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Eminent Japanese robotics researchers named first CDC Visiting Professors of Computer Science

Two Japanese educators prominent in computer vision and robotics will be the first to fill the Control Data Corporation Visiting Professor of Computer Science chair during spring quarter 1982.

Osaka University's Sabura Tsuji, professor of control engineering, and Masahiko Yachida, research fellow in control engineering, will teach a graduate level Computer Science course in Robotics and Advanced Automation, as well as offer a seminar for graduate students and two public lectures. The seminar will deal with Understanding of Dynamic Images, while the lectures will cover Japanese Research and Development Projects in Artificial Intelligence and Related Fields and Flexible Automation and Industrial Vision Systems.

According to Kurt Maly, acting head of the Computer Science department, the presence of the two Japanese scholars will help IT establish a reciprocal and mutually beneficial relationship with Japan in the computing area.

A Control Data Corporation grant of \$300,000 endowed this visiting professorship, specifying that it involve individuals from education or industry, either from the U.S. or a foreign country. Each year, the visiting professorship will bring in different experts from a variety of fields to interact with and pass on information to the Computer Science department's graduate students and faculty.

Tsuji, who is considered the best vision researcher in Japan, is noted for his work on texture, line-drawing analyses, and vision applications. When at the Electrotechnical Laboratory (ETL) of Japan's Ministry of International Trade and Industry he developed a hand-eye system using visual feedback, was the first to use color for robot vision, and helped to develop a range finder that has become a standard for range measurement. He worked at ETL from 1955 to 1970, as a senior research scientist, chief of the systems research section, and chief of the bionics section, working on

hybrid computer systems, optimal control, and bionics, and as a leader of the Intelligent Robot Project.

Since 1971 he has taught and done research in artificial intelligence at Osaka University. There he and a student devised a method for segmenting a scene with textures that is now a widely-used technique in image segmentation.

Yachida was involved in the intelligent automation project at ETL from 1969 to 1970 before joining a research group at Osaka University in 1971 where he works on robotics, computer vision, and image processing. From 1973-74 he was a visiting research associate at the Coordinated Science Laboratory of the University of Illinois.

The graduate level course in Robotics and Advanced Automation will be offered for four credits during the spring quarter. The public lectures will be part of the Computer Science department's regular spring colloquium series that takes place on Monday afternoons at 3:30 p.m.

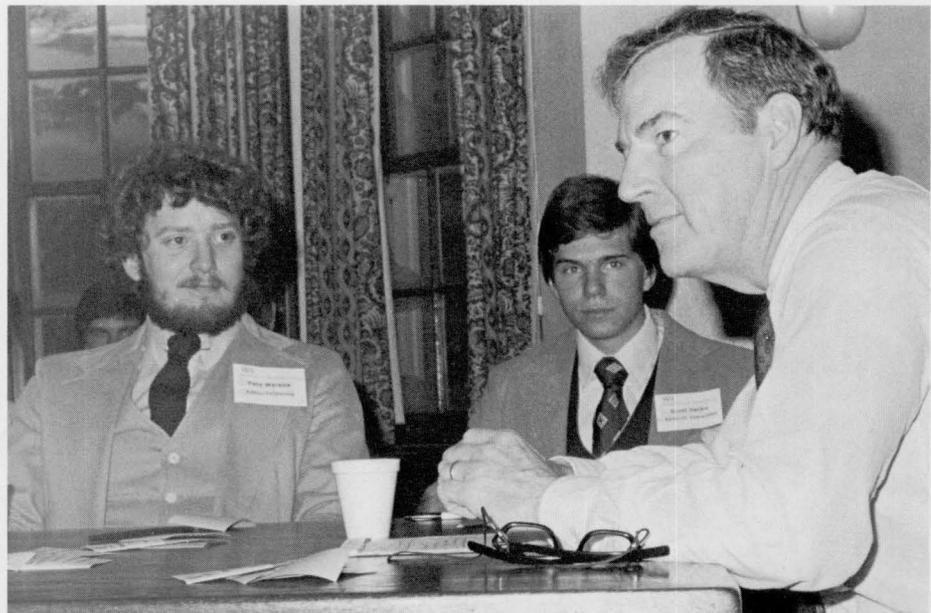
STATE BUDGET CRISIS EFFECTS INSTITUTE

Budget cuts totalling at least \$302,000 will be made in the Institute of Technology during the 1982 and 1983 fiscal years. The cuts are a direct result of a \$25.6 million reduction in state funding for the University.

The Minnesota Legislature, in an attempt to balance the state budget, passed the final budget bill in mid-January which became law without the signature of Governor Al Quie. According to President C. Peter Magrath, the \$25.6 million reduction means 400 University jobs will be lost, tuition will increase 15 percent this summer and \$6 million will be cut from the salary fund that provides raises for faculty and civil service employees. About 40 academic programs on the five University campuses could be affected by necessary elimination, reduction and reorganization measures.

The largest cut affecting IT is the Minnesota Science and Technology Center (MINTECH) which has been eliminated for the biennium, a cut of \$250,000. The newly established Center would have been organized to transfer technological developments to

(To page 3)



Leaders of IT student organizations met with Gerald Dinneen, Vice President of Science & Technology at Honeywell, (right) for one of the quarterly Dean's Seminars. Students have an opportunity to talk about careers and scientific interests. Pictured with Dinneen are Pete Marsnik, Technolog editor, and Scott Dacko, Connection editor.

Magrath outlines strategies to ensure IT's excellence and competitive edge

The following remarks by University of Minnesota President C. Peter Magrath are excerpted from an address he made at a recent Institute of Technology Advisory Council (ITAC) meeting.

The demands placed upon our teaching, research, and service resources by technology are increasing at a faster rate than those experienced by virtually any other unit at the University, said President C. Peter Magrath. And while the Institute of Technology's resources are also expanding, there remains a gap between what is demanded and what can be supplied, he noted.

Among the problems such a gap presents is the national challenge of attracting and retaining qualified faculty to schools of technology. "At a time when undergraduate enrollments in engineering have never been higher, we find a steadily decreasing production in engineering PhDs," Magrath said.

"The result is that there are some 2,500 faculty vacancies across the nation's 300 schools of engineering, and as one of those schools, our Institute of Technology finds itself in an extremely competitive market," he added. The University is presently engaged in some 15 searches for new IT faculty and faced with a decline in the rate of applications for those positions.

Magrath said competition and dollars accent the shortage. "Universities must compete not only among themselves but with the broader private and public sectors for

talented personnel," he said. And the universities don't have the dollars.

Fewer and fewer students are willing to sacrifice average starting salaries of \$25,000 a year in private industry and to spend up to five years and \$40,000 to \$50,000 in education and living costs to become an assistant professor at \$17,000 to \$24,000 a year, he notes. We lose faculty to the private sector, and, increasingly, to the federal government for the same reasons.

"New ideas, fresh talent, and different perspectives are essential elements to the progress of science," Magrath said. **"Yet, limitations on the financial resources of universities restrict their ability to have younger scientists."**

A second critical problem he cited is the future research contributions of the American academy and their corresponding impact on American productivity.

"It can be seen in the declining number of new patents by U.S. scientists and corporations, in the loss of markets through foreign industrial and technological competition, in the zero rate of growth in the U.S. GNP in 1980," he noted.

"In short, it can be seen in any arena where America used to have a competitive edge, but has since lost that edge."

Underlying the problem Magrath said are federal expenditures—the principal funds for research and development (R&D) activity in this country—that have declined in terms of constant dollars.

"Adding further to this erosion is the way the federal R&D dollars are

distributed," he said. "One of every two American research dollars is applied to defense projects."

And, with virtually all federal budgets, those earmarked for science and technology have felt the sharp edge of congressional and executive knives, he noted. "Deep base budget cuts in R&D spending are shortsighted if one looks at the long-range consequences."

"Research, especially basic research, is a long and arduous process. You are betting on tomorrow's winners.

"The picks that were made several years ago in aeronautical, computer, electronic, and other types of research have long since paid off. Alternatively, our failure, years ago, to support research in alternative forms of energy and in industrial renovation has since come back to haunt us."

The common denominator of the erosion in America's research capabilities and the declining number of faculty in schools of technology is a funding problem, according to the University president.

"You need dollars to attract and retain qualified faculty, you need funding to carry out research, you need investments today if you are to ensure a national competitive edge tomorrow."

Thus, he feels solutions must center upon how schools such as the Institute of Technology can generate the necessary dollars and he suggests broad strategies in four arenas—the federal government, the state government, the private sector,



and the University as a whole.

"In terms of the federal and state governments, our strategies must reflect the need for improved communication with the public and their elected officials. We must raise our collective voices in support of federal and state expenditures for technology programs," he said.

Magrath feels we must persuade Washington that federal support for university research will determine whether this nation's technological edge is further eroded in the years ahead. And, although the private sector might take over some of the responsibilities previously held by the public sector, we should not assume that private industry will be able, much less willing, to take on the burden of supporting most basic research.

