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Irving Robinson Ely: Oldest Living Graduate of Institute of Technology



By 1882 the University of Minnesota had been accepting students for 13 years. William Watts Folwell, the University's first president was about to retire. Nearly all activity was centered in and around "Old Main," located where Shevlin Hall stands today. In that year, Irving Robinson Ely was born, whose parents "removed West and became Pioneers on the virgin prairie at Milbank, South Dakota."

Nineteen years later, in 1901, young Irving traveled to the University on the Chicago, Milwaukee, St. Paul & Pacific railroad. "I matriculated at the University of Minnesota at Minneapolis, from which I was graduated with the degree of Electrical Engineer in 1905."

Irving Ely is now the oldest living graduate of the Institute of Technology. On September 24, 1976, he passed his 94th year, and celebrated the day by going bowling.

The only photograph of Ely available to ITEMS is his 1905 graduation picture, showing him to be a young man in a high celluloid collar looking resolutely into the distance beyond the camera. It is a fine face, intelligent, serious, steadfast. From a seventy-six year retrospective, it is certainly tenacious; tenacity displayed in Ely's grip on life, his mastery of his old age. He has enjoyed his life, used it well, and is now rewarded with undiminished senses and a lasting vitality.

Irving Ely's story begins in Milbank, South Dakota.

On September 15, 1882, eight days before Irving was born, the MILBANK NEWSLETTER printed, "The village of Milbank was located on the northwest quarter of Section 7, Township 120, Range 48 . . . the site selected in June, 1880 while yet a wheat field. The growth of the town was extremely rapid . . . by the spring of 1881 the town could boast a population of over three hundred souls . . . Within a month after the location of the town, there were nearly fifty buildings." To this raw, but promising land, Irving's parents, Erwin D. and Ella Robinson Ely immigrated, from Troy, New York. In less than a year of their arrival, the MILBANK NEWSLETTER would print . . . "The Ely, or round elevator, is forty feet in diameter and now has a capacity for 30,000 bushels, though it

will probably be enlarged this fall . . . sufficient to hold 40,000 bushels more." In very little time Ely's parents had established themselves as important contributing members of this society, active in church and town affairs.

On this new land, surrounded by wheat, fed by and blooming from the energies and dreams of the settlers, Irving grew up, went to school and the Congregational Church, played and worked. When he was nineteen, after a year spent setting type in the Milbank printing office, he came to the University.

Cyrus Northrop, "drafted" from Yale, was now the second president of the University, earning \$6,000 a year, nearly twice as much, according to James Gray's "University of Minnesota," as any other president of a midwestern university commanded. On September 10, 1901, the first class day of Irving's freshman year, William McKinley, four days away from assassination, was still President of the United States. Women's skirts just skimmed the dust of the streets, and the automobile was yet a novelty.

By the time Ely began his University work in 1901, the turbulent and chaotic beginnings of the predecessor to I. T., the College of Engineering and Mechanic Arts, were nearly over. The first Engineering dean, Frederick Jones was soon to be appointed, and he began to assemble an instructional staff that would guarantee the College's eventual prestige. Ely remembers some of them — Jones, dean of the College, and father of the infant Physics department, John Zeleny, pioneer researcher, among whose early experiments in electrical instruments were some which led to discoveries commercially important to the grain industry.

In 1901, University tuition was free. Ely's expenses were a \$5.00 quarterly incidental fee, the cost of his books, and minimal laboratory fees, plus room and board and personal expenses. The total amount averaged out to about \$300 per year. Admission to the University was open to anyone, whether a Minnesota resident or not, over fourteen years of age, passing the regular entrance examinations, or presenting sufficient credentials from an accredited high school.





Irving R. Ely

In his freshman year, Ely took courses in Mathematics, German and French, Chemistry, Drawing, Shop Work, Military Drill, and Rhetorical Work, receiving grades in the high 80's and 90's. As a sophomore, in 1902, the course of study branched into one of three areas, civil, mechanical, or electrical engineering. As a student in the electrical course, his work, as shown on his four-year transcript, began to specialize. He continued to get grades of A and B in such subjects as Mechanics, Electric Laboratory, Electric Design, Alternating Currents, and Thermodynamics. A four credit senior thesis was required. Ely received a B.

Although memories of his student days at Minnesota are still clear, Ely likes best to remember football . . . "I remember most vividly the 'Giants of the North'. I used to know the names of all the players and saw every game I could, including the famous tie game of 1903 with Michigan."

Ely had no trouble in 1905 getting a job as an electrical engineer. Recruiters from industry then, as now, came to campus seeking likely graduates as employees. Ely says, "I accepted the offer of representatives from the General Electric Company, and I spent 1½ years on the Electrical Test Course of the General Electric Company at Schenectady, New York, getting practical knowledge of electrical apparatus and its operation. I worked the night shift to get \$14.80 a week, as the day men only got \$12.40 (about)."

His next position was an electrical load dispatcher for the Electric Zone of the New York Central Railroad in New York City. "Here I spent four very interesting years participating in the initial operation of electric trains into and out of Grand Central Station."

