VOLUME 8, NUMBER 9, NOVEMBER 1974

CALTECH NEWS

PUBLISHED FOR ALUMNI AND FRIENDS OF THE CALIFORNIA INSTITUTE OF TECHNOLOGY

Caltech, JPL design self-reliant robot

A robot that is capable of self reliance and independent action is being developed at Caltech and JPL. With thousands of instructions programmed into its computer brain, the robot is being equipped with metal arms and hands, a visual system composed of two television cameras and a laser, and wheels for legs.

Its immediate purpose is to determine whether robots like itself can do scientific exploratory work on a planet such as Mars without the need for constant human instruction. But eventually its successors may be able to work in a variety of jobs in hostile environments on earth—for example, mining at the bottom of the sea or fighting a fire.

William M. Whitney, project manager for JPL's robot program and manager of JPL's astrionics research section, said, "When the machine is complete, it will be able to examine a scene optically, extract information from it, and make some choices of its own. It will have the capacity to pick up rocks and move boulders, to recognize craters and cliffs, and to travel safely through rough terrain."

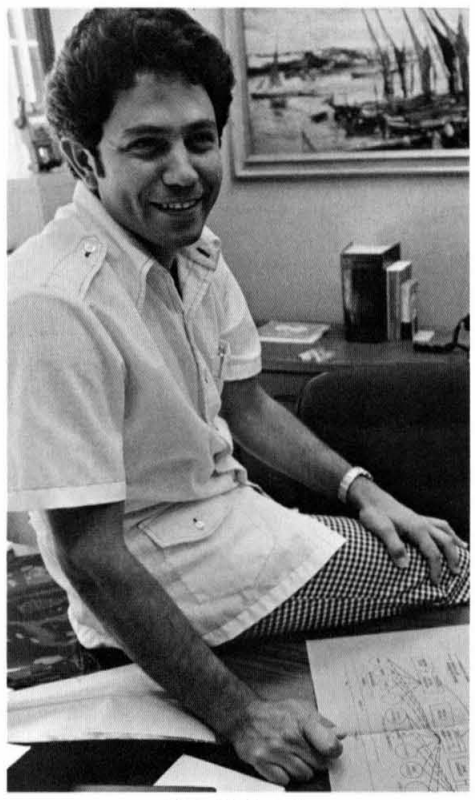
The robot's development is sponsored by NASA, in part, to gain expertise in building further robot machines. JPL is responsible for the overall system and for the hardware construction and operation. Meir Weinstein, visiting assistant professor of computer science at the Institute, and a team of Caltech graduate students are attempting to resolve some basic problems of artificial intelligence with an autonomous robot as their eventual goal. The Caltech team already has provided the system for integrating the robot's arm and its vision.

The approach taken by Caltech and JPL in developing a robot for planetary exploration differs from the master-slave type of robot which is completely under human control, such as the Russians evolved for lunar projects. JPL's model is designed to have an increasing amount of autonomy, so that one day it will be capable of doing complex tasks on its own.

Weinstein pointed out that a robot operating on the master-slave principle is not satisfactory for the exploration of a planet more than a few light seconds away from the earth. He explained:

"A radio message requires at least 6 minutes to reach Mars. That means that a round trip requires at least 12 minutes and, at greater distances from Mars, as much as half an hour. A robot must possess enough autonomy to survive and remain effective during that interval."

By next January, the research teams expect the robot to be able to pick up a rock, display it to cameras, and deposit it on a table. But the robot's successors won't be ready for a trip to Mars until 1985 or 1986.



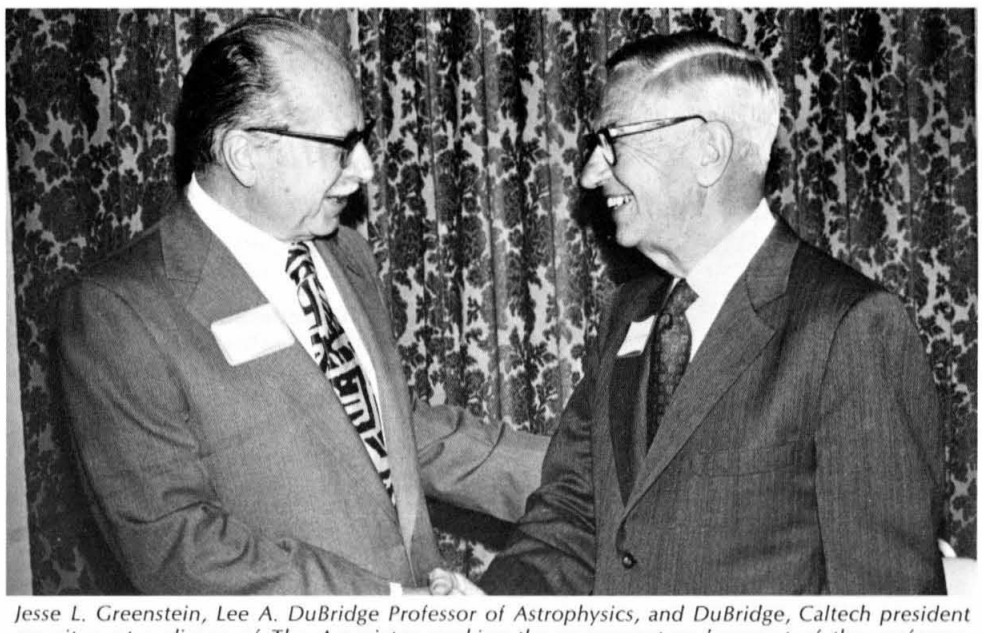
Meir Weinstein

After artificial intelligence studies have provided solutions for the present model, then much smaller and more compact versions may be designed. Its developers believe that by 1985, when the robots are ready for Martian exploration, technology will enable computers to be sufficiently miniaturized so that tiny ones as complex as the large ones of today can provide the robot with brains.