In Minnesota, he said, we must make sure our elected officials understand the pivotal role that high technology plays and the concomitant role that the University plays in meeting the needs of the high technology industry.

"More specifically," Magrath said, "we must communicate the need for competitive faculty salaries. Their migration from the University will hardly serve the economic and technological welfare of Minnesotans.

"State officials must also be made to realize that the University of Minnesota is different from other systems of higher education in the state. No other institution in Minnesota has similar responsibilities in graduate and professional training, in research, and in public service."

The private sector, Magrath said, in many ways is far ahead of the rest of the country in recognizing that if

educational and research programs suffer, so too will the rest of the nation.

"Equally encouraging," he noted, "is the willingness of private industry to fund new cooperative research and service ventures with schools of technology.

"Yet, it would be mistaken to assume either that private support can offset the loss of public funding or that the corporate sector's role in technological education is limited to dropping coins in our outstretched tin cups," he said.

Industry and schools of technology must find new ways to expand their collaborative efforts, the University president said. Among those he cited were joint research projects, loaning employees to teach at universities on a part-time basis, sending engineers back to school for advanced degrees, sharing sophisticated research equipment, and providing summer jobs programs to enable students to develop technology-related skills.

Finally, Magrath said, "the University itself must take internal steps to assist IT in carrying out its responsibilities.

"In the absence of adequate external resources, the University has been willing to engage in the type of tough decision making that is necessary to preserve IT quality," Magrath said.

"To the extent possible, the Central Administration will continue to assist IT in meeting its ever increasing demands . . . IT will enjoy a favored nation status over the next decade, but it's up to us to secure much needed foreign aid from federal, state, and private sources," he concluded.

IT undergraduate enrollments climbing

Undergraduate enrollments in the Institute of Technology increased by approximately five percent during each of the last two quarters, up 317 students for a total of 5,959 during fall quarter 1981 and 329 students, bringing undergraduates to 6,298 during winter quarter 1982.

IT's winter quarter increase was more than that for the University's Twin Cities campus which went up 327 undergraduates. Though University enrollments were higher over all, the percentage increase was not as dramatic as IT's. Enrollment in the entire University five campus system increased by .3 percent, up 58,903 from 58,705 during fall quarter 1981, and by .8 percent, up to 56,091 from 55,633.

"Once again it is clear that the citizens of our state value higher education and see the University of Minnesota as a unique educational resource," said University President C. Peter Magrath of the enrollment increases.

"Our dilemma is equally clear," he added. "It becomes increasingly difficult to educate record numbers of students at the high quality that they and our state expect with fewer funds."

The Institute of Technology has been particularly hard hit by the state's and University's budget problems because of increasing demands for its graduates who must be taught in overcrowded and outmoded facilities.

Budget cuts

(From page 1)

state businesses in an effort to create new jobs. The University plans to resubmit its request for MINTECH as a high priority in the 1983 biennium.

The Minnesota Geological Survey was cut by \$40,000 over the two years, a reduction which could result in some staff layoffs. The Survey is the research and service arm of the School of Earth Sciences and investigates the geology of Minnesota.

The Mineral Resources Research Center faces cuts of \$12,000 during the biennium. The Center provides technical service to the state in promoting the development of Minnesota's mineral resources and in solving problems relating to them.

In addition, the college will not obtain any funds this year for repairs and betterments beyond the \$200,000 committed to renovation of an advanced microelectronics laboratory, a part of the Microelectronic and Information Sciences Center.

In a recent development, the Minnesota Board of Regents met March 11 to discuss further budget cuts in the face of another impending state budget shortfall. It was not immediately known whether the shortfall would mean more cuts for the University or how IT would be affected.

In the event more cuts are necessary, they would be made by University officials later this spring.

\$125,000 ARCO grant received

The Department of Geology & Geophysics received a \$125,000 grant from Atlantic Richfield Foundation, Los Angeles, to support graduate students and junior faculty, as part of an effort to make academic careers in science and engineering more attractive.

"At present the shortage of high caliber science and engineering faculty at American universities is reaching crisis proportions, some of it due to high salaries offered for engineers in industry," said Atlantic Richfield Company's (ARCO) president.

The Geology & Geophysics grant is part of a four-year \$5 million company program supporting doctoral students and junior faculty in science and engineering at 30 U.S. universities. ARCO provided 40 grants of \$125,000 to specific departments at these universities.

3M gives \$1.2 million to IT Research Centers

Recognizing that the University of Minnesota and companies such as 3M have interests in common, including complementary strengths in technological areas, 3M gave \$1.2 million to the Institute of Technology in mid-January.

One million dollars of the award goes to the Microelectronics & Information Sciences (MEIS) Center for basic research over a two-year period. The support will be considered for renewal in 1983.

The remaining \$200,000 helps fund the Computer Aided Design/Computer Aided Manufacturing (CAD/CAM) Center, supporting the Department of Mechanical Engineering's work in productivity.

Lewis W. Lehr, 3M board chairman and chief executive officer, spoke of an industry awareness of "the need to replenish the stock of basic research ideas and a belief that universities probably are best equipped to carry out this task in a cost-effective way.

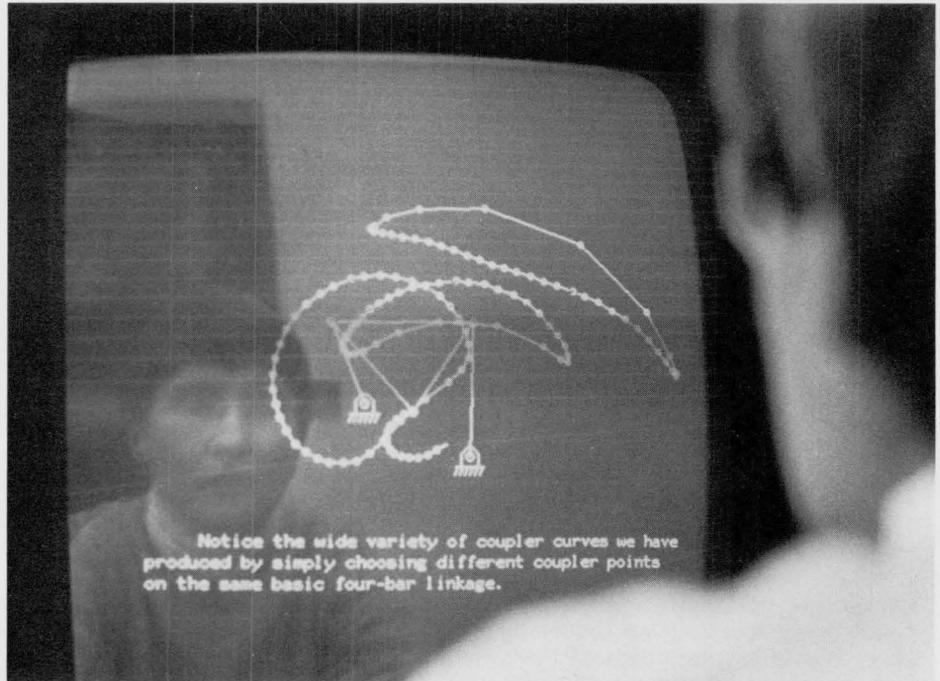
"Closer interaction of this kind between academic institutions and industry can help the United States in its efforts to maintain a competitive world position," Lehr said, commending the University and its Institute of Technology "for taking the initiative and assuming a leadership role in this activity."

University President C. Peter Magrath, citing 3M's international reputation for investing in creativity, said that same investment spirit is reflected in 3M's generous gift.

"Naturally, the entire University community appreciates 3M's vote of confidence. So, too, should the people of Minnesota be grateful. It is precisely this type of commitment that is so essential to advancing Minnesota's status as a high technology leader," Magrath said.

Scientists from 3M's Electronic and Information Technologies sector will collaborate with those of MEIS to help build upon other programs that already involve extensive participation by research personnel at Control Data Corporation, Honeywell, Inc., and Sperry Univac, according to Robert M. Hexter, director of the MEIS Center.

MEIS was established as a major research center two years ago in the Institute of Technology through efforts of the Institute and Control Data, Honeywell, and Sperry Univac. MEIS participants study new techniques and methods in microelectronics, the science of adding more electronic



A student in mechanical engineering works on a computer aided design/computer aided manufacturing exercise.

circuitry to computer chips, and in the information sciences, the design of computer software and systems.

"We look forward to active, side-by-side collaboration between University of Minnesota faculty members and 3M research personnel, particularly in areas that have to do with the basic sciences underlying such critical requirements as the design and packaging of the high-density integrated circuits of the future," Hexter said.

Work in productivity seeded

The one-year, \$200,000 contribution to the CAD/CAM Center will be funneled into undergraduate education and the purchase of equipment for hands on experience in the areas of computer graphics and robotics, according to Mechanical Engineering Professor Arthur Erdman. Along with ME Professors Donald Riley and Max Donath, Erdman formed an informal center three years ago which has since developed core faculty, graduated students, and does research and teaching in the CAD/CAM areas.

"The 3M grant officially christens our activities," Erdman said.