Ely's next move was to a position he devoted the rest of his working career — thirty-five years as a civilian electrical engineer for the Navy, first at the New York Shipbuilding Company in Camden, New Jersey, and then with the Wm. Cramp and Sons Ship and Engine Building Company in Philadelphia, where he was involved in the building of the battleship Wyoming. He remarks, "In 1913 I was transferred to the Brooklyn Navy Yard, a base renowned for its extensive naval ship construction and repair work. My term of duty at the 'Yard' included the very trying and strenuous years of both World Wars." Ely protests that he never worked on any "secret" projects vital to the war effort, and says he worked "principally on tests of electrical machinery." He still regards the closing of the Brooklyn Navy Yard as a mistake, and feels "it should have been retained by the Government."

Since his retirement in 1946 from the Brooklyn Navy Yard, Irving has lived in Ft. Myers, Florida, where he has been able to devote time to personal activities. He was always a good golfer, and remembers with pleasure playing on courses in Guatamala, Jamaica and other islands in the West Indies. For many years he was active in the AIEE. Only recently has Ely been reluctantly giving up some of his more active pastimes; golf a year ago, and although he still bowls every day for exercise and recreation, he maintains his average is on the "low side."

Ely never married, unless a thirty-five year devotion to service with the Navy can be called a certain sort of marriage. "I have lived for many years with my sister and no doubt this has influenced my way of life, for I seem to have been content to remain a bachelor." His sister, Gertrude, is now in a nursing home, but comes to visit occasionally.

Paul Cartwright, Assistant Dean for Student Affairs of the Institute of Technology, has known the Ely family for many years. Two years ago when he visited Ely in Ft. Myers, there were, Cartwright said, "two cousins from New York living with him. They were almost as venerable as he was."



Electrical engineering laboratory in Eddy Hall about the time Ely was a student.



During the visit they played bridge, and Dean Cartwright reports that "Ely is still a very good bridge player."

The young man whose origins and roots begin in a small town in the middle of the South Dakota wheat fields, brought up by pioneers, and whose young adult life was enriched and shaped by his teachers and the early environment of the still youthful University of Minnesota, now eagerly awaits the appearance of this "write-up" about him. He is delighted with the thought that he is the oldest living graduate of the Institute of Technology. Perhaps it is a responsive pioneer spirit speaking when he claims . . . "the U. of M. experience has been a source of satisfaction to me and I would be happy to repeat it."



ITEMS

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Photographs courtesy of University Archives

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

I.T. Gets Grant To Study Storage of Thermal Energy in Native Rock

The Institute of Technology is the recipient of a grant of \$172,174 from the U.S. Energy Research and Development Administration (ERDA) for a project to investigate the development of practical, low-cost methods for storing large amounts of high temperature energy in Rock Bed Heat Accumulators. The grant for this project extends from June, 1976 to June, 1977.

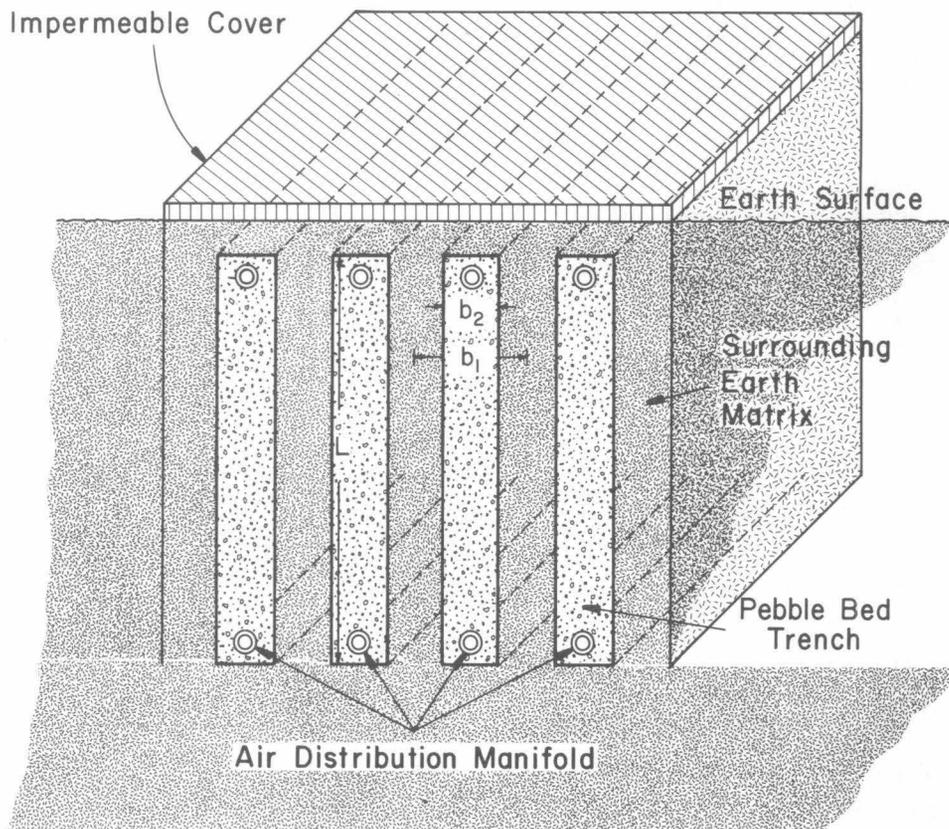
Principal investigator and project director of the study is Associate Professor M. Riaz of the department of Electrical Engineering.