Whitney explained that the robot's dual visual system consisting of lasers and TV cameras has definite advantages. Unlike the range-finder of a laser, the eye of a television camera can be confused by shadows. However, TV can observe texture and color whereas lasers cannot.

In discussing the goals of his project, Weinstein said, "The robot we are designing now will have limited autonomy, restricted by the state of the art of artificial intelligence and by the size of a computer we can send to another planet. But even when a large computer system can eventually be compressed to the size of today's minicomputers, the main limitation in robot autonomy will still exist: our inability to provide the necessary software. This limitation may be with us for some time.

"For this reason, we've selected a strategy to fit both the fast development of complex hardware and the slow development of software."



Jesse L. Greenstein, Lee A. DuBridge Professor of Astrophysics, and DuBridge, Caltech president emeritus, at a dinner of The Associates marking the permanent endowment of the professorship. DuBridge was the honored guest; Greenstein was the featured speaker. More coverage of the dinner will be featured in the December issue of Caltech News.

Faculty Honors

Guido Münch

Guido Münch, professor of astronomy and staff member of the Hale Observatories, is recipient of an Exceptional Scientific Achievement medal from NASA for his contribution to the Pioneer Program in which he was the principal investigator.

Arie J. Haagen-Smit

Arie J. Haagen-Smit, professor of bio-organic chemistry, emeritus, was awarded the Elliott Cresson Gold Medal of The Franklin Institute. The award was in recognition of his contributions to knowledge of plant hormones and volatile oils in plants, techniques in quantitative microanalysis, his understanding of the chemical and photochemical nature of smog, and for his outstanding leadership on the local, state, and national levels in programs in air pollution abatement. The medal is presented for discovery or original research adding to the sum of human knowledge.

Harrison S. Brown

Harrison S. Brown, professor of geochemistry and of science and government, has been elected president of the International Council of Scientific Unions (ICSU)—the world's largest scientific federation.

The ICSU is a nongovernmental federation of international scientific unions covering 17 fields, and includes national scientific institutions from 60 countries.

Cornelius J. Pings

Cornelius J. Pings has been elected chairman of the Chemical Engineering Division of the American Society of Engineering Education for 1974-75. Pings is professor of chemical engineering and chemical physics, vice provost, and dean of graduate studies.

Allan J. Acosta and Vijay H. Arakeri

Allan J. Acosta, professor of mechanical engineering, and Vijay H. Arakeri, research fellow in mechanical engineering, have received the Robert T. Knapp Award of the American Society of Mechanical Engineering. The award was presented for a paper, "Viscous Effects on the Inception of Cavitation on Axi-Symmetric Bodies," termed outstanding by the Society.

19 Fairchild Scholars now on campus

The Sherman Fairchild Distinguished Scholars Program has entered its second year with the arrival of 19 new Scholars on the campus and 27 expected by January. This ten-year program was established by the Fairchild Foundation to bring intellectual leaders from many disciplines to Caltech for the exchange of ideas on new directions in science and technology.

Fairchild Scholars now on campus are listed alphabetically by division.

Biology

Norbert Bischof, in residence September 1973 through March 1975. Behavioral scientist from the Max Planck Institute for the Physiology of Behavior, Germany.

Antonio Garcia-Bellido, in residence July 1974 through March 1975. Professor of research and head of the section of developmental genetics, Institute of Genetics of the Center for Biological Research, Madrid, Spain.

John Derek Smith, in residence October 1974 through September 1975. Chief Investigator, Medical Research Council Laboratory of Molecular Biology, University Postgraduate Medical School, Cambridge, England.

Chemistry and Chemical Engineering

Jerome A. Berson, in residence November 1974 through February 1975. Professor of chemistry and chairman of the Department of Chemistry, Yale University.

Sir George Porter, in residence September through December 1974. Nobel laureate in chemistry, the director and Fullerian Professor of Chemistry at The Royal Institution, London, England.

Robert W. Zwanzig, in residence August 1974 through June 1975. Research professor, Institute for Fluid Dynamics and Applied Mathematics and Institute for Molecular Physics, University of Maryland.

Engineering and Applied Science

George K. Batchelor, in residence October through December 1974. Chairman of the Department of Applied Mathematics and Theoretical Physics and professor of applied mathematics at the University of Cambridge.

William B. Bridges, in residence July 1974 through June 1975. Senior Scientist at Hughes Research Laboratories.

Edward Fredkin, in residence September 1974 through April 1975. Professor of computer science and director of Project MAC at the Massachusetts Institute of Technology.

Ivan Kuscer, in residence September 1974 through June 1975. Professor of physics at the University of Ljubljana, Yugoslavia.

Leendert van Wijngaarden, in residence August 1974 through June 1975. Professor of fluid mechanics at the Twente Technological University, Enschede, the Netherlands.

Geological and Planetary Sciences

Yaakov K. Bentor, in residence October 1974 through January 1975. Chairman of the Department of Geology at The Hebrew University, Jerusalem, Israel.

Paul G. Hoffman, in residence October 1974 through June 1975. Research scientist for the Geological Survey of Canada.

Harrison H. Schmitt, in residence July 1973 through December 1974. Assistant administrator for energy programs, National Aeronautics and Space Administration.