The CAD/CAM Center has been the recent focus of teaching and research activities integral to the increased productivity of major state industry.

Graco donates robot to IT

Graco, Inc. has donated a Tokico paint spraying robot and control console to the Department of Mechanical Engineering for adaptation and use in the computer aided design/computer aided manufacturing center (CAD/CAM).

The robot, valued at over \$100,000, will be used by students and faculty in educational and research activities.

In particular, faculty will use the robot as a demonstration vehicle for students to see what the capabilities are of a commercially available manipulator. The end effector, or wrist joint, will be modified by faculty and students to allow the robot to perform general robotic tasks in addition to paint spraying.

"We will also try to modify the control console to tie in with other computers which will allow us to program with other computers, thereby giving us greater flexibility and higher level languages to control the robot," said Professor Don Riley.

Company executive challenges government, industry, education to preserve technology base

Citing forthcoming shortages of scientists and engineers and the reasons for these shortages, Chuck Denny, president and chief executive officer of Magnetic Controls Company, stressed the need for government, industry, and education to make commitments that will reverse the situation.

Denny was speaking on "The Availability of Human Resources in High Technology" at the January seminar on Managing People, Markets, and Changing Technologies for managers of high technology companies. The seminar was presented by the American Electronics Association and Peat, Marwick, Mitchell & Co.

Denny said four sectors could help solve current problems. "The federal government must recognize that an adequate supply of engineers and scientists is basic to our international economic competitiveness, as well as to the



grit of our defense programs," he said. "If my understanding of the Institute of Technology's situation is correct, an additional \$20 million per year—\$15 million in operating expenses and \$5 million in equipment—would yield a first class institution."

Turning to the state government he noted that the \$20 million required by IT is less than 1% of our state's annual expenditures.

"Industry is the principal recipient of the University's product," Denny said. "We will rise or fall with their success or failure."

"It seems to me that we in industry must simultaneously organize to make our needs known at both state and federal levels and begin a systematic and long-term program to financially support our local engineering schools."

Finally, Denny said, the educational institutions must respond to the crisis with more than an outstretched hand. "The acceptance of monies (from industry and the taxpayer) carries with it a special responsibility to employ the monies wisely," he said.

"I believe it is also time for industry and education to re-examine what kind of education will best serve our country's needs."

Earlier Denny had noted some alarming statistics:

- The number of college-aged students has peaked and will decline by at least 15 to 25 percent in the next 15 years.

- Many engineering colleges are now limiting enrollment and more will do so as public funding is reduced or redirected.
- 10 percent of college engineering and science faculty positions, or approximately 2000 to 2500 places, were unfilled in fall of 1980.
- Substantially fewer graduate students are enrolling at both the master's and Ph.D. levels because of high beginning industrial salaries and low professional salaries and rewards. Of those who do attain graduate degrees, only one out of four will enter the teaching ranks.
- 46.3 percent of graduate level students are foreign and most will return to their country of origin.
- The quality of science and engineering education is suffering as most universities must operate below proper student-teacher ratios and are forced to curtail homework and laboratory sessions.
- Few schools possess sufficient and modern equipment and many operate in old, crowded, and costly facilities.
- Faculties are being demoralized by unreasonable teaching loads, lack of equipment, and poor salaries.
- A 1981 American Electronics Association survey projects that the shortfall in the supply of bachelor's of Electrical Engineering and Computer Science graduates will be around 129,000, or 25,000, annually by 1985.
- A preliminary 1980 ITAC survey projecting Minnesota companies demand on the University of Minnesota by 1990 for all types of engineering and science degrees showed that the University could supply only 25 percent of the state's needs.
- Energy rich states have the financial capacity to woo industry with both low taxes and the promise of delivering an adequate supply of engineering graduates.



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The University of Minnesota adheres to the principle that all persons shall have equal access to its facilities, activities, and employment without regard to race, creed, color, sex, national origin, or handicap.

World's largest underground energy storage project begins in Minnesota

Engineers and geologists at the University of Minnesota are creating an underground heat-storage bubble to test the feasibility of saving summer waste heat for use in colder months.

Last December, in the first stage of the largest experiment of its kind, water heated to 100 C (212 F) was pumped 820 feet underground into a thick layer of slow-moving, well-insulated watery sand called an aquifer. Some 80 percent of the heat should be recovered when the water is withdrawn.

Because nearly three-fourths of all major American cities lie over aquifers of some kind, this storage of heat energy has great potential for solar and district heating, said James O'Gara, engineer and aquifer project director at the university. Smaller projects using cool water have begun in Stonybrook, N.Y., and with warmer water, in Bethel, Alaska, at Auburn University in Alabama, and in several European and Far Eastern countries. Minnesota's is the only attempt to test the feasibility of injecting heat in summer, then retrieving it for use in winter.

In the first stage of the experiment water at 54 C (129 F) was withdrawn from the aquifer, heated to 100 C (212 F) and then injected into the aquifer at a second pump site 800 feet away. Although the project is designed to test the feasibility of utilizing waste heat, the temperature of the water used in the experimental stages has been raised by conventional heaters.

After eight days, the water was recovered and the heat removed by a heat exchanger between the wells. This massive pipe system extracts and measures the heat both before and after its early experimental aquifer storage.

Eventually project engineers hope to pump water heated to 150 C (302 F) into the ground at the rate of 300 gallons per minute and withdraw it 180 days later, creating a 5-megawatt thermopower system. At that point, O'Gara said, the university will decide whether to ask the federal Department of Energy (DOE) to fund a full-scale demonstration of the summer-to-winter heating system that could eventually save 30 percent of the raw energy costs for the university's St. Paul campus.

The pilot project, which has

received nearly \$2 million from the DOE's Battelle Pacific Northwest Laboratory, should be paying for itself by 1985 or 1986, O'Gara said. The technology should then be transferable to utility companies, large solar energy concerns and other large users across the country where slow aquifers of the right porosity are found.

The Minnesota project is being done in stages so that environmental conditions can be carefully monitored, O'Gara said. The first heat bubble is expected to be hour-glass shaped and cover a 40-foot-diameter area within the thousands of square miles of the Franconia-Ironton-Galesville aquifer which extends into four states. A slatted screen on the injection cylinder is already drawing and returning only clean water from the aquifer, without contaminating it with materials from the layers of glacial drift, shale, sandstone, dolomite, quartz and less-pure water it passes through. Nine monitoring wells are also being used to check water quality at points in the aquifer near the storage site and at water supply sites some 800 feet apart.

The pumping will not drain the aquifer of a single gallon of its extraordinarily clean water either. "What comes out goes back in. Only heat is added," O'Gara said.

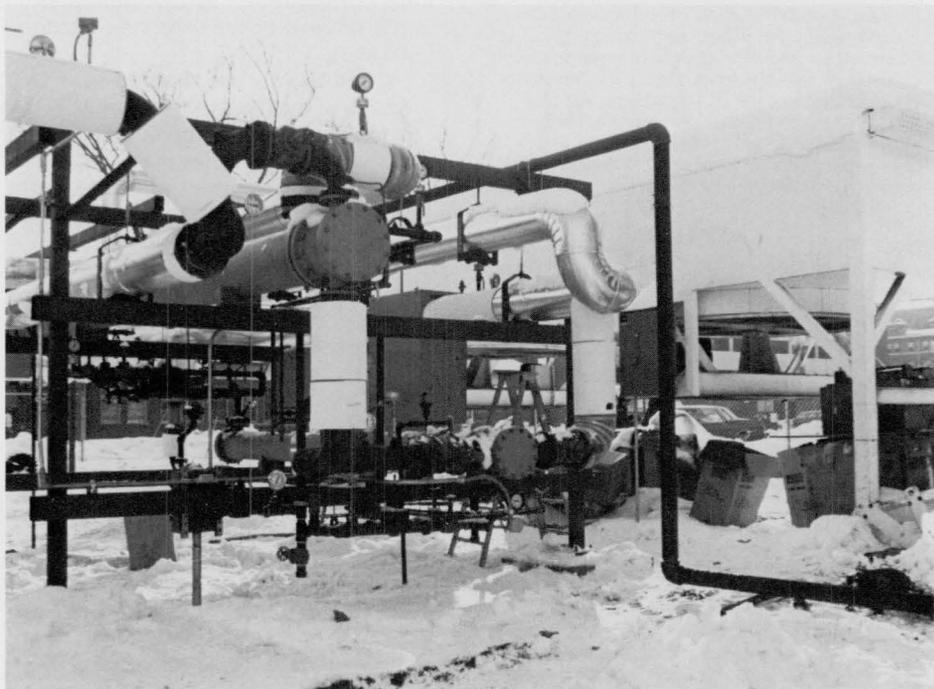
The heat bubble should be stable, he said. Like a thermos bottle, it is

well insulated within a "sandwich" of clay layers. Any change in temperature, pressure or flow rate will immediately register on displays and alarms at the surface. These will be monitored constantly by teams from the Minnesota Geological Survey under Matt Walton and the U.S. Geological Survey under Robert Miller. Any such information would be transmitted to the Minnesota Pollution Control Agency, Minnesota Department of Health and the Department of Natural Resources which regulate the project.