A unique feature of the project is the cooperative venture responsibility which will be shared equally by the departments of Electrical Engineering, Mechanical Engineering, Geology and Geophysics, and Civil Engineering.

The main objectives of the study are: to investigate the technical and economic feasibility of storing large amounts of thermal energy over extended periods of time using native

earth materials that can be prepared at low cost; to conduct studies to establish the performance characteristics of large rock bed heat accumulators at various power and temperature levels compatible with thermal conversion systems; and to assess the materials, geological and environmental problems associated with the installation and operation of large earth heat accumulators, with its utilization of on-site native materials, from the increased energy density obtainable with large temperature risings, from the possibility of activating controllable environmental impact, and, most importantly, from the economic standpoint of inherent low-cost of materials preparation, installation, and operation.

Thermal energy storage will play an important role in energy conservation for such large-scale applications as electric utility systems — where load leveling provides for improved utilization of





capital equipment resulting in substantial cost savings, community or district heating systems — where the inherent cyclical and intermittent nature of solar energy necessitates the use of efficient storage systems for optimum energy utilization. The basic function of the thermal energy storage system is to provide the necessary buffer and match between the time-varying thermal energy inputs, and the corresponding output thermal and electrical loads. The development of practical, low-cost storage systems is becoming of increasing importance for solar-thermal conversion systems adapted to electric power generation and total energy systems.

The concept, which will be studied by researchers in the Institute of Technology, will involve the use of arrays of pebble-filled trenches, or holes, surrounded by undisturbed earth which can be fed by hot air from above or below. This concept will be investigated by conducting studies dealing with a) accumulator sizing and economic analysis; b) storage system analysis, and c) environmental impact and materials. Ranges of parameters to be explored are 30 to 300 MWt in power level, 250° to 500°C in temperature differential, and 1 to 180 days in time duration, for either charge or discharge modes.

The initial phase, for which the current contract from ERDA was granted, will cover the study of mathematical transient models, computer simulations, and accumulator performance evaluation. To study material properties under cyclic thermal conditions, native rocks will be heated in a "batch roaster" located in the Mineral Resources Research Center, said Dr. Riaz. On-site experimentation, further than what could be done with present equipment here in the Institute of Technology, will be left for future proposals to ERDA for continuation of the study, he said.

Because the heat accumulator must be capable of storing large amounts of energy (in the tens of megawatt-years) at high temperatures (250°-500°C) over long duration (up to six months) and furthermore, must be inexpensive (perhaps less than \$50/GJ or \$0.18/kwh), and made of abundant materials that tolerate high

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Retention Rate of I.T. Freshmen Up 38% in 12 Years

The Institute of Technology had approximately half of its freshman class on probation or flunked out at the end of fall quarter, 1963. Twelve years later, at the end of fall quarter, 93% of the freshman class of 1975 were doing 'C' work or better. These figures reflect a greatly enhanced learning environment for the student in I.T., as well as a more nearly optimum use of the resources available to the Institute of Technology in attracting the superior student.

The office of the Assistant Dean for Student Affairs is responsible for a wide ranging area beginning with early contacts in the high schools and colleges searching for prospective students, admission decisions, orientation of the freshmen, and advising of students. Responsibility for academic standards and their enforcement, maintenance of undergraduate records of the Institute of Technology, and encouragement and support of extra-curricular activities rest with this office.

During the last school year, staff from I.T. Student Affairs visited over 100 high schools in the state of Minnesota. Visits were made to nearly all of the community, State, and private colleges in the State of Minnesota, as well as the coordinate campuses of the University at Morris and Duluth. These visits served to provide counsel and guidance for high school students who may be prospective admissions for the Institute of Technology and, at the college level, served to provide ease of transfer from pre-engineering programs operated by other schools in the state.

The freshman class of 1976 is approximately 725 students, slightly larger than last year's class, and the median high school rank is calculated at the 91st percentile. This is an all time high. The total undergraduate enrollment is about 4100, approximately the same as Fall 1975.

One of the major efforts and challenges of this office during the preceding year has been to promote a philosophy in the University system of using merit scholarship money (in

very modest quantities) to attract top scholars. The Institute of Technology, through Dean Swalin's office, has been fortunate in having a small amount of money available to be used for "merit only" allocation — "need" not being a factor. The availability of this money over the past several years has resulted in attracting to the Institute of Technology a number of exceptionally capable students.

We have continued to operate our Institute of Technology dormitory house-tutoring programs. The dorms have set aside for I.T. freshmen and sophomores entire floors, each floor housing about 50 students, one of whom is an I.T. senior honor student hired by the Institute to serve as a tutor and adjunct advisor for the freshmen. This program has been eminently successful.

To serve the commuter student, I.T. honor students will tutor two evenings per week at local high schools — Coon Rapids Senior High School, Edina South View High School, Robbinsdale High School, Washburn High School, and, we hope to add St. Paul Sibley High School to this list in the coming year. We think that these rather extensive tutoring programs have in some way contributed to the improved retention of I.T. students.