The Humanities and Social Sciences

David Hamburg, in residence September 1974 through June 1975. Chairman of the De-

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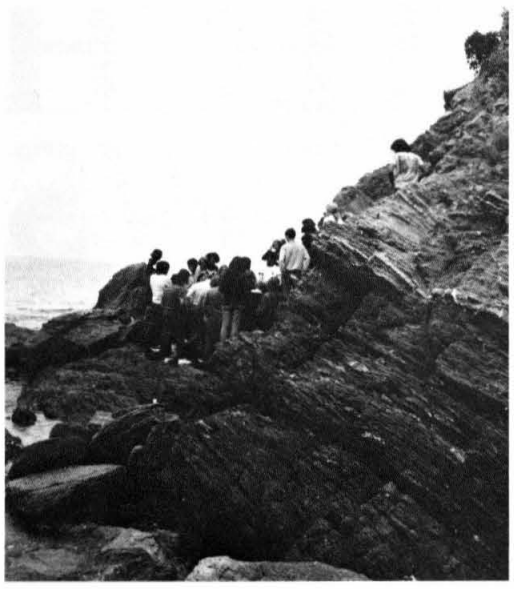
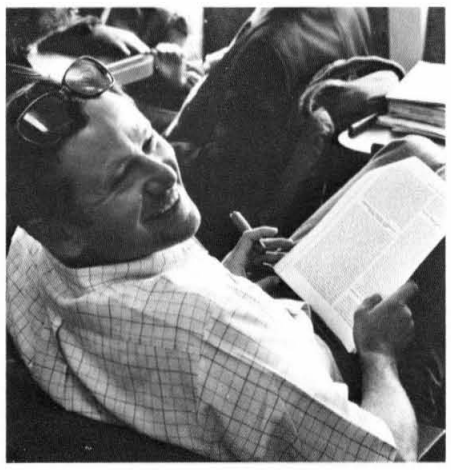
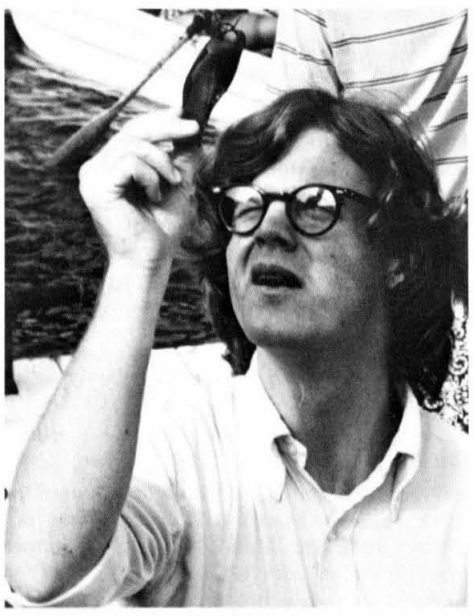






Accompanied by faculty, administrators, alumni, and upperclassmen, Caltech freshmen were oriented to the Institute and to each other at a three-day outing on Catalina Island. Upper left: "Now, let's walk along the beach and look at the rocks," said Eugene M. Shoemaker, professor of geology, as he led freshmen on a field trip. The stroll turned out to be as much vertical as horizontal. Upper right: On board boat bound for Catalina, Thomas J. Ahrens, associate professor of geophysics, pauses from work on a research paper. Lower left: A student scrutinizes a sea specimen brought up by Wheeler J. North, professor of environmental science. Center right: Richard L. Russell, assistant professor of biology, shows film on nervous system of the nematode. Lower right: Fredrick H. Shair, associate professor of chemical engineering, displays skill he acquired by taking guitar lessons offered through the Caltech Women's Club.

Kowal discovers Jupiter's 13th moon

A tiny object only three to five miles in diameter and presumed to be the 13th moon of the planet Jupiter has been discovered by Caltech astronomer Charles T. Kowal.

Kowal made the discovery with the 48-inch Schmidt telescope at Palomar Observatory as he was conducting a study to determine accurate orbits for some of Jupiter's outer moons, which are perturbed by Saturn.

The new satellite showed up on three photographic plates exposed for two hours each on successive nights. Kowal actually made the discovery while examining the 14-inch-square glass plates in a Caltech laboratory.

He noticed that each of the plates contained a minute point of light that wasn't one of Jupiter's 12 known moons. Stars were shown as streaks on the exposures because the telescope was adjusted for tracking Jupiter and its satellites as they moved through the star field. The newly found object was moving with Jupiter—evidence that it is a satellite.

Since Jupiter is one of the brightest objects in the night sky, Kowal clouded the center of a glass filter in front of the plates with smoke from a lighted match before the plates were exposed. Otherwise, light from the planet would have damped out light from the moons.

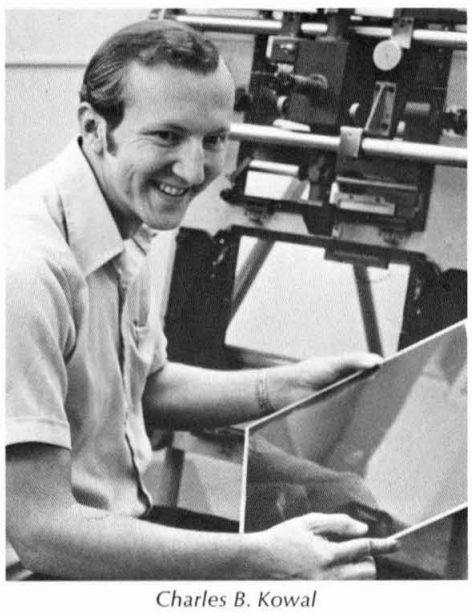
"If we go even fainter I'm sure we'll find that Jupiter has still more satellites," Kowal said. "Moon No. 13 could have been an asteroid that was trapped by the planet's powerful gravitational field."

