+200,000=921,440
Gift & Grant (National Science Foundation) $600,000
Self-financed --

	Programmed	Stage II
General Construction	$869,000	$829,000
Heating, Vent., Air Cond.	198,000	240,000
Plumbing	47,000	47,000
Electrical	134,000	134,000
Elevator	38,000	38,000
Fixed Equipment	0	0
Other	0	0
BUILDING CONSTRUCTION COST	$1,286,000	$1,286,000
Architect's Fee	94,000	94,000
Bur of Eng. & Supervision		
Movable Equipment	32,000	32,000
Planting	10,000	10,000
Contingency	59,440	59,440
Other	0	0
PROJECT COST	$1,481,440	$1,481,440
Utility Extension	40,000	40,000
Land Purchase	-	-
Legal Fees	-	-
Interest	-	-
Other	-	-
TOTAL COST	$1,521,440	$1,521,440

WEILER, STRANG, MCMULLIN
AND ASSOCIATES, ARCHITECTS
810 UNIVERSITY BAY DRIVE
MADISON, WISCONSIN 53705

PROJECT #6406-12
NUMERICAL ANALYSIS AND STATISTICS
THE UNIVERSITY OF WISCONSIN, MADISON CAMPUS

January 25, 1965

CALCULATION OF AREA

	PROGRAMMED As revised by letter of Dec. 1, 1964		STAGE I CONCEPT	STAGE II PRELIMINARY DRAWINGS	
	Net Area (approx.)	Gross Area	Gross Area	Net Area (approx.)	Gross Area
Basement	-	-	13,930	7,521	13,757
1st Floor	-	-	12,225	8,929	12,039
2nd Floor	-	-	11,500	7,721	11,502
3rd Floor	-	-	12,400	8,213	12,646
Penthouse	-	-	None	-	None (Fence only)
Totals	31,920	50,000	50,055	32,364 (64.8%)	49,944

TIME SCHEDULE

	AS PROGRAMMED	AS ESTABLISHED AT STAGE II
Completion - Stage I	Dec. 15, 1964	Dec. 15, 1964
Completion - Stage II	Jan. 25, 1965	Jan. 25, 1965
Completion - Stage III (to Bureau of Engr. for review)	Apr. 5, 1965	Apr. 5, 1965
Advertisement for Bids	Apr. 26, 1965	Apr. 26, 1965
Bids Received	June 1, 1965	June 1, 1965
Construction Start	June 30, 1965	June 30, 1965
Construction Complete	-	Sept. 1, 1966

OUTLINE SPECIFICATION
FOR
PROJECT #6406-12
NUMERICAL ANALYSIS AND STATISTICS
THE UNIVERSITY OF WISCONSIN, MADISON CAMPUS

January 25, 1965

WEILER, STRANG, MCMULLIN
AND ASSOCIATES, ARCHITECTS
810 UNIVERSITY BAY DRIVE
MADISON, WISCONSIN 53705

1. Demolition

   a. Remove all existing structures.

   b. Remove trees, shrubbery, fences, etc., as will be indicated on the plot plan.

2. Sitework

   a. Excavate as required for footings and basement.

   b. Leave rough grade ready for seed, sod and planting.

   c. Foundations, walks, planter walls : concrete.

   d. Parking area : blacktop.

3. Structure

   a. Reinforced concrete flat plate (no drops, no caps) two way system.

   b. Reinforced concrete columns, spread footings.

   c. Above closed computer lab (larger span) : metal pan concrete joists one way.

   d. Basement walls, reinforced concrete.

   e. Stairs, reinforced concrete.

   f. 3,000# concrete throughout.

   g. 60,000 psi reinforcing steel in all floors and roof and columns.

   h. 40,000 psi reinforcing steel in footings and basement walls.

   i. Penthouse fence : light structural steel and portland cement plaster surface.

4. Exterior Walls

   a. Brick (red-brown) with concrete block backups, wood furring (1" insulation between furring), gypsum lath and plaster.

   b. Limestone window sills.

   c. Basement walls : poured concrete faced with 4" concrete block.

   d. Penthouse : lightweight steel frame with Portland cement plaster panels to form fence enclosure.

5. Insulation

   Glass fiber between furring on exterior walls, AWC roof.

6. Roofing

   a. Four-ply built-up (20-year bond).

   b. Redwood deck portions of second floor court.

7. Flashing

   a. All copper bearing galvanized iron for counter flashings set in galvanized reglet in concrete parapet.

   b. Thruwall flashing 20 mill vinyl.