A decade ago the Institute of Technology was noted for its exceedingly tough grading policy. The grade point average of the freshman class at the end of the school year in 1965 was less than 2.0. The 1975 freshman class has a grade point average falling between 2.8 and 2.9. We feel this reflects a more realistic grading policy, as well as the exceptionally high quality of the freshman classes of recent years.

In order to encourage more high school students to take challenging courses in high school, and in order to encourage the high school faculties to provide such courses, we have for some years given on campus in May, comprehensive examinations in Calculus. It is possible for high school seniors to take these examinations and to be granted advanced standing with degree credit in the Calculus sequence. For



example, this past spring we had nearly 80 students who successfully passed the comprehensive examinations and were granted one quarter's advanced standing in calculus. We had an additional twelve who got two quarters of advanced standing, and we had three students who were granted advanced standing in the full year of freshman calculus. In addition, we have working arrangements with one or two local high schools wherein direct credit for calculus is granted for classroom work in the high school. On this basis, we have granted advanced standing to perhaps an additional twenty students.

We now find that in a senior class of approximately 750 students graduating over a period of a year, about 55 percent of them did not start with us as freshmen. This implies that we are receiving more students with advanced standing work and is beginning to be reflected in our enrollment patterns. We find we had lower division enrollment of approximately 1600 students, and upper division enrollment of 2400 students, in the fall of 1975. This is a complete reversal of the pattern of fifteen years ago, and has certain implications for teaching costs, and utilizations of resources.

To sum up, during the past year we have made substantial efforts to attract into the Institute of Technology qualified students, and in particular, we have made an effort to attract the exceptionally well-qualified student. We will continue to make a substantial effort to retain all our students once they are here, or at least to help them achieve a satisfactory academic record so, if they wish, they may transfer elsewhere. We find our students performing well, active in extra-curricular affairs, able to get jobs when they graduate. We take great pride in our students, our faculty, and our alumni.

Paul Cartwright
Assistant Dean-Student Affairs

SOLUTIONS DEPEND ON PAST, PRESENT AND FUTURE RESEARCH

SHEPHERD DISCUSSION CONCLUDED



William G. Shepherd

In the summer issue of ITEMS, Dr. Shepherd, in considering obstacles to energy solutions, reviewed the concept of heat storage in rock piles. Since that time, I.T. has received a grant

from the U.S. Energy Research Development Administration (ERDA) to investigate such high temperature rock bed storage systems. This project is discussed elsewhere in this issue of ITEMS.

Having touched on possible solutions to the energy crisis and the part departments in I.T. are taking in overcoming these questions, Dr. Shepherd turns his attention now to other areas.

"Let me list a few of the things that I think deserve mention. We've got transportation problems that derive in part from limits of energy, as well as from the enormous waste of human time and effort, in moving from one place to another. There are better ways of getting some of these things done. I had a very distinguished friend who talked about a society in which one would *communicate* to work, rather than commute to work. Our ability to transmit large quantities of information very cheaply and quickly would presumably enable us to have what amounts to a face to face conference with people who might be all over the country. They can be videophoned into a center, and one can interact that way, rather than expending the time and the effort and the energy in moving people from place to place.

"Techniques for managing the enormous problems in storing and disseminating knowledge must be improved. One of the things we are running into at this university, and at others, is the tremendous cost of printing and holding of the literature that appears every year. It is a question of whether in the longer

term, we can really afford to produce and store much of our scientific literature in the form that it is presently. Are there better ways? It is a waste to publish journals several inches thick with a number of articles, only a few of which are of interest to any particular individual. There ought to be ways in which that information could be put into a record, and retrieved selectively so that you receive only what you are interested in getting.

"In a somewhat related area we are seeing electronic developments which are making it possible to produce compact and cheap devices which store and process information at prodigious rates. The most familiar example of this is the pocket calculator which has rapidly increased in sophistication while rapidly decreasing in price. This has been possible because of the development of integrated circuitry which accomplishes circuit functions in an extraordinarily compact space. These devices have implications for many control functions both in industry and in consumer products. Further advances are possible in the micro-processor field. These will involve understanding and control of material properties on a scale of microns. Such studies are of interest to electronic engineers and materials scientists. The application of these micro-processors will depend not only on the design and production of the necessary hardware but also on the development of the software which programs the manipulation of the input data to yield the desired output information. The software development is in the province of the computer and information scientist."

In this overview Dr. Shepherd has covered some of the I.T. research activities related to some of the immediate scientific and engineering problems confronting society. He points out that there is a great deal of basic research going on in I.T. whose application is not so immediately apparent which in no way diminishes its importance. Most of the solutions of the problems described in this series will result from the basic research of the past, and some will result only from discoveries in present and future basic research.

“... The concept of continued learning throughout life is a powerful tool ...”

Continuing Education for Engineers and Scientists is a partnership between industry and government and the university. Industry today more than ever before recognizes that its employees, particularly its professional personnel, are critical resources whose improved skills are essential to the continued productivity of the company. Professional development of its employees has become a major responsibility of management. One of the keys to professional development is motivation of the professional. This involves an overt commitment of the company to continuing education.

The individual engineer must feel assured that he will be recognized and rewarded for his effort to improve his skills by undertaking continuing education programs.

Klus and Jones (Department of Engineering, University of Wisconsin-Extension, Madison, Wisconsin, “Engineers Involved in Continuing Education, A Survey Analysis”) have found corporate commitment to professional development not only leads to improved skills but also to job satisfaction of the employees.