Jupiter's four largest moons were discovered in 1610 by Galileo. The fifth was discovered in 1892 by E. E. Barnard. The remaining seven are smaller, fainter, and farther from the planet. The last four were discovered by the late Dr. Seth B. Nicholson of Mt. Wilson Observatory between 1914 and 1951.

Moons 8, 9, 11, and 12 orbit Jupiter in the opposite direction from its rotation, and are 13 to 15 million miles from the planet. Moons 6, 7, and 10 revolve in the same direction as the planet's rotation and are about 7 million miles from Jupiter. The other moons are nearer to it and larger.

Dr. Brian Marsden at the Smithsonian Astrophysical Observatory in Cambridge, Massachusetts, is calculating the orbit of the satellite. Kowal said further observations are necessary for the orbit to be confirmed.

A research assistant in astronomy, Kowal is involved in a search for supernovae.



Charles B. Kowal

Comments at Freshman Camp

Entering Caltech freshmen are bright, talented, creative—and generally a little panicky about what lies ahead of them. Perhaps it is because Alumni Association members recall their own cases of jitters that they recognize the importance of a smooth, comfortable beginning for new students.

For the past three years, the association has helped support Freshman Camp, Caltech's annual orientation on Catalina Island. This year, Association funding accounted for one quarter of the camp's total budget.

These are comments from Freshman Camp this year, by those counseling and those being counseled—quotes that may stir memories in anyone who was ever a Caltech freshman.

At this point, many of you may be feeling that everyone else here is a genius and you bluffed your way in. Let me assure you that our Admissions Committee is one of the best anywhere. If you're here, it's because you belong.

DIRECTOR OF ADMISSIONS

Most of you are well aware of the unique quality of Caltech's academic program. What you may not be aware of is the diversity of the extracurricular opportunities it offers. If you don't take advantage of these opportunities, you'll be short-changing yourselves in terms of your total Caltech experience.

ALUMNUS

The faculty at Caltech begins right away to treat you like scholars, not students. A scholar's horizons are always widening. You never really finish a course a Caltech because it always relates to another one you'll be taking here or at graduate school.

UPPERCLASS COUNSELOR

If you've been used to studying for grades rather than for knowledge, then the pass-fail system will be a threat to you.

UPPERCLASS COUNSELOR

One reason the honor system has succeeded at Caltech is because it is used to enforce laws that the students believe in. We don't try to use students to enforce laws that the faculty believe in.

FACULTY MEMBER

The faculty here are high achievers; they're under a very special set of pressures in terms of internal motivation and drive to achieve. They work at transferring these pressures to you. Whether they are conscious of it or not, most faculty members attempt to prepare you to make a major contribution to science by the time you're 25.

FACULTY MEMBER

In track B physics, you work about three hours a week more for the same credit than in track A. In track B, you work nine hours for credit and three hours for love.

PHYSICS PROFESSOR

It's your friends who help you through those times during finals week when you feel as if you want to stand outside your room and scream.

UPPERCLASS COUNSELOR

Girls now are under less pressure to pair off with someone just to avoid the rush than when we were first admitted. We're not so much a novelty any more.

SENIOR WOMAN

One question you should ask yourselves now is whether you're really here because you're excited about science and mathematics, or because you want to please the adults in your life. There's nothing sadder than seeing a third year graduate student ask himself this question for the first time.

INSTITUTE PSYCHOLOGIST

Many of you have put most of your eggs into the academic basket. What's going to happen to your self-esteem now that a large number of you are brought together and only 20 percent of you can continue to regard yourselves as being at the top? Try to begin by accepting yourselves as persons with human limitations.

INSTITUTE PSYCHOLOGIST

Everything he said was like what I'd been thinking. Now I feel more normal.

FRESHMAN

The way I feel is . . . well, even if you're at the bottom, at Caltech the bottom is great!

FRESHMAN

Pickering, Pierce honored in Italy

William J. Pickering, BS '32, MS '33, PhD '36, professor of electrical engineering and director of the Jet Propulsion Laboratory, and John R. Pierce, BS '33, MS '34, PhD '36, professor of engineering, are two of three recipients of the Guglielmo Marconi Award. The awards were given for contributions to communications technology, and in celebration of the centennial of Marconi's birth. Each recipient received five million lira, or approximately 7,800 American dollars. Joseph V. Charyk, MS '43, PhD '46, president of Communications Satellite Corporation, received the third award.

Fairchild Scholars

Continued from page 1

partment of Psychiatry at the Stanford University School of Medicine.

Physics, Mathematics and Astronomy

Stephen W. Hawking, in residence September 1974 through May 1975. Staff Member of the Institute of Astronomy, Cambridge, England.

Werner Israel, in residence September 1974 through May 1975. Professor of physics, University of Alberta, Canada.

Joseph G. Stampfli, in residence September 1974 through July 1975. Professor of mathematics at Indiana University.

Hans J. Zassenhaus, in residence September 1974 through August 1975. Research professor of mathematics, The Ohio State University.

Alumnus achieves fame in free throw arena

To hear that a Caltech alumnus has earned a place for himself in the *Guiness Book of World Records* by setting a new mark in a major sport is almost as surprising as hearing that a zebra has sprouted polka dots.