8. Windows

   Gray anodized aluminum casement sash with gray plate glass and fixed gray plate glass at ceiling. Special treatment at computer laboratory.

9. Exterior Doors

   Heavy-duty aluminum with gray plate glass.

10. Floors

   a. Vinyl asbestos tile and rubber base throughout except ceramic tile in toilets.

   b. Stairs : concrete with non-slip nosings, steel handrails.

   c. Closed computer laboratory, special removable floor units.

11. Interior Partitions

   a. Metal stud, gypsum lath and plaster except lightweight block in basement.

   b. Metal door frames.

c. Wood doors.

d. Floor-mounted metal toilet partitions.

12. Ceilings

Exposed concrete (painted). Suspended fiberglass exposed spline acoustic board in corridors and portions of offices.

13. Finishes

a. Walls, throughout : Zolatone 43 except ceramic tile in toilets.

b. Ceilings : Zolatone 43 on exposed concrete. Exposed spline, acoustic board in suspended areas.

c. Wood doors, cabinets, casework : natural finish.

d. Exposed mechanical work painted to match adjacent surfaces.

14. Elevator

Hydraulic Passenger and hydraulic sidewalk type service elevator.

15. Building Equipment

Chalkboard and tackboard in each office and in research training labs. Hat and coat racks on wall near door of offices and research training laboratories.

PLUMBING AND SEWERING

1. General. All piping and fixtures provided for the santiary plumbing system as well as storm sewer system, hot and cold water as standard and acceptable by Owner.

2. Water Heater. Steam coil insertion type in storage tank equal to Patterson-Kelly Series 500.

3. Water Softener. Manual type.

HEATING AND AIR CONDITIONING

1. Description of System. Computer area: separate air handling unit supplying heating and cooling and separate chiller and heat rejection device supplying chilled water.

Balance of building: central built-up type air handling system supplying heating, ventilation and cooling supplemented by radiation for heating. Booster coils furnish reheat for each room for control of individual room temperature.

2. Source of Heat. Campus 150 psig steam service to PRV station in building. Steam reduced to low pressure for supplying convertors and other uses. Condensate pump and receiver return condensate to campus return system.

3. Convertors and Hot Water Pumps. Steam to water convertors supply hot water for booster coils and other coils and radiation which has outdoor reset temperature control. Centrifugal pumps circulate water in piping systems.

4. Main Chiller, Cooling Tower and Pumps. Centrifugal compressor, water chiller, hermetic type, sized for complete building, less computer area, approx. 150 tons supplies chilled water to cooling coils of built-up air handling system. Cooling tower, located on roof rejects the condenser water heat of the chiller. Tower base bid specifications similar to Marley HC type wood fill tower, propeller type fan, with possibility of centrifugal fans for quiet operation. A chilled water pump and a condenser cooling water pump, centrifugal type circulate respective water systems.

5. Built-up Air Handling System.

   a. Fan: single width single inlet backwardly curved fan similar to Buffalo Forge Company Type BL, Class I construction.

   b. Cooling coil: chilled water coils equal to Trane.

   c. Heating coil: hot water coils equal to Trane.

   d. Filters: standard for normal occupancy of campus building as acceptable to Owner. Consider AAF Roll-a-matic supplemented by bag filters.

   e. Humidifiers: steam supplied, similar to Armstrong insertion type.

   f. Exhaust/Return Fans: sized for allowing 100% fresh air to built-up unit when in 100% exhaust cycle. Similar to Dryer axial centrifugal type.

6. Computer Room Air Handling Unit

   a. Unit: similar to Trane Climate Changer complete with chilled water coils and hot water heating coil.

   b. Filters: electrostatic type equal to AAF Electro-Pak.

   c. Humidifiers: Armstrong type, steam operated.

   d. Standby coil, motors central valves and other parts stocked for emergency.

7. Computer Room Chiller, Evaporative Condenser and Pump. Chiller would be a reciprocating type similar to Trane, approx. 50 ton nominal unit. Evaporative condenser located on roof, sized for load equal to Acme. Controls and piping to allow for winter operation automatically to prevent freezing problems. Centrifugal pump for chilled water.

   Cross piping and valved connections to be provided for emergency supplying chilled water from main centrifugal chiller.

8. Computer Room Special Conditions. Investigation of all aspects of special ambient conditions required by computer equipment and operation will be conducted for maintenance of accurate control of temperatures, humidity, air cleaning, etc.