The overall program in large companies consists of both in-house programs and programs to make it possible for the professional employees to take relevant collegiate offerings.

IBM has developed a nationwide Technical Vitality program to meet its goals for the development of professional personnel. We believe this program is of sufficient interest to the readers of ITEMS to present below excerpts from an article by Gabor Koves. Dr. Koves is responsible for the Technical Vitality program at IBM Rochester. It describes how in-house programs and university programs are blended to provide a total program for professional development.

“The Rochester, Minnesota Plant and Laboratory comprise one of two major locations in the General Systems Division where data processing systems are being developed and manufactured. The

data processing industry has been characterized by rapid growth and the continuing demand for immediate application of fast changing advanced technologies.

“Continuing education has been a way of life in IBM from the early days of the company, particularly since the mid 1950’s when the corporation entered the electronic digital data processing business.

“Although Rochester is only one of about a dozen major domestic facilities of the IBM Corporation, its educational activities are fairly typical and certainly reflect a basic commitment of the corporation to provide an environment which supports personal growth and learning. Company support is available for any educational program, whether one hour or one year in duration, provided the employee and his manager agree on its applicability to current work or its desirability for future growth.

“Within this very broad framework, a wide variety of organized programs are available, administered by the Education department. A number of educational specialists in this department research, develop, organize, and coordinate the various programs. They utilize a broad range of in-house capabilities, all the way from corporate educational facilities to local technical specialists as part time instructors. An equally wide range of outside facilities also are being utilized from university graduate schools to correspondence courses. Most educational programs are organized on company time, although additional effort in studying and homework usually is required on the student’s own time. In most cases educational expenses, including tuition and materials, are reimbursed by the company.

“The IBM graduate work study program takes a special form in Rochester to provide the opportunity for our professionals to obtain a master’s degree in disciplines relevant to the Rochester mission. This company-supported job-time program is conducted by the

University of Minnesota Institute of Technology. Courses originate on campus and are transmitted live to Rochester by the university industry television education (UNITE) closed circuit television system.

“On-site classrooms in the Rochester plant are equipped with both video and a two-way audio system. In addition to regular classroom attendance, students meet periodically on-site for university advisor consultation and colloquia participation.

“Electrical engineering, mechanical engineering, and computer science are the areas in which students may pursue a master’s degree.

“To qualify for work study, the employee must obtain his manager’s approval and must, of course, be accepted by the University of Minnesota Graduate School. The classes are conducted on company time (typically three hours per week for a three credit course) and all necessary materials are provided by the company.

“A recent specialized program developed jointly by the University of Minnesota Institute of Technology and IBM, as well as other area corporations, is the Professional Development Recognition Program (PDRP). This program provides for the attainment of highly specialized educational goals for professionals who already have college degrees and are not interested in obtaining an additional degree. The program for a particular individual is worked out with the participation of the individual, his manager and the designated advisor in his specialty from the university. The student can utilize a variety of means from classes through self-study to attain his objectives. At the successful conclusion of the program (which usually takes about two years), the university presents the student with a Citation of Completion.

“A specialized program, conducted by the University of Minnesota Institute of Technology, is a two week concentrated off-site course for engineering managers, “Modern Technical Concepts,” which aims to revitalize the individual’s technical knowledge, as well as bring him up to date on the newest advances in technology.

“Renewal for the individual and the organization, to which we apply



the term "technical vitality," has become a very important concern in IBM during the last few years. Technical vitality refers to a broad range of activities, not exclusively courses or education, designed to help engineers and scientifically trained people become more productive. Maintenance of vitality depends heavily on personal responsibility, but provision of educational facilities and an environment which encourages learning is a positive company contribution to future productivity. The concept of continued learning throughout life is a powerful tool. Combined with our other programs in technical vitality, it provides a firm support for personal growth and learning."

AMCEE TO PRODUCE VIDEO SERIES ON USE OF SOLAR ENERGY



Morris E. Nicholson

At the September meeting of the Association of Media Based Continuing Education for Engineers (AMCEE), the board of directors voted to develop a ten hour video tape program on Solar Space

Heating and Cooling. AMCEE is a non-profit corporation originally composed of twelve universities having four year degree engineering colleges. The University of Minnesota is a charter member of AMCEE. The director of Continuing Education in Engineering and Science, Dr. Morris E. Nicholson, is treasurer of the corporation.

The purpose of AMCEE is to produce media-based materials which can be purchased or leased from cooperating universities by industry or governmental organization or professional societies. By this means it is expected that relevant programs in continuing education can be made available on a nationwide basis for the professional development of engineers.

The board of directors determined at the September meeting that one of the most pressing national needs is for authoritative information related to the practical

use of solar energy, and therefore voted to undertake this program. The program will be a cooperative effort under the direction of J.R. Williams of the Georgia Institute of Technology. He has been involved in solar research for many years. Through the cooperative effort of AMCEE, it will be possible to obtain a wide number of university faculty who have expertise in the solar energy field.

At the meeting the board of directors accepted as member universities, Auburn University in Birmingham, Alabama, and the University of Illinois at Champaign-Urbana.