But it's happened.

Fred L. Newman, BS '60, who earned 11 varsity letters as a Caltech undergraduate, recently set out to break two world records in basketball—the most consecutive free throws, and the highest percentage of free throws over a marathon 24-hour period.

Working in Caltech's Scott Brown Gymnasium, he broke the second record by achieving a 97.56 percentage with 12,777 baskets out of 13,097 throws. And during the marathon he came close to breaking the most consecutive free throw record of 386 by basketing a consecutive 362. On five occasions, he hit more than 300 consecutively.

The previous marathon record was held by a dairy farmer, Ted St. Martin, of Jacksonville, Florida. St. Martin achieved a 90.72 percentage in basketing free throws last July, with 11,930 baskets out of 13,151 attempts. He also holds the most consecutive free throw record.

In setting the new mark, Newman brought $644 into the Alumni Fund. The contributions came in response to a letter to a group of his friends and former classmates, asking them to pledge a specific amount toward the 1974-75 goal.

Newman, a computer programmer for Control Data Corporation, says he thought of trying for the world records when he learned that he had come close to breaking them while practicing at the YMCA gymnasium in San Jose where he works out eight hours a week.

"I was just curious to see if I could do it," he explained.

Samuel R. Suitt III, BS '61, who helped Newman with arrangements for the attempt, had praised the former Caltech athlete's qualifications for the endeavor.

"You need precision, consistency, and endurance," he said. "You just stand there and you throw and you throw, again and again. Newman has these qualities if anyone does."

As an undergraduate, Newman compiled an impressive record at the Institute. He was the top individual scorer in basketball in the Southern California Intercollegiate Athletic Conference for two consecutive years, and was named to the all-conference teams in basketball and football, and to the all-league first team in soccer. He earned three varsity letters as guard in basketball, three as halfback in football, three as shortstop in baseball, one in soccer, and one in track.

Warren G. Emery, director of physical education and athletics, said, "Fred was one of a relatively few genuinely fine athletes who have come to Caltech. He could have made the team at almost any school he attended."

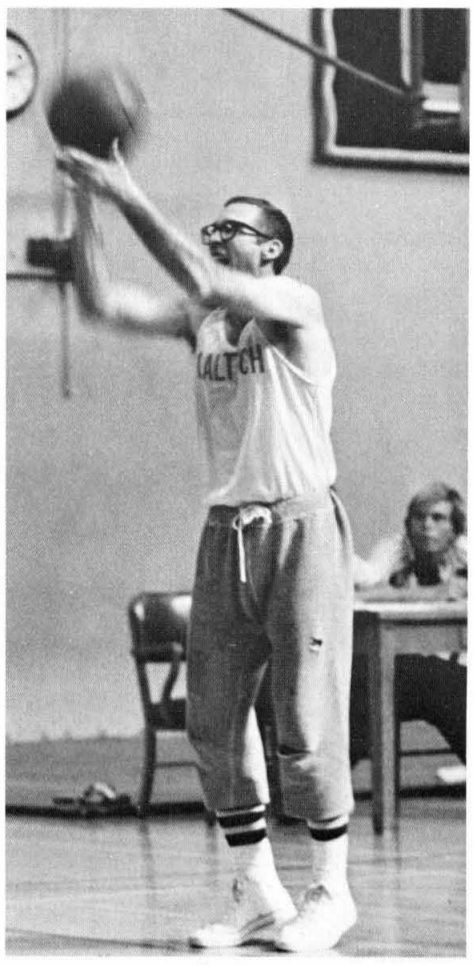
Newman had run through a 24-hour marathon practice before his official attempt. Shooting baskets is fun for the first eight hours, he said. After that, he admitted that it gets to be a bit of a drag.

What does he think about during the early hours of the morning when his audience has drifted away and there's little more than the swish of the basket to break the stillness?

"I just think that I've got to keep getting my arms up and flicking my wrists," he explained.

Newman said that sleepiness and fatigue created little difficulty for him during the marathon, but that keeping his mind focused on the ball for so long sometimes became a problem.

After Newman ended his grueling feat, he went to his mother's house in Santa Monica and took a five-hour nap. He says he's going to have another try at breaking the most consecutive free throw record—but not until his hands and feet have recovered from their recent workout.



Fred L. Newman

ALUMNI ASSOCIATION
CALIFORNIA INSTITUTE OF TECHNOLOGY
Pasadena, California
BALANCE SHEET
June 30, 1974

ASSETS

Cash on Hand and in Bank	$ 14,526.96
Investments:	
C.I.T. Consolidated Portfolio	261,530.21
Short-term Promissory Notes	25,000.00
Deposits in Savings Accounts	2,024.89
Investment Income Receivable	12,475.00
Other Receivables	149.90
Postage Deposit	44.21
Furniture and Fixtures, at nominal value	1.00
Total Assets	$315,752.17

LIABILITIES, RESERVES, AND SURPLUS

Accounts Payable	$ 1,643.76
Deferred Income:	
Annual Membership Dues paid in advance	29,455.55
Investment Income from C.I.T. Consolidated Portfolio	12,475.00
Life Membership Reserve	267,720.21
Reserve for Directory	6,204.36
Surplus (Deficit)	(1,746.71)
Total Liabilities, Reserves, and Surplus	$315,752.17