Probably the most complicated problem of water chemistry in the project is under study by Steve Eisenreich, professor of civil engineering, and Tom Holm, visiting professor in the department. They are looking at the possibility that grains of the sandstone and other rock particles permeating the aquifer will dissolve from the heat and form new minerals such as calcite, dolomite and muscovite. These minerals might then clog the aquifer in the well area. As the water is brought up and cooled within the heat exchanger, these minerals could also form scales there and interfere with operations.

One of Eisenreich's graduate students has begun heat treatments of rock grains from the exact storage area. Ground water sampling is also beginning. Soon, the slight movement of heat and water within the aquifer should be measurable too.

But potential problems do not compare to ground water contamination by toxic chemicals in other areas, Eisenreich said. This



aquifer was chosen out of many under the Twin Cities area because it lies very deep and moves very slowly. Only one well in the area reaches it, O'Gara said, so that pumping has not changed water pressures, which can increase the flow rate of aquifers.

"The worst case is that this aquifer might get plugged (clogged) in one small area, wasting the months of drilling," Eisenreich said.

"In this project, any contaminants would be discovered and easily pumped out. Every precaution is being taken," said Brad Sielaff, soil scientist at the Minnesota Pollution Control Agency.

Gifts of equipment increase

Since the Internal Revenue Service changed its laws regarding gifts of equipment to universities and colleges, corporations can donate major pieces of new equipment at essentially no cost. The Institute of Technology is benefiting from this ruling.

Among the recent gifts of equipment to IT are:

Electrical Engineering department

HEWLETT-PACKARD COMPANY:

HP1000 Model 45 Computer System with related hardware, software, software support, and training; HP9835A Desk Top Computer; equipment development of Digital Computer laboratory in excess of \$76,000.

INTEL CORPORATION: Eight MDS-800 Development Systems with related hardware and software.

St. Anthony Falls Hydraulic Laboratory

ALLIS-CHALMERS: Model Turbine Test Stand and engineer to assist in its erection, to strengthen laboratory capability in hydraulic machinery (\$100,000 **Minnesota Energy Agency** grant will facilitate relocation and installation).

IT Departments

ELECTRO/GENERAL

CORPORATION: Approximately 50,000 new resistors, capacitors, circuit boards, modules, et cetera, given to IT departments on "first come, first served" basis.

Minnesota Wellspring mobilizes to help state economy

Minnesota's economic future could brighten considerably if certain technological opportunities are exploited and used to create new industries, Minnesota Wellspring leaders told participants at the recent premiere dinner meeting.

The coalition of business, government, labor, and academic leaders met to develop plans to stimulate the state's technological growth. In late December the Minnesota Wellspring board named seven key committees that will formulate projects to speed the growth of high technology industry.

All of their projects reflect five major areas that involve technology—job creation, education, public understanding, technology transfer, and technology in the workplace.

The committees, their chairpersons, and goals include:

Business Capital Needs—Richard McFarland, Dain Bosworth, Inc.

Work with the investment community to help create jobs and improve technology transfer.

Biotechnology Center—Richard Caldecott, University of Minnesota College of Biological Sciences

Stimulation of cooperative research and facilitation of the transfer of technology in medical, chemical, biological, agricultural, pharmaceutical, and energy fields.

Minnesota Energy Resource Center—Kent Eklund, Minnesota Department of Energy, Planning & Development with State Representative Ken Nelson Development of Minnesota market potential as an energy resource and conservation state.

Labor Force Supply and Demand—State Representative Phyllis Kahn Improvement of the effectiveness of the "fit" between the supply of workers and the demand for skills by technologically-oriented employers.

Practical Applications of New Technologies in K-12 Education—Lloyd Neilsen, Roseville School District #623

Maintenance and improvement of student learning in elementary-secondary schools, particularly in science and mathematics, by accelerating the application of technology in education.

Master of Management Arts—

Eugene Kotz, College of St. Thomas Development of the kind of entrepreneurial manager necessary to promote ongoing creative growth, especially in large organizations.

Public Information and

Involvement—Harlan Cleveland, University of Minnesota Hubert H. Humphrey Institute of Public Affairs Stimulation of increased collaboration among a broad range of persons in labor, business, education, and government in job-creating activities.

In his remarks at Minnesota Wellspring's Premiere dinner, Cleveland stressed Wellspring "as the aspect of Minnesota that knows how to say, 'Why not?'"

"It's our task to define the main chances for job-creating innovation, and focus community attention on them," he said.

Executive challenge

(From page 5)

- Some state legislatures, such as Arizona's and North Carolina's, have recognized the importance of technology to their economies and have made significant commitments to building their technology infrastructure.

Joining Denny on the seminar program were John Rollwagen, chairman of Cray Research, Inc., who spoke on "Managing the High Technology Work Force"; Don Bice, general manager for Small Business Strategies, Control Data Corporation, on "Grading Your Strategic Planning Process"; Marty Mayer, partner in charge of Twin Cities Tax Practice, Peat, Marwick, Mitchell & Co., on "Management Considerations Relating to the Economic Recovery Tax Act of 1981 for High Technology Enterprises"; and Richard Horner, chairman and president of E. F. Johnson Company, on "Managing Changing Technologies and Markets."

CALENDAR...

APRIL

- CONTINUING EDUCATION:**
National Symposium on
Computer Conferencing*
- CONTINUING EDUCATION:**
Conference of the Upper
Midwest Chapter of the
Human Factors Society*
- 2 **AEROSPACE ENGINEERING &
MECHANICS COLLOQUIUM:**
Very Large Deformations of
Elastic Structures
Stuart Antman, University of
Maryland
2:15 p.m., Akerman Hall 225
- 9 **AEROSPACE ENGINEERING &
MECHANICS COLLOQUIUM:**
Applications of Boundary-
Element Methods in Rock
Mechanics
Steven Crouch, University of
Minnesota
2:15 p.m., Akerman Hall 225
- 16 **AEROSPACE ENGINEERING &
MECHANICS COLLOQUIUM:**
Richard H. Gallagher,
University of Arizona
2:15 p.m., Akerman Hall 225
- 20 **INSTITUTE OF TECHNOLOGY
ALUMNI SOCIETY: Board of
Directors Meeting**
- 23 **AEROSPACE ENGINEERING &
MECHANICS COLLOQUIUM:**
Carl Peterson, Sandia Labs,
Albuquerque
2:15 p.m., Akerman Hall
- 30 **AEROSPACE ENGINEERING &
MECHANICS COLLOQUIUM:**
Finite Amplitude Water Waves
P. G. Saffman, California
Institute of Technology
2:15 p.m., Akerman Hall 225

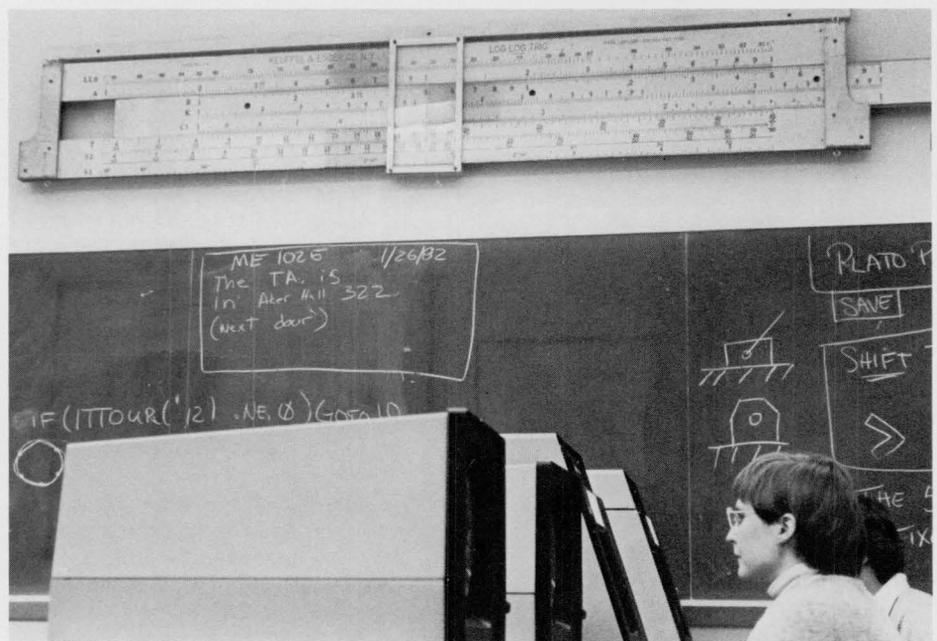
MAY

- 3-4 **CONTINUING EDUCATION:**
Corrosion Control in Electronic
Components and Assemblies
Conference*
- 7 **AEROSPACE ENGINEERING &
MECHANICS COLLOQUIUM:**
Role of Water in Artery
Mechanics
- 13-14 **CONTINUING EDUCATION:**
Minnesota Public Works
Association Spring
Conference*
- 16-21 **ENGINEERING FOUNDATION
INTERNATIONAL CONFERENCE:**
Microbial Enhancement of Oil
Recovery
Afton Oklahoma
Registration information:
Engineering Foundation, 345
East 47th Street, New York,
NY 10017, (212) 644-7835
- 17-21 **CONTINUING EDUCATION:**
Colloids and Surface Science*
Chemical Engineering &
Materials Science