UNITE ADAPTS TO CHANGING ENGINEERING NEEDS

When the UNITE system was first established, engineers working for high technology industry were generally interested in pursuing M.S. degree programs in engineering. There was also a high percentage of engineers who had no degree interest but who wished to take courses for credit. Many of these engineers already had the M.S. or Ph.D. degrees yet wanted to obtain information and skills in new areas as their careers changed.

During the last several years a new interest has developed on the part of the new practicing engineer. Because of the press of work and commitments which frequently take

engineers away from their plant location there has been an increasing interest in taking courses on a non-credit basis. This permits an engineer to take only that portion of a course in which he is interested. Frequently he is interested in concepts rather than skill development. As a result, UNITE has been expanded to permit participation of engineers as auditors. Listed below is a table of participation at Stanford University showing the continued interest in degree programs and the growth of the auditor program. On an experimental basis last year the University permitted auditors to participate in the UNITE courses. This was of considerable interest to some companies, and as a result, the audit concept has now been built into the UNITE structure.

Along with the increasing interest in audit participation there has been an increasing interest in state-of-the-art courses. In order to meet the interest in state-of-the-art courses the UNITE system will offer this Fall quarter a special course entitled Methods of Surface Characterization. The course will cover principles and applications of modern techniques of analysis of solid surfaces. These will include Auger Electron Spectroscopy, X-ray Photo-electron Spectroscopy, Secondary Ion Mass Spectrometry. The Institute of Technology plans to offer additional state-of-the-art courses as late afternoon classes and by UNITE in the future.

Table 1. Stanford Televised Engineering Instruction Participation Data.

	1969-70	1970-71	1971-72	1972-73	1973-74	1974-75
Honors Coop Program (Degree Seekers)	762	836	546	562	577	685
Non-Registered Option	37	106	66	95	185	374
Television Auditors	102	97	746	1,372	1,246	1,475
Total Registrations	901	1,038	1,358	2,029	2,008	2,534
Number of TV Courses	116	148	143	145	150	148
Average Per Course	7.8	7.0	9.5	14.0	13.4	17.1
Number of Member Companies	23	24	26	30	36	38



Schedule of Conferences and Short Courses

ENGINEERING MANAGEMENT SEMINAR. **October 11-13, Nolte Center, fee: \$225**

This seminar is designed for the middle or lower level engineering manager with at least one year of supervisory experience, who directs the work of engineers or other professional personnel. The seminar will assist the manager to establish engineering department responsibilities, objectives and action plans which will enable him to evaluate the effectiveness of his performance, and that of his subordinates. Emphasis will be placed on understanding the management by objectives philosophy and applying this approach to achieve results in an engineering department. The management functions of planning, executing, reviewing, motivating, and developing professional personnel will be included.

1976 MINNESOTA POWER SYSTEMS CONFERENCE. **October 12-13, Registry Hotel, fee: \$50**

The Twin Cities section of IEEE and the University of Minnesota are co-sponsoring the 1976 Minnesota Systems Conference, which will feature:

- Load Management
- Speed vs Security in High Speed Pilot Relaying Schemes
- Developments in Computer Relaying
- Turbine Generator Operating Limits and Power System Behavior During Period of Abnormal Frequency

PROJECT MANAGEMENT. **October 13-15, Kahler Motel, fee: \$375 per person. \$337.50 per person per team (3 or more people from same company).**

This 3-day seminar is designed for project managers and project engineers, research and development managers, program managers and construction managers. This seminar will cover how to plan, organize, integrate and measure the work of the project team members, and examine alternative approaches to project management. A step-by-step methodology for accurate preparation

of time, resource, and cost schedules will be demonstrated. An emphasis will be placed on how project management systems can be used to produce and manage innovations.

MANAGING A PREVENTIVE MAINTENANCE PROGRAM. **October 27-29, Radisson Hotel, Downtown Minneapolis, fee: \$375 per person. \$337.50 a person per team (3 or more people from same company).**

This seminar is designed for chiefs of operation, plant engineers, directors of physical plants, industrial engineers, plant managers, and safety program directors. Topics, which will be covered during this three-day seminar, will include:

- establishing, implementing, and operating a preventive maintenance program;
- identification of equipment and components;
- preparing procedures;
- coordinating work with production, and;
- recording feedback information.

MASONRY DESIGN APPLICATIONS FOR BUILDINGS. **November 20, Rodeway Inn, fee: to be announced**

A one day conference to be held on November 20. This conference will review fundamentals of structural masonry design, with emphasis on thorough understanding of selected NCMA design aids. It will include case studies in masonry design and construction techniques.

9TH ANNUAL WATER RESOURCES SEMINAR. **November 22-23, Arden Hills Training Center, fee: to be announced**

The format for this year's seminar will be 1½ hour workshops to facilitate interaction with the faculty. Topics to be covered include:

- Stormwater Design Practice
- Groundwater Contamination
- Climatology and Hydrology
- Flood Control and Flood Plain Management
- Hydrologic Frequency Analysis
- Irrigation Practice in Minnesota
- Laws, Regulations and Permits, and the
- Implementation of Hydrologic Research

23RD ANNUAL BITUMINOUS CONFERENCE. **December 1, Prom Center, fee: \$16**

This program is designed to provide current information on research, principles, and practices of quality bituminous construction. The topics relate to two general themes, each scheduled for one-half day. The theme for the morning will be, "Maintenance and Reconstruction," and the afternoon theme will be, "Recreational and Other Specialty Uses."