STATEMENT OF INCOME, EXPENSES, AND SURPLUS
FOR THE YEAR ENDED JUNE 30, 1974

INCOME

Dues of Annual Members	$ 33,857.85
Investment Income:	
C.I.T. Consolidated Portfolio	11,582.00
Short-term Promissory Notes	1,469.15
Deposits in Savings Accounts	715.24
Annual Seminar	8,769.25
Program and Social Functions	9,859.90
Area and Chapter Meetings	1,132.00
Miscellaneous	1,406.48
Total Income	$ 68,791.87

EXPENSES

Publications	$ 12,000.00
Annual Seminar	10,209.72
Program and Social Functions	14,974.45
Area and Chapter Meetings	4,747.94
Student Programs	5,969.65
Institute Secondary School Relations	45.05
Administration	14,843.69
Membership Committee	4,296.31
Directory Appropriation	3,500.00
Total Expenses	$ 70,586.81
Excess of Expenses over Income	$ 1,794.94
Surplus, July 1, 1973	48.23
Surplus (Deficit), June 30, 1974	$ (1,746.71)

AUDITOR'S REPORT

Board of Directors, Alumni Association, California Institute of Technology:

I have examined the Balance Sheet of the Alumni Association, California Institute of Technology as of June 30, 1974, and the related Statement of Income, Expenses, and Surplus for the year then ended. My examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as I considered necessary in the circumstances.

In my opinion, the accompanying Balance Sheet and Statement of Income, Expenses, and Surplus, present fairly the financial position of the Alumni Association, California Institute of Technology at June 30, 1974, and the results of its operations for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

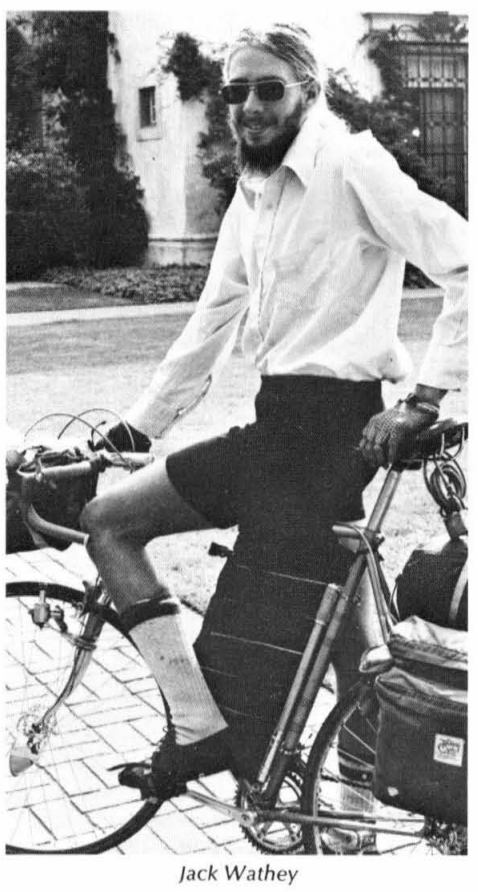
Calvin A. Ames
Certified Public Accountant
September 23, 1974

ALUMNI EVENTS

November 16

Reunion, class of 1959. Campus tour, 4 p.m., starting from the Athenaeum courtyard. Social hour, 5:30 p.m., followed by dinner, 7:30 p.m., the Athenaeum.

Interhouse Dance. Caltech campus.



Jack Wathey

Freshman cycles to Caltech: 2,500 miles

As out-of-state freshmen converged on Caltech by plane, train, bus, and automobile, John C. Wathey arrived by bicycle—all the way from Charlotte, North Carolina.

Fulfilling a six-year-old dream of cycling across the country, Jack spent 33 days and $200 in making the 2,500-mile journey. He used the money to pay for a few nights in motels and for food.

"I ate a lot. Cycling makes you hungry," he explained.

The tall, blond, 18-year-old stated emphatically that he'd do it again. "I love the self-sufficiency and the sense of accomplishment that bike travel brings," he said, "but I'd allow myself more time for the next trip, and I'd take someone with me."

Riding a professional bike and attempting to travel 100 miles a day, Jack carried supplies weighing about 40 pounds: tent, sleeping bag, stove, water, cooking equipment, and tools to fix just about anything that might go wrong. Repairs were minimal however; they consisted of a few punctures and broken spokes, and a mechanical difficulty caused by his luggage rack.

Jack plotted his route in advance, and headed west through Tennessee, Arkansas, Oklahoma, the Texas Panhandle, New Mexico, and Arizona.

"I was never sorry I had undertaken the trip," he said, "but sometimes I really felt bad. In Tennessee it rained steadily for three days, it was very cold in New Mexico, and some of the mountains were formidable. My longest ascent was 10 miles up the Salt River Canyon on the Apache reservation in Arizona. But I always reminded myself that for every long climb I could look forward to an equally long descent."

Jack averaged 10 to 15 miles an hour—except in the mountains. "Then I went up at 5 miles an hour and came down at 30," he said.

Jack's friends had warned him about perils from strangers he would meet on the trip—people who might even try to kill him. But instead of danger he experienced friendliness and sympathy.

"Almost everyone was helpful," he said. "On two occasions a family invited me to sleep on their couch, and once, at 29 Palms, a man gave me a free motel room. Several people offered me food and others invited me to ride in their car. I always refused the rides though."

Jack's longest day was his third from last, from Bouse, Arizona, to 29 Palms, California—140 miles through the desert in temperatures above 100 degrees. He rates his last day as the most difficult, however. As he approached Los Angeles on Route 62, which empties into Interstate 10, not only did he encounter a strong headwind that bore smog out of the Los Angeles basin, but several spokes in his bicycle broke, necessitating repairs.