JUNE

- 1-4 **CONTINUING EDUCATION:**
Polymer Reactor Engineering
Course
Chemical Engineering &
Materials Science
- 7-11 **Aerosol Science and
Engineering**
Particle Technology Laboratory
- 14-17 **Digital Image Processing**
Electrical Engineering
- 16-18 **Methods Engineering and
Work Measurement**
Mechanical Engineering
- 21-24 **Polymer Rheology of Liquids**
Chemical Engineering &
Materials Science
Polymer Rheology of Solids
Chemical Engineering &
Materials Science
- 21-25 **An Introduction to
Programming with Basic**
Microelectronic & Information
Sciences
- 21-23 **Human Factors/
Ergonomics**
Mechanical Engineering

(*) Registration information: Department
of Conferences (612) 373-3157



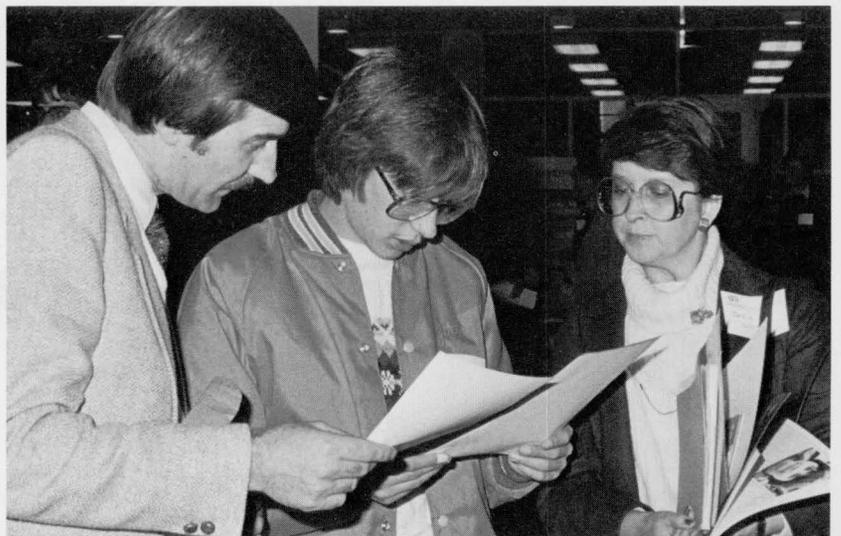
The slide rule, though no longer used by students or most faculty, still dominates this computer aided design classroom.



Career fair sponsored by several IT organizations drew students in record numbers this winter.



Architecture students work to put together exhibit on their recent trip to China.



A high school honor student and his parents study information on IT during a special meeting sponsored by the IT student affairs office this winter.

ALUMNI NOTES

CHEMICAL ENGINEERING

'42 **William J. Benjamin** BChE, Walnut Creek, CA, retired three years ago from Shell Oil Company after 30 years in process design, development and editing and joined the faculty of the Chemical Engineering department at the University of California-Berkeley where he is a lecturer and lab coordinator.

'60 **Lee R. Raymond** BChE '63PhD, cited for technological contributions to meeting our nation's energy requirements by improving methods and developing new sources, received a Distinguished Service Citation from the University of Wisconsin-Madison during Engineering Day 1981. Raymond has been an Exxon production engineer and in a number of other management positions before becoming president of Exxon affiliate Lago Oil and Transportation Company, Ltd. In 1979 he became president of Exxon Nuclear Company and, in 1981, executive vice president of Exxon Enterprises where he develops advanced information systems, new technology in the fields of renewable energy resources and energy storage, and new high performance materials.

'61 **John Rosandich** BChE, is a senior engineering associate in Exxon's EE-Petroleum department.

CHEMISTRY

'34 **Russell W. Johnson** BChem, Villa Park, IL, formerly an UOP, Inc. research chemist and group leader-heavy oil research, now is manager of fuels process research. He has been awarded seven patents.

'42 **John A. King** PhD, Princeton, NJ, formerly technical director of American Cyanamid's Agricultural division, now is involved in product acquisitions globally as director of licensing.

J. Keith Lawson PhD, with Monsanto at Research Triangle Park, NC, since 1961, leads his local American Chemical Society section.

'43 **Virgil Boekelheide** PhD, Eugene, OR, works in the University of Oregon's Department of Chemistry.

'44 **Walter Harris** PhD, Edmonton, Alberta, Canada, an emeritus professor of chemistry at the University of Alberta, retired in September 1980.

'46 **Daniel Hemker** BChem, San Rafael, CA, is a research engineer with the Agricultural Chemical division of Ortho Products, Chevron Chemical Company.

'48 **Otto C. Elmer** PhD, Akron, OH, has been with General Tire & Rubber Company since 1953.

'49 **Kataro Mura** PhD, Brooklyn, NY, is a senior investigator in analytical research at the Pfizer Control Research Laboratories in Orono, CN.

Paul N. Richardson PhD, Talleyville, DE, has done technical service and research work for duPont for the past 28 years. He is now a research associate working with nylon.

'51 **Ralph E. Kelly** PhD, Chadds Ford, PA, recently was transferred to Europe by the Hercules Corporation to be their director of research and development.

Paul Sollman PhD, Wilmette, IL, who retired from the Searle Company after 29 years, now works in research and development for the Regis Chemical Company in Morton Grove, IL.

'52 **Lester C. Krogh** PhD, St. Paul, MN, vice president of 3M's Commercial Chemicals division, is chairman of the board of the National Home Fashions League Educational Foundation.

'53 **Robert G. Lockwood** PhD, Mendota Heights, MN, research specialist with 3M's Packaging System division, has served 15 years on the Mendota Heights City Council, four as mayor.

'55 **Robert A. Fuller** PhD/Biochem, Westfield, NJ, is vice president, corporate office of science and technology, at Johnson & Johnson, worldwide manufacturer of health care products. He had served as vice president of academic affairs on the corporate staff since 1980. Fuller joined the company in Montreal, Canada, in 1955 as a research chemist. He is also presently chairman of the Research and Development Council of New Jersey.

'56 **Johan Coetzee** PhD, Minneapolis, MN, has been elected chairman of the Commission on Electroanalytical Chemistry of the International Union of Pure & Applied Chemistry.

'57 **William H. Gumprecht** PhD, Wilmington, DE, a senior research chemist with duPont, is engaged in fluorochemicals research and process development.

'58 **Ronald F. Lange** PhD, now an assistant professor at Fitchburg State College, was involved in the development of Qiana crepe and broadcloth fabrics while a research chemist with duPont.

James J. Markham PhD, Glenside, PA, is on the faculty of Villanova University's Department of Chemistry.

'59 **Daryl L. Ostercamp** PhD, Moorhead, MN, has returned to Concordia College as a professor of chemistry after three years in a similar position at the University of Petroleum & Minerals in Dhahran, Saudi Arabia.

'59 **Donald N. Robinson** PhD, Colledgeville, PA, has been a senior research chemist at Pennwalt Company for 11 years.

'60 **William C. Kuryla** PhD, St. Albans, WV, is associate corporate director of applied toxicology at Union Carbide.

'64 **Norman W. Gill** MS, Minneapolis, MN, chairman-elect of the Minnesota section of the American Chemical Society, is a technical service manager for the Tennant Company.

S. J. Harr MS, Monsey, NY, is employed by Texaco, Inc.

Ronald O. Kagel BChem, Midland, MI, is manager of Dow Chemical's environmental regulatory affairs in water.

CIVIL & MINERAL ENGINEERING

'66 **Raymon J. Burkel** BCivE, Madison, IN, is an associate of Sargent & Lundy. He joined the Chicago-based engineering firm in 1966.

COMPUTER SCIENCE

'76 **Betty Fuchs Beall** BCompSci, Minneapolis, MN, is project manager in the Systems and Data Processing area of General Mills Consumer Foods. She joined the company in 1976 as a programmer analyst and became an applications analyst in 1980.

ELECTRICAL ENGINEERING

'60 **John M. Braasch** BEE '63MSIE is president of Energy Systems, manufacturer of a comprehensive boiler management system, the MPH-100. Previously Braasch taught business and engineering courses at the University of Minnesota, was an assistant professor at Case Institute of Technology in Ohio, a mortgage banker, general

manager of the Information Services division and treasurer/controller of the leasing subsidiary for Industrial Nucleonics (now AccuRay Corporation), and assistant to the chief executive officer, controller, and vice president of Eurafrikan and South American operations for the Donaldson Company.

