Team tries teaching SLIM to think
What's the difference between factory automation and C3PO?

By Tom Krattenmaker

Imagine the brain power and muscle it takes to unload a truck. The worker must size up the contents, use balance and strength to remove them, and then exercise some more intelligence to arrange the unloaded goods according to the appropriate scheme. Now imagine a robot doing it. Imagination is what it requires, because no such robot exists.

The robots available today can execute a particular task over and over with a high degree of precision, provided the job and conditions remain precisely the same. But the robots being created by a team of Princeton researchers may one day be capable of far more difficult enterprises: thinking and automatically reacting to unexpected events as they navigate through an unstructured world.

Michael Littman, associate professor of mechanical and aerospace engineering, and Jack Gelfand, research scientist in psychology, and collaborators David Handelman and Stephen Lane, control engineers in psychology, are laying the groundwork for an intelligent robot of the 21st century. In a lab in the Engineering Quadrangle, with a flat aluminum figure dubbed "SLIM," the researchers are learning how to replicate dexterity and intelligence in a machine.

Foundation establishes Wilson Society
Faculty, graduate student fellows pursue interests related to those of former president

By Justin Harmon

With support from the Woodrow Wilson Foundation, the University has established a new society of graduate students and faculty working in public policy and administration, American history, political science, and international affairs. Because Wilson's scholarship ranged across the social sciences, graduate student fellows will be chosen from the departments of anthropology, economics, religion and sociology, as well as history, politics and the Woodrow Wilson School. Their dissertation topics will address broad issues or problems in addition to extending disciplinary scholarship.

Up to 10 senior fellows among current faculty are invited for terms of three years. Nominated by the society's director and appointed with the approval of the foundation board, the senior fellows each year choose a cohort of approximately 10 graduate students who have passed their general examinations and selected dissertation topics that fall within the society's areas of interest. These graduate student fellows, chosen on a competitive basis from among candidates nominated by academic departments, receive tuition and a stipend; fellows who make satisfactory progress during their first year will be eligible for an additional year of support. The second year may follow a year during which students are active members of the society even though their support comes from teaching rather than the society. Thus, when fully recruited, there will be 25 to 30 graduate student fellows of the society.

The initial cohort of senior fellows includes professors in the departments of anthropology, economics, history, politics, religion and sociology and in the Woodrow Wilson School. The director for the first year is Donald Stokes, dean of the Woodrow Wilson School.

Benefits for graduate students
The society encourages discussion across disciplinary boundaries for both faculty and graduate student fellows. Senior fellows and fellows attend regular colloquia at which they report on their scholarly activities and the progress of their dissertations, and once each term they convene for a dinner meeting.

“We are pleased that the Woodrow Wilson Foundation has found such an innovative way to support graduate students,” commented Dean of the Graduate School Theodore Zielinski.

The years following general examinations are a time when adequate support — both collegial and financial — is crucial. The Wilson Society offers substantial benefits to graduate students who are starting on the road to success.
SLIM (Continued from page 1)

key that makes higher forms of life capable of dealing with unstructured environments.

The research team is taking its cues from biology. Built two years ago by MAE major Jeff Russkoff '90, SLIM -- the Skill Learning Intelligent Manipulator -- looks somewhat human, though it has just one arm and one leg in its two-dimensional design. Its aluminum bones correspond to a human skeleton, and its nylong-clad rubber muscles have a layout analogous to people's. SLIM's muscles and joints, however, are biological counterparts, are equipped with sensors to measure position and force. These sensors connect with computers -- SLIM's version of a brain -- that direct the robot's movements.

"Our philosophy is to look at humans," says Dave Newman, a second-year MAE graduate student from Australia who is working with Littman on SLIM's control system software. "We can see they're very dexterous and capable of learning, so we're looking to see if biology can give us a few insights." Donald Littman, who is interested in parallel computing and distributed control, believes that the best way to learn from biology is to build and test working models. His immediate goals for SLIM sound modest until one recognizes the difficulty and complexity of such apparently simple things as balancing and catching a ball. Littman believes the balancing can be accomplished by early next year, but getting SLIM to see the ball and respond to it is a more difficult enterprise. Its vision system is still five times too slow, and its electronic control systems for rapidly getting the hand in position is still being developed.

Learning to benefit from experience

A still more daunting task that excites the researchers' imaginations is getting a robot to benefit from experience, according to Handelman and Lane, who earned their PhDs in the MAE Department and are now staff members in the Psychology Department. They are applying artificial neural networks and expert systems to the problem of skill acquisition and motor planning.