26TH ANNUAL CONCRETE CONFERENCE. **December 6, Marriott Inn (tentative), fee: \$27**

This one-day annual conference addresses itself to a variety of concerns and techniques used by the concrete industry. Designed for engineers, architects, contractors, and other allied industry personnel. Sponsored by the American Society of Civil Engineers, the American Concrete Institute, the Concrete and Masonry Contractors Association of Minnesota, and the Minnesota Department of Highways.

For further information on the conferences described above, please call the department of Continuing Education in Engineering and Science, 373-3132.

LANDO AND NSF — SUMMER UNDERGRADUATE RESEARCH IN CHEMISTRY

Two undergraduate research fellowship programs were conducted this past summer by the department of Chemistry — the Lando Summer Research fellowship for outstanding undergraduate students between their junior and senior year, and a similar summer program of undergraduate research supported by a \$60,460 grant from the National Science Foundation.

The Lando program is primarily funded by a bequest to the University from Maximillian N. Lando, who received a bachelor of science degree in chemistry from the University in 1902. The Lando funds are supplemented by additional

Everett Dale, President, I.T. Alumni Association

Annual Science and Technology Day



Everett H. Dale

In the previous issue of ITEMS, we presented some of the plans for I.T. Alumni Association's Annual Science and Technology Day, Friday November 5, 1976. Since then, your Board of Directors, working closely with the University, have firmed up the program.

The afternoon seminar will be held on campus this year, in the new Coffman Memorial Union Theater, from 1:30 until 4:30. There is no charge for the seminar, and everyone is welcome. The evening banquet will be at the Radisson South Hotel at 7:00, preceded by a social hour at 6:00.

A remarkable revolution is taking place in electronic technology, and no industry or engineer will escape its impact. In what other area do you find product sophistication increasing, while unit cost declines dramatically? This year's timely seminar topic is "Minnesota's Role in the Microelectronics Revolution" with the introduction being given by *Richard Swalin*, Dean, Institute of Technology. Professor *Ray Warner*, who heads the Microelectronics program at the University, is the session moderator. The panelists include *James Moore*, Research Director of the Minnesota Department of Economic Development, *George Champine* of Sperry Univac, *Robert Henle* of IBM, and Professors *Robinson*, *Robbins* and *Kinney*. Following a tutorial overview of the subject, the panel will look ahead at the economic development opportunities now emerging, and at the expanding and somewhat amazing variety of new product applications. They will focus particularly on the Minnesota scene.

The principal speaker on the evening program will be University President *C. Peter Magrath*, who will maintain the momentum of the day's economy-technology theme by sharing some cogent observations on "The University, Technological Progress and Industrial Survival." Those who have heard Peter Magrath will agree

that he is a most effective and stimulating speaker.

In the past years, a significant number of area industries have supported the Association's program through the purchase of "PATRON" tables. A \$140 "PATRON" table includes:

- Eight tickets to the evening dinner program
- A reserved table for eight with a placard identifying the company
- A program listing the company as a "PATRON"
- An invitation to attend the seminar sessions.

Members of the I.T. Alumni Board of Directors will be contacting industry again this year. They will be able to answer any questions about the program. Companies may desire to have Institute of Technology students or faculty at their table. The University Staff will make arrangements for this through the Board Members.

We believe that the afternoon seminar and evening program will continue to be a valuable forum for the Minnesota leadership community. Company support will help achieve this goal.

ALUMNI BOARD LIAISON ACTIVITIES

The Alumni Association is seeking better ways to assist the University and, in particular, the students. Your Board of Directors has been working with *John Clausen*, Office of the Assistant Dean for Student Affairs, and *Beth Berman*, I.T. Board Vice President. She has outlined the tasks that their Board will be involved with during the 1976-77 academic year.

The I.T. Board has two main projects or objectives that we, so far, plan to work on this year. Both involve a great deal of time and effort and will most likely take more than a year to do and complete. They are:

- 1) *Teacher Evaluation* — The Board plans to examine the current method of teacher evaluation used in each department in I.T. and to get a form suitable to each. It is our goal to have each professor who teaches during a

particular year evaluated on a one course per year basis and the results reviewed by the department heads and put on file. We have also been considering the possibility of having the results published and distributed to the students.

- 2) *Contact with I.T. Students* — We plan to improve our contact with the students this year. This is to include wider publication of the Board's activities and projects, continuing to have Board members sit in the office during the day to talk to students who drop in or phone us on a particular matter, and do an all out campaign to interest and recruit new Board members and I.T. representatives to various committees.

Other projects that the Board is thinking about where help could possibly be needed are the improvement of providing job information and tours to unclassified and other interested I.T. students and recommendations on what courses and/or specialties are the most useful later on the job. Help in setting up such company tours and making the recommendations is where the alumni association could help with the Board this year.