"I didn't feel any elation at being so close to my destination," he said. "Instead, I began hating the world because of air pollution and what it was doing to my lungs. I didn't even feel exhilarated when I reached Caltech and was greeted by an informal welcoming committee of several people who had been wondering if I'd make it.

"The exhilaration caught up with me the next morning. It really felt great when I woke up in Fleming House and realized that I didn't have to get on my bike and ride another 100 miles."

PERSONALS

1929
FREDERICK R. WILSON has retired from the Samuel Goldwyn Studios after 40 years. He had been chief sound recording engineer.

1930
O. F. VAN BEVEREN, executive vice president of Chevron Overseas Petroleum, Inc., retired after 40 years in petroleum exploration. He is now a consultant for domestic and international petroleum exploration.

1932
CHARLES M. HARSH retired in December 1973 after careers as a psychology professor, a man-machine system designer, a general systems theorist, and a behavioral science monitor with the Office of Naval Research in Boston.

KARL E. HEGARDT writes, "In February of this year I retired after 37 plus years with Pacific Telephone Company. At the time of my retirement I was staff director in the network operations and engineering group and was headquartered in Pasadena. Shortly after retirement, we moved to Palm Springs where we hope to enjoy some of the activities of the desert area. Although three of my four children are grown and have families of their own, we still have a son who is attending Palm Springs High School."

1936
WILLIAM R. MENDENHALL, MS, received an honorary doctorate this spring from Friends University in Wichita, Kansas. He is vice president and general manager of sales for the California Company Division of the Chevron Oil Company.

1938
WILLIAM R. SEARS, PhD, received the famed Prandtl Ring on September 17 in Kiel, Germany, for his work in aerodynamics. A quartz ring with an eagle emblem, the award is given for outstanding research in fluid dynamics and aerodynamics. Sears is a professor of engineering at the University of Arizona.

1940
GERALD P. FOSTER is now professor of administrative sciences at the University of Denver. Formerly, he had been associate professor there.

ROBERT L. WELLS, MS, has been appointed vice president of the European Region of Westinghouse Electric Corporation. He had been heading management and professional personnel activities at the company's headquarters in Pittsburgh.

1945
MERRITT A. WILLIAMSON, MS, is recipient of the 25th annual James H. McGraw award for outstanding contributions to the advancement of engineering technology education. Williamson is Orrin Henry Ingram Distinguished Professor of Engineering Management at Vanderbilt University.

1947
DUDLEY W. THOMAS, MS, PhD '51, has been promoted to professor of biology at California State University, Los Angeles.

1948
ARNOLD FELDMAN, MS, former assistant professor of radiation physics at the Washington University School of Medicine, St. Louis, is now a radiological physicist with Midwest Radiation Therapy Consultants, Ltd., of Peoria, Illinois.

PATRICK NORMAN GLOVER writes, "I am leaving with my wife, Betty, and my son, David, 16, for a two-year assignment in Saigon. I will be vice-president and resident manager of Pecten Vietnam Company (a subsidiary of Shell Oil Company)."

BENOIT B. MANDELBROT, MS, science adviser to the director of research at IBM, has been named an IBM fellow. He is also an institute lecturer at MIT.

1950
DONALD A. DOOLEY, MS, PhD '56, is a senior vice president and general manager with Perkin-Elmer of Norwalk, Connecticut.

FREDERICK W. DRURY, JR., became executive vice president of Philippine Rock Products of Manila in July and is concurrently the president and general manager of Philippine Markets, Inc., a marketing company.

LESTER KEPNER GOODWIN is a staff physicist with Philco Ford.

WILLIAM T. MORGAN, MS, is chief program engineer for Liquid Metal Fast Breeder Programs at Atomics International in Canoga Park, California.

1951
MICHAEL A. BASIN, MS '52, PhD '54, is the founder and president of System Development Planning, Inc., Sherman Oaks, California, specializing in underwater acoustic systems research and development for the U.S. Navy.

JAMES O. DENTON, professor of mathematics at Amherst College, has been promoted to chairman of the mathematics department.

BRUCE B. HEDRICK is commuting 110 miles a day from Costa Mesa to Pasadena as senior mechanical engineer in building design and construction for Pacific Telephone.

ULRICH MERTEN is vice president of Gulf Research and Development Company in Pittsburgh.

DUANE CHARLES NEVERMAN is vice president of Hallanger Engineers in Paramount, California.

P. Claude Mahieux, BS '56, left, and Stanley T. Wolfberg, BS'38, right, administrator, Division of Engineering and Applied Science, in the PLM St. Jacques Hotel, Paris, France. The Wolfbergs traveled in France on their vacation. Mahieux is organizing a French chapter of Caltech alumni and says the group has a potential membership of 100. He adds that visits from alumni traveling in France are welcome.

1953
WALTER J. EAGER writes, "I have recently retired from the U.S. Navy, after having developed and directed its ocean engineering and construction program for the past six years. The program's success resulted in my receiving the American Society of Naval Engineers' Gold Medal. Professor Jack Nath of Oregon State University and I have formed the firm, Nath-Eager and Associates in Corvallis, Oregon. We are developing improved methods for designing open sea mooring systems and seeking to expand the firm's scope to the full range of our ocean facilities experience."

1954
W. BEN DAVIS is director of corporate projects at Caltech's Development Office. Davis had been research director with the Aseptic-Thermo Indicator Company, North Hollywood, California.

1957
EDWIN X. BERRY writes from Washington, D.C., "In November I will move to Burlingame, California, to be part of NSF RANN's new western projects office. After placing second all season, my wife, Valerie, and I finally got it all together and won the 1974 Canadian-American Championships for the International Fireball sailboat, held as part of the Canadian Olympic-Training Regatta, Kingston, Ontario."