The two use a tennis analogy to describe the benefits of learning from experience. Beginners must concentrate on holding the racket the right way and simply hitting the ball. Those things become second nature to the average player, however, and then players can turn their attention to hitting the ball hard or deep or to tactics. "Being an intelligent being is a very complicated thing," Gelfand says. "If you had to pay attention to all the details of your environment, your brain would be so large you'd have to carry it around in a vacuum." He adds that what they're trying to do is simplify these tasks by paying attention only to those things that matter in a particular task.

Not "if" but "when"

The researchers have planted five years ago when Littman became interested in the human nervous system and movement. His reasons then were largely personal; he wanted to understand his daughter's neurological disorder to make better informed decisions about her medical care. His first models were surgical affairs made with LEGO gears and pulleys.

Gelfand, who at that time was head of the Intelligent Systems Laboratory at the David Sarnoff Research Center, funded some of Littman's work. Three years ago he came to work for the University and continued working with Littman. Both say that the collaboration is greater than the sum of its parts.

Intelligent robots are not a question of "if," according to the Princeton researchers -- and they will not long be confined to laboratories. Littman observes that the field of robotics is not nearly as academic interest but "has some very clear-cut, real-world applications." Gelfand contends that robots will have the dexterity and smarts to clean a house within 10 years. Their greatest usefulness, however, may lie in their ability to work in environments and situations that would be dangerous or impossible for humans. Additional robots built by the manufacturer of SLIM's artificial muscles, is producing robots that can wash away the costs of their work in hazardous environments.

Woodrow Wilson Fellows

(Continued from page 1)

Founded in 1922 "in recognition of national and international services of Woodrow Wilson," the foundation took

as its purpose "the promotion of public welfare, the advancement of liberal thought and the furtherance of peace through justice." Among its founders were Cleveland Dodge of the Class of 1879, who was a friend and classmate of Wilson, and Franklin D. Roosevelt. The Papers of Woodrow Wilson project was an outgrowth of a national celebration in 1956 of the centennial of Wilson's birth. The foundation secured contributions with which to start the project and then suspended other activities in order to devote its own capital resources to it. Littman became coproprietor of the project in 1959, assuming responsibility for housing (Continued on page 3)

Woodrow Wilson Senior Fellows

Director Donald Stokes, Class of 1943 University Professor of Politics and Public Affairs; Natalie Davis, Henry Charles Lea Professor of History and director of the Shelby Cullom Davis Center for Historical Studies; Amy Gutmann, Laurence S. Rockefeller University Professor of Politics and director of the Center for Human Values; Albert Raboteau, Henry W. Putnam Professor of Religion; Uwe Reinhardt, James Madison Professor of Political Economy and Woodrow Wilson School Professor of Economics and Public Affairs; Lawrence Rosen, president of the American Philosophical Association; Gilbert Rozman, professor of sociology; Alan Ryan, professor of politics; and Richard Ullman, David K.E. Bruce Professor of International Affairs in the Woodrow Wilson School.

Woodrow Wilson Fellows

In economics, Kristen Willard (dissertation topic: "Intersections Between Political and Economic Markets"); in history, Benjamin Alpers (A Cultural History of the Concept of Totalitarianism in the United States, 1930s to 1950s); and Jane Delury (Politics Across the Color Line in Richmond, Virginia, 1879-1883); in politics, Joshua Dienstag (The Temple of Memory: Historical Thinking in Locke, Nietzsche, and Hegel); Judith Faller (Rights, the Self, and Society: The Civil Community of Joyce Brown); Andrew Farkas (The State of International Relations Theory, and Strategies Through Which Policy Makers Can Respond More Effectively to International Change); William Grimes (Japanese Strategies of Economic Coordination) and Ariel Kacowicz (Peasant Territorial Change); in sociology, Terry Boychuk (Philanthropy and the Public Interest: A Study of the Voluntary Hospital Systems of the United States and Canada, 1850 to the Present) and Bai Gao (The Role of the Kachosh Horticulture and Social Group in the Japanese Miracle); and in the Woodrow Wilson School, Kathryn Foster (Political Fragmentation in Metropolitan Areas: Policy Implications and Government Decentralization).
Library exhibits Catherwood views of Maya monuments

Drawings published in 1840s gave America first accurate portrayal of splendors of Central America’s past

By Tom Krattenmaker

The images from the 1840s that gave the American public its first glimpse into the world of the ancient Maya are now on exhibit at the Firestone Library’s Leonard L. Milberg Gallery for the Graphic Arts. A portfolio of 25 original hand-colored lithographs by Frederick Catherwood has been loaned to the Graphic Arts Collection by Leonard Milberg ’53, for whom the gallery is named. The lithographs vividly capture the intricate art and architecture of famous sites as Inca-Palencan and Chichen Itza in Mexico.