MECHANICAL ENGINEERING

'40 **Gershon (Gus) L. Gendler** BME, formerly president of G. L. Gendler & Associates, Inc., consulting engineers, San Francisco, CA, has retired to Sedona, AZ, to pursue an interest in solar design.

'78 **Michael Kallok** PhD BioE, currently employed by Medtronic, Inc., Minneapolis, MN, has been named Statewide Young Engineer of the Year in Minnesota.

PHYSICS

'61 **Earle F. Kyle, Jr.** BPhys, Rochester, NY, formerly director of Carnegie-Mellon University's Applied Systems division, is now manager of Xerox Corporation's Advanced Systems Development activity, responsible for designing future electronic telecommunication/printing systems.

'67 **Laramie M. Winczewski** BPhys, Houston, TX, works for Shell Oil Company as a systems analyst designing geological data bases. Since leaving IT he has spent four years in the Navy, earned a B.S. in education and an M.S. and Ph.D. in geology from the University of North Dakota, and worked on federal and state projects relating computers and geology to mining, land reclamation, oil exploration and production, and geothermal energy.

'79 **Michael Sivertsen** BPhys is a physicist for the Radiological Assessment branch of North East Utilities in Hartford, CT.

A strong alumni society means a stronger IT

"The stronger the Institute of Technology Alumni Society becomes, the stronger IT becomes," said Joe Schumi '66BMath '71PhDMath, first vice president, when he discussed the alumni society's long range plans.

Schumi said the IT alumni group, which numbers 2,700 members, touches five broad areas to:

- Serve as a catalytic resource and reinforcement for IT
- Manage alumni as a resource for IT
- Design methods to encourage communication among alumni
- Enhance communication to organizations and industry
- Communicate with IT faculty

Future ITAS efforts could involve its members in recruiting honor students for the Institute of Technology, lobbying in behalf of IT at the state and federal level, promoting more alumni/faculty interactions and the formation of ITAS groups across the nation.

This year ITAS is preparing a directory of IT graduates, seeking to reduce the costs of continuing education for its members, forming stronger links with the professional societies, participating in the Wellspring project, building stronger liaisons with the IT faculty and the Institute of Technology Advisory Council, becoming a better conduit between alumni and IT, and increasing its involvement in student activities.

In addition, the alumni group will maintain and strengthen its annual Science & Technology Day, scheduled for November 12, 1982, to discuss law and technology, as well as sponsor four student career guidance seminars, fund two scholarships, present outstanding teaching awards, and contribute to *ITems*.

ITAS subsidizes the biweekly student newsletter, *Connection*, which is an important communicator among IT students and faculty. In its second year of publication, *Connection's* popularity has brought increased circulation and frequency. Additionally, ITAS contributes to the support of IT-week which is organized by the Plumb Bob Society, a student honorary, and contributes to undergraduate tutorial areas.

Besides heading the ITAS long range plan committee, Schumi is also responsible for student-alumni relations.

The 1981-82 ITAS president is Jack Meyer '47BCivE.

Second vice president Jack Braun '56BCE '57MSCE is in charge of 1982 Science and Technology Day, while secretary-treasurer Gregg Vandesteege concentrates on alumni contact and the ITAS directory project.

Past president Leigh Nelson '51BChemE is ITAS student liaison, serving on the IT Student Board.

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Stronger IT (From page 11)

ITAS board members serve as representatives to the eleven departments in the Institute of Technology and, as such, meet regularly with department members to exchange ideas and offer support.

Newest ITAS board members include Curtis Green '46BA '48MA, president of Hammel Green & Abrahamson, Inc., Minneapolis; Oliver Ossanna '62PhDChem '76JD, director of quality assurance for Economics Laboratory, Inc., St. Paul; Donald M. Sudor '54BMath, manager of information systems, IBM Corporation, St. Paul; and Roland E. Weber '62BEE '64MEE '67PhD, vice president and general manager of Perkin-Elmer's Physical Electronics Division, Eden Prairie.

Science & Technology Day Adds Up Success

1981 Science & Technology Day profited the alumni group and those who attended. Following an afternoon seminar program which focused on The Impact of Technology on Society, an evening banquet at the Radisson South Hotel in Bloomington featured presentation of University of Minnesota Outstanding Achievement Awards to Earl Bakken, chairman of the board of Medtronic, Inc., and Richard Mollison, chairman and chief executive officer of Texasgulf, Inc. The award is the highest honor the University gives to alumni who have achieved distinction in their fields.

Bakken '58BEE developed the first portable, battery-powered pacemaker and founded Medtronic, the largest manufacturer of heart pacemakers in the world. He has published many articles on bioengineering and, in 1976, opened the Bakken Museum of Electricity in Life. The museum includes 900 antique medical devices, including an "electric bath" used in 18th century medicine, an early X-ray machine, and a display on Benjamin Franklin's experiments.

After receiving his mineral engineering degree from IT in 1941, Mollison worked as an exploratory geologist and discovered the Kidd Creek ore body, the largest new mineral discovery in Canada in 50 years.

As an executive, he established a system to allow employees to become stockholders after a year on the job and has received numerous safety citations.

Minnesota Governor Al Quie keynoted the banquet program, calling the Institute of Technology one of

Minnesota's great resources.

"We will do all we can in state government to maintain the strength of our educational institutions," he said. "But it is clear that the state is terribly strapped. In this environment, IT needs, and deserves, generous private support."

Quie went on to discuss IT in detail, as well as the state's economic situation, and the essential role that high technology or technology-intensive industry plays in that economy.

A special guest at the banquet was Marie N. V. Pearson, who recently pledged \$100 a year to the Institute of Technology, to strengthen the scientific and technical fabric of the state through education. Marie graduated from the College of Liberal Arts in 1930.

1927 Civil Engineers count 54 annual reunions

Since graduation the Class of 1927 Civil Engineers has held an annual reunion each year for 54 consecutive years. And, beginning in 1964, an annual letter with a complete roster has been sent to all surviving classmates.

Last year 13 class members and 9 wives gathered at Elmer and Alice Christenson's summer cabin on Ward Lake near Luck, WI for reunion activities. Among those attending were Clifford and Shirley Brattlof, St. Paul, MN; Luard and Gertrude Briggs, Portland, OR; Gus and Eulalie Brohaugh, Scandia, MN; Douglas and Leona Campbell, San Diego, CA; Ken Johnson, Chicago, IL; Larry and Myrtle Johnson, St. Paul, MN; Roy and Ruth Kastner, Peoria, IL; Loran McDaniel, Minneapolis, MN; George and Florence Platzer, Minneapolis, MN; Nick and Frieda Preus, Minneapolis, MN; Abe Sperling, St. Louis Park, MN; and Ed Witt, Minneapolis, MN.

Three mini-reunions were held in California during the 1980/81 winter season and a summer luncheon in St. Paul arranged for Francis and Doris How, Palo Alto, CA, who could not make the regular June reunion. How died in early August from a stroke. Classmate Joe Paulson also passed away during the summer.

Four Architecture alumni win awards for excellence

Four School of Architecture & Landscape Architecture alumni won 1981 Minnesota Awards for Excellence in Architecture presented at the Minnesota Society American Institute of Architects' convention.

The architects and their award-winning projects included **William E. Anderson '65BArch**, with Hammel Green and Abrahamson, Inc., Minneapolis, for the Myles Reif Performing Arts Center in Grand Rapids, MN, and the Hamline University School of Law in St. Paul.;

William Fay '53BArch and **John Litchie '69BArch**, with Thorsen & Thorshov Associates, Inc., Minneapolis, for the Oliver Hudson Kelley Interpretive Center in Elk River, MN; and

Milo Thompson '57 BArch, with Frederick Bentz/Milo Thompson/Robert Rietow, Inc., Minneapolis, for the LeJeune residence in Orono, MN. Thompson is also a professor in the University's School of Architecture & Landscape Architecture.

Only Civil Engineers should be cited

In the 1981 October/November *ITems* on page 12 the 1931 Civil Engineering Class alone should have been acknowledged for its contribution of more than \$7,000 to equip the new Civil & Mineral Engineering building. This editor hurried history and added the Mineral Engineers to their designation before mineral engineering appeared on the department roster.

IN THE INSTITUTE...

PEOPLE

Mechanical Engineering Professors Benjamin Y. H. Liu and Emil Pfender have been elected Fellows by the American Society of Mechanical Engineers.

Mechanical Engineering Professor Ernst R. G. Eckert is spending February, March, and April of 1982 in Japan as a Fellow of the Japan Society for the Promotion of Science.

Chemistry Professor Ronald Gentry is associate editor of the *Journal of the American Chemical Society*.

Chemical Engineering Professor and Department Head H. Ted Davis gave the California Institute of Technology **W. N. Lacey Lecture** in Chemical Engineering this February. In years past Minnesotans L. E. Scriven, Rutherford Aris, and Neal Amundson have also been invited lecturers—making four of five lecturers from the University of Minnesota. Also, Andreas Acrivos and Leon Lapidus, the 1972 and 1976 Lacey lecturers, received their Ph.D.s from the University of Minnesota. Davis is internationally known for his research in thermodynamics and transport phenomena, statistical mechanics, and molecular dynamics. He has also been invited to Notre Dame as the 1981-82 **Peter C. Reilly Lecturer in Chemical Engineering**.