9. Automatic Temperature Control System. Pneumatic type equal to Johnson Service Company. Consider central control panel for indicating and possible reset operations of temperatures, pressures, etc. Automatic bypass dampers and volume dampers considered for economizing purposes for booster coil system.

ELECTRICAL WORK & FIXTURES

1. General Requirements

2. General Scope

   Primary cable by others, telephone wiring and equipment by others. Intercom wiring and equipment by others. Low voltage wiring for other trades by others, temporary electric service as described in Special Conditions.

3. Code Requirements

   National and State Codes. National Board of Fire Underwriters.

4. Examination of Site and Contract Documents.

5. Permanent Electric Service

   4160 volt, 3 phase, 4 wire, 60 cycle service from college campus distribution system to line side of primary switch in Unit Sub (including cable and connections) by others. Unit sub with lightning arrestors. 3 conductor pothead; G & W switch; (3) single phase core and coil Sorgel transformers enclosure; 80°C maximum hot spot rise; 45 db noise level, listed in its Delta primary; 208Y/120V secondary; (2) 2½% taps above and below normal voltage; (3) bulb united temperature indicator and alarm contacts, (2) Westinghouse 5KV C.T.'s 10/5 amp; (2) Westinghouse P.T.'s 4,160 to 120V; Westinghouse type CBH-8F thermal KW demand watt hour meter. Details must be coordinated with Owner and Bureau of Engineering.

6. Emergency Generator (if required)

   Fuel, natural gas. Cooling, city water.

7. Lighting and Power Panels

   Square D, Westinghouse, Kinney, bolted in breakers, all panels with doors - keyed alike.

8. Circuit Identification

   Circuit directories with plastic covers in all panels, numbers must be continuous; nameplates to identify feed to distribution panel on all panels, switchens, etc.; nameplates to identify all panels and terminal cabinets. Nameplates shall be painted stencil, engraved bakelite or other permanent type, minimum 1" high. Adhesive type not permitted.

9. Telephone Conduit

   Two phones on 1" conduit, one phone on 3/4" conduit, pull wire all conduits. Terminal cabinets with locking doors, keyed to match lighting panels, 1/4" wood backboard for telephone company's terminal strips, size cabinets per telephone company requirements. #8 ground wire in 3/4" conduit from telephone service equipment to service ground.

10. Workmanship - Experienced mechanics.

11. Cutting and Patching

    Sleeves for all conduit, core drill holes where required with approval of Architect.

12. Materials and Appliances - all new, U.L. approved.

13. Wiring Method

    All wiring in conduit; conceal all conduit except on ceilings of mechanical equipment rooms, at surface mounted panels, or as noted. Computer lab wiring must be coordinated with equipment.

14. Conduit

    Heavy wall galvanized for all sizes 1½" and larger in all concrete slabs and walls. Thinwall EMT for all sizes 1½" and smaller in dry locations (block walls, furred ceilings, exposed).

15. Conduit Fittings

    Insulated throat type. Crimp, screw and tomic type fittings not permitted. Expansion fittings. Thin wall fittings must be rain and concrete tight.

16. Outlet Boxes

Size to suit number of wires and splices; 4" octagonal, minimum 3" deep. Raco masonry boxes and/or tile rings in block and brick walls. Plaster rings in concrete and plaster walls. Non-ferrous for weatherproof devices. Raco masonry boxes for surface devices.

17. Metal Access Panels - Milcor.

18. Wiring

All copper (Anaconda, U.S. Steel, G.E., or approved equal) #12 AWG minimum size except as noted. TW in all general areas. THW for branch circuit wiring in continuous fluorescent fixture channels, #6 and larger or as noted on service riser. THW. TW #14 AWG for fire alarm or as otherwise noted. SF #16 AWG fixture wire. Scotchloc or Ideal Super-Nut up to two #8 wires. T & B compression method for #6 and larger.

19. Grounding

Water system on street side of service shut-off valve. 3/4" x 10' 0" copper rods in vault for primary neutral, equipment and core grounds. Ground bus in vault. All grounding conductors in conduit except perimeter ground bus in vault. Ground fittings, O.Z. Ground test. Green ground wire for motors.

20. Devices - Bryant, P & S, Arrow-Hart, Hubble. Hand dryers.

21. Mounting Heights.

22. Motor Wiring and Wiring for Other Trades.

Do all electrical work and all line voltage wiring required in connection with other trades.

23. Fixtures and Components

As listed on schedule (will furnish brochure of catalog sheets) fluorescent most areas, incandescent in janitors closets, inactive storage, etc.