NEWS FROM ALUMNI

Many alumni keep in contact with their former associates by reading the Newsletter, attending class reunions, the Annual Science and Technology Day Seminar and Program and other forms of communication. Of interest are promotions, changes in career plans, professional accomplishments, technical contributions and awards since leaving the University. We, on the Board of Directors, are interested in these areas and would like you to share with us your experiences. Along this line, we would like you to know better some of the members and officers of your Board serving the I.T. Alumni Association. Additional space will be devoted in future issues to other Board members and Alumni alike.

Wayne Schmaedeke is Vice President of the I.T. Alumni Board of Directors. He is Director, Operations Planning



at Minnesota Gas Company. Before joining Minnegasco, he held several academic and consulting positions, among them being professorships in Mathematics at St. Olaf College, the University of Minnesota and Rice University. He also founded Update, Inc., an engineering and consulting firm serving such clients as Honeywell, 3M Company and Minnegasco.

Dr. Schmaedeke holds a Ph.D. in mathematics from the Institute of Technology at the University of Minnesota. His postdoctoral years were spent in consulting with Honeywell, Univac and Standard Oil of New Jersey. He is the author of over a dozen papers in various mathematics journals and the co-author of two books on optimal control theory.

Board member *George A. Champine* is Senior Staff Consultant at Univac in the division responsible for the design and development of large scale commercial computer systems. In his 18 years with Univac, he has held several technical and managerial positions in the software and systems design fields. His most recent prior position was Director, Advanced System Design, where he was responsible for the system design of advanced large scale systems.

Dr. Champine holds a B.S. and M.S. in physics from the University of Minnesota and a Ph.D. in Management Information Systems from the University of Minnesota.

Board member *Kenneth A. Finden* has been Director of Environmental Engineering for The Toro Company since 1973. He received a B.S. in Agricultural Engineering from the University of Minnesota in 1949.

At Toro since 1960, Mr. Finden has held various engineering management positions including: Chief Engineer and Director of Engineering Services, Chairman of ANSI Commercial Turf Equipment Sub-Committee, Chairman of ISO Lawn & Garden Equipment Committee and Past Chairman of ASAE PM 52 Small Tractor Committee.

He previously served as Chief Engineer-Farmhand, Product Planner-Ford Tractor & Implement Division, Research Engineer at Green Giant and Chief Engineer of Smalley Manufacturing Company.

LANDO — from page 8

money from research grants of the chemistry faculty.

The program was initiated by Professors Louis H. Pignolet and Donald G. Truhlar in 1974. It is now in its third year and has been well received both by participating fellows and by their faculty advisors. The 13 fellows accepted for the 1976 program represent less than 10 percent of the applicants.

The Chemistry department was also the recipient of a grant of \$60,460 from the National Science Foundation to fund a similar undergraduate research program for sophomore, junior and senior students. Forty-six students have participated in this program over a three year span, and represent seventeen different schools within the five state midwest region. Nearly all of the graduates of the program have gone on to professional or graduate schools.

The department of Chemistry reports that one of the most important aspects of the program is the research experience it provides to the student at an early stage in their academic training, and believes that the NSF program helped resolve the problem experienced by many of the students of whether or not to continue on to do graduate work.

NATIVE ROCK — from page 4

temperature cycling, all these considerations have governed the preliminary design decisions concerning the storage system to be studied, and have led to the configuration of a pebble-bed module as shown on this page.

To minimize the impact of the storage system upon ground water, double-bed configuration is also proposed in which the low-temperature return is placed at the top and bottom of the bed while the hot air is supplied to the center. The advantages of such thermal storage stem from the inherent simplicity of the scheme.

The cross-departmental team has been organized to study the several aspects of the RBHA concept. Dr. Riaz, project director, and Dr. V.D. Albertson, both of Electrical Engineering, will concentrate on system and economic analyses. Storage system performance investigation will be

carried on by Dr. P.L. Blackshear, Jr. of Mechanical Engineering. The assessment of materials and environment will be the area of Dr. H.O. Pfannkuch, Geology and Geophysics, Dr. T.P. Bligh, Mechanical Engineering, and Dr. M. Hardy, Civil Engineering.

NEW JOURNAL INTRODUCED AND EDITED BY CIVIL ENGINEERING STAFF

UNDERGROUND SPACE, a handsome new journal published by Pergamon Press, was launched this summer. Senior editor of *Underground Space* is Professor Charles Fairhurst, head of I.T.'s department of Civil and Mineral Engineering.

This new publication is the official journal of the American Underground Association. It will be devoted to the broad technical, legal, and social aspects of expanding the use of this important resource. The Journal was introduced, according to Professor Fairhurst, to provide a vehicle for interdisciplinary communication on matters concerned with the development of the underground. It will publish articles of broad general interest rather than those of a narrower professional concern which would more appropriately appear in existing professional journals.

Dr. Fairhurst said that the first two or three issues of *Underground Space* will feature articles on a variety of topics to demonstrate the breadth of coverage of the journal. Subsequent issues will each emphasize a particular theme related to the underground.

The Editorial Board is composed of individuals of various professional backgrounds, but each concerned with some aspect of underground space, and reflects the interdisciplinary character of this new journal. Thomas P. Bligh, department of Mechanical Engineering is a member of the Board, and has an article published in this first issue, "Energy Conservation by Building Underground." It is planned to add overseas members to the Editorial Board as the journal progresses, to ensure full coverage of underground developments, worldwide.



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