Architecture graduate students Michele Cronin, Sandie Gay, and Jim Miller won First Honorable Mention in a National Student Design Competition sponsored by the Walker Group, Inc. of New York City. The project involved adaptive reuse of existing space for a sporting goods store that would generate excitement in a retail environment. **Architecture Professor David Bennett** served as critic for the competition.

Dean Roger W. Staehle has been elected a trustee of the **Great Northern Iron Ore Properties Trust**. The trust was started in 1906 and is responsible for 12,033 acres on the Mesabi Iron Formation. Other trustees include Robert L. Stein, Dean of the Law School, Joseph Micallef, and Harry Holtz, chairman of the trustees.

Architecture graduate student James E. Miller is the first Thomas F. Ellerbe Scholar sponsored by the Minnesota Architectural Foundation. A \$2500 scholarship was presented to him during the annual awards convocation of the Minnesota Society/American Institute of Architects. Miller works for Korsunsky, Krank, Erickson, a Minneapolis architectural firm.

Civil & Mineral Engineering Professor Heinz G. Stefan of the St. Anthony Falls Hydraulic Laboratory recently taught a course on Hydrothermal Analysis and Waste Heat Dissipation from Thermal Power Plants at the Central Water and Power Research Station in Puna, India. The station is the national hydraulic laboratory. His participation was cosponsored by the government of India and the United Nations Development Program.

Regents Professor Herbert E. Wright, Jr., director of the Limnological Research Center, recently was a visiting fellow in the Department of Geomorphology and Biogeography at the Australian National University in Canberra.

Dean Roger W. Staehle is participating as a member of the **Minneapolis Futures Project**. He has



been asked by the Downtown Council to advise them how the future of downtown Minneapolis will be affected by the revolution in computing and communications. The committee started its work in October, 1981 and will provide a report to the Downtown Council by May, 1982. Other members of the committee include Fred Asher, O. D. Gay, Todd Heggland, John Holten, Peter Heegaard, Earl Joseph, Ken Lampert, Stu MacIntire, James Nermyr, Gil Regnier, Lyall Schwarzkopf, Carol Wold Sindt, and Christopher Burns.

Geology Professor Subir Banerjee's geomagnetism research group has two international visitors: **Horst-Ulrich**, University of Bochum, Germany, is here on a German Government Fellowship for graduate work related to the origin and metamorphism of the

ocean crust and **Xiang-Yuan Zhu** from the Geophysical Institute of the Academic Sinica, Beijing, China, is a visiting scholar in paleomagnetism.

Geologist O. Ozdemir of Istanbul Technical University has returned to her home institution after 14 months in the **Department of Geology & Geophysics** as a research associate in paleomagnetism and rock magnetism.

Civil & Mineral Engineering Professor Edward Silberman of the St. Anthony Falls Hydraulic Laboratory retired in 1981. After receiving his B.S. and M.S. degrees in Civil Engineering from Minnesota, he worked in water resource assessment, flood control, and drainage with the Minnesota State Planning Board, the Corps of Engineers, the Minneapolis Dredging Company, the Tennessee Valley Authority, and the Civil Aeronautics Authority. In 1946 he joined SAFHL as a research associate, becoming an assistant professor in 1948, associate professor in 1951, and professor in 1957. Silberman directed SAFHL from 1963 to 1974. He has taught courses and conducted research in water resources management and in fluid mechanics, especially boundary layers and turbulence and also supervised hydraulic model studies.

Among the **Architecture** students who have received awards and scholarships in 1981 are **Ira Steigler** who received an \$800 American Institute of Architects (AIA) scholarship; **Jennifer Miner**, a \$500 award from Tanick & Heins, Minneapolis Attorneys at Law; **Tami Sellman**, \$500 from the Women's Architectural League; **Diane Kasprovicz**, \$300 from the Wisconsin Architects Foundation; and 1981 graduates **Mike Faber**, the AIA Medal, **Yvone Hobbs** and **Denise Rasche**, AIA Certificates, and **Marla Nadolney**, the Alpha Rho Chi Medal.

At the Conference on the Dynamics of Molecular Collisions in 1981 **Chemistry Professor W. Ronald Gentry** was promoted to chairman of the 1983 conference and **Chemistry Professor Donald Truhlar**, vice chairman, to head the 1985 conference. Minnesota becomes the third school to provide two chairmen. Also, Truhlar was appointed to a four-year term on the visiting committee for the Chemistry department at Brookhaven National Laboratory.

Chemistry Professor Robert Brasted received the **1981 Mosher Award** sponsored by the American Chemical

People

(From page 13)

Society's Santa Clara Valley section. He was the first to receive the award which recognizes and encourages work in chemistry, advances chemistry as a profession, and recognizes service to the American Chemical Society.

Richard Richtman joined the **Aerospace Engineering & Mechanics** faculty during fall quarter as the second **Akerman Visiting Professor of Aircraft Design**, to teach a senior course on aircraft design. An assistant project engineer with the General Dynamics Company, Fort Worth division, he has been involved with the development of several major aircraft over the past 32 years. Richtman received his B.S. in aerospace engineering in 1945 and his M.S. in 1947.

The Department of Aerospace Engineering & Mechanics has had several international visitors during 1981-82. **Piero Villaggio**, professor of strength of materials at the Institute of Scienza delle Costruzioni, Università di Pisa, Italy, taught a course in mechanics fall quarter and continued research on unilateral problems in elastostatics. **James Dunwoody**, professor of engineering mechanics at the Queen's University, Belfast, Ireland, is on a Fulbright Travel award to the department. **Donald Nield**, associate professor of mathematics at the University of Auckland, New Zealand, is working for several months on mathematical applications to fluid mechanics problems. **Michael Renardy**, a post-doctoral student from the University of Stuttgart, West Germany, worked in fluid dynamics and rheology. **Jie-Zhi Wu** from the Chinese Aeronautical Establishment, Beijing, and **Zi-da Zhang**, with Jilin University of Technology in the People's Republic, are visiting scholars.

Mathematics Professor Johannes C. C. Nitsche received the **Senior U.S. Scientist Award** from the Alexander von Humboldt Foundation in recognition of past accomplishments in research and teaching. The award allows him to stay for an extended period in the Federal Republic of Germany to carry out research of his own choice, thus contributing "to the promotion of scientific cooperation between research institutions in the Federal Republic of Germany and in the United States of America."

Mathematics Professor George Sell has been invited to deliver an address on "Ordinary Differential Equations and

Dynamical Systems" at the 1982 meeting of the International Congress of Mathematicians in Warsaw, Poland. The worldwide gathering of mathematicians is held every fourth year.

Patrick L. Brezonik joined the **Department of Civil & Mineral Engineering** this fall as professor of Environmental Engineering. He received his B.S. degree from Marquette University in 1963, and his M.S. and Ph.D. degrees from the University of Wisconsin, Madison, in 1965 and 1968, respectively. Previously he was professor of Environmental Engineering Sciences at the University of Florida. His current research interests include chemistry of natural waters, limnology, eutrophication, nutrient cycling and chemistry, nitrogen fixation, management of models for water quality control, biochemistry of waste treatment, trace metal reactivity and speciation in waters, toxic organics in natural waters, and water supplies.

Chemical Engineering & Materials Science Professor Matthew V. Tirrell has received a \$25,000 **Alfred P. Sloan Research Fellowship** to support research over a two-year period.

Professor Tore Undeland of the Norwegian Technological University, Trondheim, Norway, is visiting the **Department of Electrical Engineering** until August 1982, assisting with laboratory development and research in power electronics. He is sponsored by the **Center for Electric Energy**.

PROGRAMS

The School of Mathematics continues its Distinguished Visitor Program supported by the Ordway Endowment, with month-long visits from **Bernard Dwork**, Princeton University; **Avner Friedman**, Northwestern University; **Bjorn Dalberg**, Uppsala, Sweden; **Harry Furstenberg**, Hebrew University of Jerusalem; and **Roberto Conti**, Istituto Matematico, Florence.

The school also involves Chinese scholars **Jin Zheng-zhong**, an Honorary Fellow from Nankai who works in partial differential equations, and **Gong Guanglu**, a Visiting Scholar from Peking who specializes in probability theory.

As part of its expanding **Actuarial Science program**, the **School of Mathematics** has made Vincent Hall one of the sites at which actuarial examinations will be given periodically.

Vincent is the only such site in Minneapolis.

During 1982 the 10½ inch refracting telescope of the **Department of Astronomy** will be open for public viewing on the first and third Fridays of each month, weather permitting. The telescope will be open from 7:30 to 9:00 p.m. **only** if more than half the sky is clear. The telescope is located in Room 450 of the Physics building on 116 Church St. S.E.