24. Intercom Telephone

Conduit (with fishwire), outlets and terminal cabinet similar to public telephone. Requirements must be verified with Owner and Bureau of Engineering.

25. Television Antenna System

Jerrold or Blonder-Tongue. Cable, Superior Type 4400.

26. Clock and Program System to match campus system.

27. Fire Alarm System (Zone Coded)

    Edwards, Farady or Auto-Call. Automatic detectors (incinerator room). Annunciator at main lobby.

Computer-Science-Statistics Complex Bldg.

NEWS FROM THE UNIVERSITY OF WISCONSIN

Serving the state through campuses at Madison and Milwaukee, nine University Centers, and a statewide extension system.

1/8/65 jb RELEASE Immediately

MADISON, Wis.--General concepts of two proposed buildings on the Madison campus of the University of Wisconsin--Social Science Research and Numerical Analysis and Statistics--were reviewed by Wisconsin regents Friday.

Initial planning for the structures was detailed by representatives of the campus planning committee and the department of planning and construction.

The Social Science Research building is planned as completion of the Social Science building which opened its doors on Observatory Drive in 1962. The state is expected to provide $1,153,800 of its $2,053,800 cost, with the remainder coming from the National Science Foundation.

The facility would house the departments of anthropology, economics, and sociology, and the Wisconsin Survey Research Laboratory, and include faculty and graduate offices, laboratories, computer equipment, and conference areas. The eight-story Unit II would be constructed with materials similar to the adjacent brick and precast concrete structure.

The design of the Social Science Research Unit II was submitted by the Madison architectural firm of Graven, Kenney, and Iverson. Construction is expected to get under way next July, with a completion goal of September, 1966.

Plans call for locating the new Numerical Analysis and Statistics building on the north side of West Dayton street between Orchard and Charter streets.

It would house an anticipated $5 million in computing equipment, and provide offices, classrooms, research and training space, and administrative areas for the University Computer Center and the departments of computer science and statistics.

- more -

The state's share of the estimated $1,621,440 cost was set at $50,000.

The three-story building, expected to be completed by September, 1966, was designed by Madison architects Weiler, Strang, McMullin and Associates.

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NEWS FROM THE UNIVERSITY OF WISCONSIN

Serving the state through campuses at Madison and Milwaukee, nine University Centers, and a statewide extension system.

12/11/64 jb

Immediate Release

MILWAUKEE--Provision for parking facilities in one planned Madison campus building and a change in site for another were voted by the University of Wisconsin Board of Regents Friday.

The regents approved revision of plans to include underground parking facilities in the new $5.5 million Language Building, an 18-story structure providing class rooms, laboratories, offices, and reading, meeting, and study rooms for 10 departments. Work will begin on the building early in 1965 and is expected to be completed within two years.

Also approved was changing the site of the Computer Science-Statistics Complex from the southwest corner of North Charter and West Dayton streets to the north side of the 1200 block of West Dayton Street. The building was originally called the Numerical Analysis Building.

The south side of the 1200 block of West Dayton Street was approved as the site for the Earth and Space Science Complex.

Revisions in the cost of the Computer Science-Statistics Complex from $1,321,440 to $1,521,440, and in the cost of the Earth and Space Science Complex Unit I (formerly designated meteorology) from $4 million to $4,361,650 were also approved. The National Science Foundation and the National Aeronautics and Space Administration will pay more than half the cost of the two structures.

##

Computer-Science-Statistics Complex

(Minutes No. 100)

CAMPUS PLANNING COMMITTEE MEETING

9:00 a.m., December 2, 1964 - 319 Irving Place

Members present: Alberty, Crandall, Culbertson, Fleming (Chairman), Friedman, Peterson, Pound, Strong, Wendt, Young.

Consultants present: Ahearn, Edsall, Galbraith, Jensen (Secretary), Longenecker, Sites, Small, Tipple, White.

Others present: Hopkins, Redfern, Rule.

1. Site Location for the Proposed Rock County University Center

Mr. Edsall stated that several sites have been considered for the proposed Rock County University Center and it was decided that approximately 50 acres southwest of Janesville commonly called the Kellogg Site would be the recommended site. It is proposed to build a center for approximately 500 students for an estimated cost of $800,000. There is, at this time, no chance that this center would become a four-year institution.

It was moved and voted to recommend to the President:

> That authority be granted to approve approximately 50 acres southwest of Janesville commonly called the Kellogg Site as the site for the proposed Rock County University Center.