1960
HERMAN G. HARTUNG, MS '61, is a district sales manager with NTN Bearing Corporation of America.

VLADIMIR A. HVOSCHINSKY (formerly Vladimir A. Khvostchinsky), MS, has joined the General Electric Company and will represent the firm in Moscow. He had been with the United Nations Office for Technical Cooperation.

MARTIN A. KAPLAN is a district manager in employment with Pacific Telephone in Sausalito, California.

1961
CLARK T. BENSON was promoted to associate professor of mathematics at the University of Arizona.

JOHN E. LOHMAN writes, "I have been promoted to senior associate at the Northwest Regional Educational Laboratory where I am a developer and assistant director of the Improving Teaching Competencies Program, developing training programs for school teachers and administrators."

HENRY LUMING writes, "I am now an advisory engineer with the Corporate Equipment Engineering Division at the technical center of Continental Can Company, Inc. in Chicago. My wife, two daughters (seven and four), a son (one), and I live in suburban Westmont."

CLEVE B. MOLER writes, "I am now a professor of mathematics at the University of New Mexico, still very active in writing — two textbooks on numerical analysis and managing editor of the SIAM (Social, Industrial, and Applied Mathematics) Journal on numerical analysis."

1962
DAVID G. AGRESTI, MS, PhD '67, is chairman of the department of physics at the University of Alabama in Birmingham.

DON R. THOMPSON received his master's degree in management from Claremont Graduate School in June.

1963
JOHN S. LETCHER, JR., MS '64, PhD '66, an independent naval architect in Southwest Harbor, Maine, writes, "Following five years of cruising in *Aleutka*, the 25-foot sailboat we built at 341 South Holliston, Pati and I sailed to Maine in 1971 and settled on Mount Desert Island, a beautiful place in which to live and work. Ten years of research into the hydrodynamics and aerodynamics of sailing are paying off in establishing what I believe is the most technically based yacht design office in the world, in terms of application of fluid mechanics and numerical analysis." His recent book, published by International Marine Publishing Company and entitled *Self-Steering for Sailing Craft*, is a practical analysis of sailboat stability and control and of all types of automatic steering systems for sailboats.

1965
JOHN M. HOLTE is a visiting assistant professor of mathematics at the Rensselaer Polytechnic Institute, Troy, N.Y.

JAMES R. KERCHER has accepted a staff position as physicist in the biomedical division at Lawrence Livermore Laboratory, Livermore, California. He and his wife became the parents of a son, Andrew Matthew, born May 15.

JOEL KWOK, PhD, writes, "I am a manager in charge of merchandise, budget, and inventory control at The Wing On Company since a year ago. Wing On is the single biggest retailer in Hong Kong and has acquired the IBM 370/125 computer to modernize."

RICHARD N. LANE, PhD '68, is project director for an operation in Paris to "optimize" investments for the French telephone system.

1966
DARIO IACUELLI writes, "Mrs. Susan Iacuelli died in January. Thanks to all those who so kindly wrote to me in support and love."

ERIC M. JONES writes, "My wife, Sandie, and I parted amicably in May 1973. Sandie is a doctoral candidate at Wisconsin in computer science and will be spending the summer studying in England. We hear that AL HOLM, BS '66, was married recently."

PHILIP JAMES LAIPIS is an assistant professor of biochemistry at the University of Florida, Gainesville.

WALLACE L. OLIVER graduated *cum laude* from the Northwestern University School of Law in June and is employed by Standard Oil Company in Chicago as a patent attorney.

1968
WAYNE A. LOBB is serving as a lieutenant, junior grade, in the U.S. Coast Guard aboard the cutter *Dallas*, which is part of the Global Atmospheric Research Program. The Atlantic Tropical Experiment is doing surveys off the coast of West Africa. The *Dallas* is one of the U.S. ships in the 70-nation international project.

1969
MANUEL REBOLLO-REBOLLO, MS, PhD '73, is a scientific adviser at the IBM Madrid Scientific Center.

1970
GLENN D. PRESTWICH and JEFFREY H. RICHARDSON received their PhD degrees from Stanford University in June. Prestwich is a research scientist for the International Centre for Insect Physiology and Ecology in Nairobi, Kenya, and Richardson is working at the Lawrence Livermore Laboratory, Livermore, California.

1973
PETER G. MIASEK, PhD, is a research chemist for Imperial Oil Limited, Sarnia, Ontario, Canada.

OBITUARIES

1922
RAY W. PRESTON. He was an electrical engineer in Portland, Oregon.

1924
CLIFFORD W. MALTBY on August 7. He was retired and had been living in Boulder City, Nevada.

1925
LEO M. MILLER. He was an engineer with the Ralph M. Parsons Company, Los Angeles.

1942
VENKATACHALAM CADAMBE, MS, of a heart attack on February 24. A resident of Bangalore, India, he was retired.

1949
DOUGLAS R. BROWN of a heart attack on September 9. He was vice president of Moore & Taber of Anaheim, California.

1961
JOHN R. SOPKO, MS, on September 11 in an Eastern Airlines plane crash at Charlotte, North Carolina, one of 69 casualties. Navy Commander Sopko was the commanding officer of the nuclear ballistic missile submarine, *USS Lewis and Clark*. He is survived by his wife, Elizabeth, and two children, Michael Charles and David Kenneth.

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Name .....

Degree(s) ..... Year(s) .....

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