The Chemistry department hosted the Third Japan/USA Seminar on Education in late 1981, supported under the National Science Foundation's Office of International Programs, USA/Japan Cooperative Programs. Seven participants from Japan and 12 U.S. educators met for a four-day period to construct a chemistry course whose content will best serve the needs of the student not wishing to pursue science as a major field.

Beginning this spring, the **IT Alumni Society** will co-sponsor a number of **IT UPDATE seminar series with various IT departments**.

Each series will consist of five 3-hour seminars on topics of interest to engineers and technical managers. The first two of these series, one in Mechanical Engineering and one in Electrical Engineering, are scheduled for May-June, 1982. Seminar topics include: Robotics, Computer-Aided Design, Computer Graphics, Holography, Fiber Optics, and Digital Signal Processing.

The seminars will be presented by the University's Department of Conferences. For information, call Peter Zetterberg at 373-3486 or 373-3887.

The Institute of Technology Student Board has been running a series of **Entrepreneurial Seminars** since early January on Tuesday evenings that acquaint students with major areas, such as financial backing, personnel, and so forth, to consider in starting-up a new high technology business. The speakers have included consultants directly involved in new businesses starts or entrepreneurs from established companies. Among them have been Roland Weber, vice president and general manager of the Physical Electronics Division of Perkin-Elmer, who introduced the program; Tom von Kuster, vice president of Butler Research, on cash flow; Robert Zicarelli, chairman of Northwest Growth Fund, on venture capital; James E.

Thornton, president of Network Systems Corporation, on entrepreneurship; Vernon Heath, president of Rosemount, Inc., on employee relations; James Hearon III, president of National City Bank, on bank financing; T. Jay Salmen, a partner in Kueppers, Kueppers, Von Feldt & Salmen, on legal advice; Willis Drake, chairman and chief executive



Willis Drake

officer of Data Card Corporation, on new ventures in conjunction with a large company; and Dean Scheff, chairman of CPT Corporation, on team building.

AWARDS

The National Action Council for Minorities in Engineering is contributing \$5000 during the 1981-82 academic year to the Institute of Technology for the financial aid of four minority engineering students. The University of Minnesota received this award because of its demonstrated commitment to recruiting and graduating increased numbers of minority students from its engineering programs.

In conjunction with the **Minneapolis Walker Art Center's exhibition De Stijl: 1917-1931, Visions of Utopia**, a downtown Minneapolis skyway was transformed to look like it had been designed by artists of a De Stijl group. However, these artists were contemporary students in art, architecture, and design at the University of Minnesota and the Minneapolis College of Art and Design. They worked in teams for the competition that transformed the Northwestern Bank skyway. The winning proposal was submitted by **John Jurewitz, an Architecture student**, and Brenda Dane and Don Bergh, students from the College of Art & Design. Their "Skyway Boogie-

Woogie" incorporates transparent theatrical gels set into opaque panels in the skyway windows to create geometric patterns of red, yellow, and blue light within the skyway tunnel and on the exterior—recalling Mondrian's famous painting "Broadway Boogie-Woogie." The runner-up proposal was submitted by **Denise deVictoria, Paul Emmons, Lee Meyer, David Packard, and Christine Zagaria, all Architecture students.**

The Underground Space Center's latest publication, **Earth Sheltered Community Design: Energy Efficient Residential Development**, was chosen as the best publication of the year in the Architecture and Urban Planning category of the sixth Annual Professional and Scholarly Publishing awards.

RESEARCH

The St. Anthony Falls Hydraulic Laboratory received \$100,000 from the Minnesota Energy Agency to help relocate and install a hydropower research facility at the Laboratory. This facility, known as a turbine test stand, is valued at over \$350,000 and is being donated by the Allis Chalmers Corporation. Its installation, which should be complete by spring 1982, will establish the Laboratory as the only publicly owned test facility in the nation and a center for hydropower research.

The Mechanical Engineering department's Particle Technology Laboratory has entered into a cooperative agreement with the Division of Aerosol Management Technology of the Duisburg University, Federal Republic of Germany, for the exchange of faculty, students, and scientific information and the development of joint research programs in the area of aerosol science and technology. **Professor Heinz Fissan** visited IT in early November and **Dr. David Y. H. Pui** visited the University of Duisburg later the same month. Two researchers, one from the Institute of Technology, the other from Sperry Univac, have been awarded \$145,000 by the National Science Foundation (NSF) to develop mathematical techniques applicable to scheduling and optimization problems which are currently unsolvable using existing programming algorithms. **Professor J. B. Rosen of Computer Science** and

Dr. Edward H. McCall, Sperry Univac research scientist and a Computer Science department adjunct professor, have joined together in the three-year study which they call one of the first cooperative research efforts between the University's Computer Science department and private industry. Important applications for the techniques they develop include finding the optimum solution to the classical managerial economics of problems of economies of scale, allocation of scarce resources, scheduling, distribution, transportation, and manufacturing.

Civil & Mineral Engineering Associate Professor Otto D. L. Strack has received the **1981 Vreedenburgh Prize** of the Royal Institute of Engineers of the Netherlands for "the very original way in which (he) expanded and generalized the complex analysis theory in relation to groundwater flow." The prize, which consists of a medal and monetary award, was presented to Strack in mid-February by the president of the Royal Institute.

Anonymous family gift funds chair in rock mechanics

An anonymous family gift of \$800,000 has funded a full professorial chair in Mining Engineering and Rock Mechanics in the department of Civil & Mineral Engineering. The family will donate \$80,000 per year for ten years to support the chair.

The gift enhances a program beginning its second century of service to the state and nation and solidifies Minnesota's international pre-eminence in mining rock mechanics.

The importance of mining engineers climbed quickly and dramatically when, in 1973, the OPEC oil embargo revealed heavy U.S. dependence on an overseas supply of minerals and this country's need to develop domestic resources to reduce such vulnerability. The demand for well trained mining engineers has remained high and is predicted to increase.

The new chair in rock mechanics allows the department to continue to build a first-rank program for undergraduate and graduate students.

An IT faculty committee is currently working to appoint an individual to the chair.

Mathematics Institute announces first-year plans

The Minnesota Institute for Mathematics and Its Applications begins its first year on September 1, 1982. Its initial one-year program will concentrate on Statistical and Thermodynamic Approaches to Phase Transition.

The National Science Foundation (NSF) officially funded the institute in mid-1981. The \$5 million, five-year renewable grant will bring mathematicians from around the world to the Twin Cities campus to work with scientists and engineers in solving high-level problems. Such research, NSF has indicated, can improve productivity in engineering and science.

During the Minnesota institute's fall quarter Dr. Oscar Lanford, from the University of California-Berkeley, will coordinate studies on Statistical Mechanics and on Chaotic Behavior and Turbulence in Dynamical Systems.

The 1983 winter period will be devoted to the application of statistical and continuum methods to the study of the physical and chemical properties of materials undergoing phase transition.

University of Minnesota Regents' Professor of Mathematics James Serrin will head activities on Continuum Thermodynamics and Phase Transition during the spring and summer of 1983.

To promote interactions between

pure and applied mathematicians, scientists, and engineers the institute will sponsor a lecture series as well as individual lectures, seminars, and discussion groups.

During its second year the institute will concentrate on topics in mathematical economics.

Institute participants are supported by NSF funds; contributions from a consortium of universities including Minnesota, Indiana, Michigan State, Northwestern, Ohio State, Purdue, Illinois, Iowa, Michigan, and the University of Chicago; and contributions from Cray Research, Inc., Honeywell, Inc., Magnetic Controls Co., and 3M Company.

Professor of Mathematics Hans Weinberger is director of the institute.

68-year-old tradition is rechristened

The Institute of Technology Engineer's Week (E-Week) has a new name for 1982—*IT-Week*. The renaming reflects the expanding scope of the spring celebration which now involves the entire University community along with Twin Cities schools and numerous local and national corporations.

The return of the Technology Fair to E-Week 1981 brought a large number of high technology

corporations together to exhibit their products for two days under a big top on the Minneapolis campus mall and included such companies as IBM, Data Card, General Mills, and Cray Research. Corporate enthusiasm was so high that many more participants are expected this year. Honeywell called the event one of the best campus fairs they had participated in because of the numbers who came to see company displays. Research Inc. participants said those who came were very pleased to review the capabilities and personalities of so many companies at one time.

The Tennant Company probably best exemplified the corporate attitude to the fair. Tennant came to the campus to promote the engineering profession as a career.

Last year 35 corporations participated. One hundred twenty-five 100 square foot lots will be available this year and allotted on a first come, first served basis. They are expected to be gone by the end of February.

Already Institute of Technology students are gearing up for the annual *IT-Week*, designing noncombustion cars and other engineered devices with which they will compete in car races, paper airplane contests, or bed and tricycle races.

IT-Week is May 3 to May 7 this year. If you have questions about participating in the Technology Fair, contact Nancy Penrod, Plumb Bob Honor Society, 5 Lind Hall, 207 Church St. S.E., Minneapolis, MN 55455. Plumb Bob members are in charge of all IT-Week activities.

ITEMS

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