2. Report on Progress on Site Selection for the Waukesha University Center

Mr. Edsall reported that the county board chose a site for the proposed center but it did not meet the approval of the University. The county board is presently considering other sites and a new site may be selected in the near future.

3. Final Approval for Sites for the Proposed Computer Science—Statistics Complex and the Proposed Earth and Space Science Complex

Mr. Edsall reported that agreement has been reached with the building committees on the sites for the proposed Computer Science—Statistics Complex and the proposed Earth and Space Science Complex. The proposed Computer Science—Statistics Complex would be north of West Dayton Street and the proposed Earth and Space Science Complex would be south of West Dayton Street.

There was discussion concerning the size of the Computer Science—Statistics Complex Unit I but the building is only in the concept design stage and the size has not been determined. Dean Wendt emphasized that

the setback line from the street for the building should be checked to be sure it does not conflict with the proposed width of West Dayton Street.

There was a short discussion on the space standards as set up by the Coordinating Committee for Higher Education. Copies of the Project Justifications, University of Wisconsin were distributed to members of the Committee.

It was moved and voted to recommend to the President:

a. That authority be granted to approve the area bounded by North Orchard Street, the railroad tracks, North Charter Street, and West Dayton Street as the site for the proposed Computer Science—Statistics Complex.

b. That authority be granted to approve the area south of West Dayton Street between North Charter Street and North Orchard Street as the site for the proposed Earth and Space Science Complex.

4. Parking at the Proposed Madison Classroom Building I (Foreign Language)

Mr. Edsall showed plan and section views of the proposed underground parking facility on the south side of the Madison Classroom Building I (Foreign Language). The size of the parking facility is approximately 10,500 square feet and will accommodate 34 cars and service to the building. The entrance to the parking facility is to be off Linden Drive and the estimated cost of the project is $100,000 which is to be financed from State Building Funds.

Mr. Friedman raised the question of the proposed parking facility and the Cars on Campus Report. It was stated that another look will have to be taken concerning the Cars on Campus Report. Dean Wendt suggested expansion of the proposed parking facility to the west.

It was moved and voted to recommend to the President:

That authority be granted to approve the proposed underground parking facility on the south side of the Madison Classroom Building I (Foreign Language) at an estimated cost of $100,000 which is to be financed from State Building Funds.

5. Graduate Center-University Park Corporation Report

Mr. Peterson reported the actions taken by the Regents concerning the Murray Mall Development. He reported that the appraisals of the property are being brought up to date and that he is having conferences with all the property owners. It is hoped that all of the property can be acquired by July 1, 1965.

6. Crew House-Willows Report

Mr. Edsall reported that the Recreational House has been divided from the Crew House. Meetings have been held with the Capital City Citizens Group concerning the development of the Crew House and Willows Beach. The Group likes the beach development but wants the land to be held by the City of Madison. The Group does not like the development of the Crew House. The proposed development has the approval of both Mr. Clark and Mr. Marshall of the City of Madison.

7. Report on the Land Between Monroe Street, United Building Center and the Illinois Central Railroad

Mr. Peterson reported he had received a letter from the Illinois Central Railroad stating that the railroad does not wish to sell their property in the area where their right-of-way intersects with Monroe Street.

The meeting adjourned at 10:50 a.m.

DEAN E. JENSEN
Secretary

Computer Sciences - Dept. 7.

U.W. NEWS

FROM THE UNIVERSITY OF WISCONSIN NEWS SERVICE, MADISON, WISCONSIN 53706

7/17/64 gc1

RELEASE: Immediately

MADISON, Wis.--What's the best way to come up with a name for the science which deals with computers and data processing? Take a public opinion poll, of course.

That is exactly what the University of Wisconsin and a number of other universities did in an effort to standardize the name of the discipline formerly referred to as numerical analysis.

Seventy-five per cent of the educators polled favored computer sciences and the numerical analysis department on the UW Madison campus promptly became the department of computer sciences.

In addition to a new name, the department has a new home at 435 N. Park St. "The move was made to separate the instruction from the Computing Center," said Prof. Preston C. Hammer, department chairman.

The department is only a year old, and Dr. Hammer expects it to grow rapidly. He estimates an enrollment of 35 graduate students this fall--compared to last year's 15.

Within two years Hammer expects 100 graduate students in the department. "By that time we should have a new home and an undergraduate major," he said.

Two new professors will be added to the department next year and several new courses offered. "A new field like this is particularly hectic to teach in," Hammer said. "The material in any course may change completely from one year to the next."

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