They were the first extensives surveys of any of these cities,” said Matthew Robb ’84, who helped prepare the exhibit by doing extensive research on Catherwood and his brother, John Lloyd Stephens.

“Some European travelers had visited the sites before, but they had portrayed them as mythic, lost kingdoms, and their drawings were very vague and romanticized. Catherwood and Stephens were the first to go and see what was really there. So faithfully and accurately did Catherwood record what he saw that modern scholars can read the Maya glyphs – a highly intricate form of writing – on walls and other objects in his drawings.

Stele, Copan

Athletic highlights

In football, the Tigers advanced to 4-0 with a 59-37 win over Brown on October 12. Wide receiver Michael Lech ’93 caught nine passes for 371 yards and four touchdowns, including one of 90 yards. He broke two NCAA records, three Ivy League records, three Princeton records and was named offensive Player of the Week by Sports Illustrated. Quarterback Chad Robb ’93 threw for 401 yards and five touchdowns.

In field hockey, the Princeton stickers battled both Delaware and Brown and won 2-0 overtime ties, extending Melanie Orpen ’94’s streak of consecutive shutouts to seven. The Tigers also broke into the national rankings for the first time all season, at number 15. (7-0-3 overall, 3-0-1 Ivy)

In men’s soccer, the boosters broke a three-game losing streak by beating South Florida, 3-0, in the Rutgers MetLife Soccer Classic on October 13. In women’s soccer, the Tigers had their first win since a 2-0 defeat of Yale on October 9.

In volleyball, the spikes won against defending Ivy League tournament champion Pennsylvania, 3-2, on October 8 and against Fordham, 3-1, and Dartmouth over the weekend. Virginia Goss ’93 had another outstanding all-around week, with 19 kills and no errors in 30 attempts, 12 service aces and 30 digs. (10-6 overall, 2-0 Ivy)

As their writings make clear, the travelers did a lot of considerable work to their health and comfort. In the jungles of Mexico and Honduras, the pair endured oppressive heat, humidity, insects and logistical obstacles. And once was not enough. After returning from the first trip and publishing the highly successful "Incidents of Travel in Central America, Chiapas, and Yucatan" in 1841, Catherwood and Stephens made the voyage a second time – a trip that led to the 1843 publication of "Incidents of Travel in Yucatan."

A revelation today?

Following the publication of that second book, Catherwood began work on a set of 25 lithographs. The result, a book entitled "The Views of Ancient Monuments of Central America, Chiapas and Yucatan," stands as Catherwood’s greatest achievement. This is the focus of the Princeton exhibit.

In addition to providing the first accurate, detailed account of the Maya ruins, Catherwood and Stephens were the first to recognize them as part of a greater architectural heritage. The drawings of earlier visitors – some of which probably inspired the Catherwood and Stephens voyages – were wildly inaccurate depictions that recast the Maya works into something more reminiscent of ancient Rome or Egypt.

"Catherwood and Stephens realized that this group of ruins extending from present-day Guatemala to the highlands of Mexico and the Yucatan Peninsula were not part of a single culture, one that was independent from the Indo-European tradition and had its own iconography and history," Robb says. "That was a revelation to any student of the history of the Americas. Their cultures had always been thought to be highly derivative."

It’s still a revelation today,” adds Dale Roylance, Firestone’s curator of graphic arts. The importance of these ruins is often inadequately recognized. It’s only in recent times that the creations of the Maya have been correctly perceived as a very worthy form.

The Catherwood show, “Frederick Catherwood’s Views of Ancient Monuments in Central America, Chiapas and Yucatan," opened in September. It and a co-exhibit in the library’s main Exhibition Gallery, "The Distinct View: 19th Century Artist-Explorers in the Newly Independent Latin American States," will be on display through January 5. The exhibits are free and open to the public. For hours, see the Weekly Calendar.

Wilson Society

(Continued from page 2)

Wilson Society presents annually by the American Political Science Association for the best book written in the area of public affairs.

"Ideals in an air they can breathe"?

The society seems a good way to carry forward a concept of scholarly association that fits truly in the Wilsonian tradition," says Pendleton Herring, who has served as president of the Woodrow Wilson Foundation for 30 years. "The world is a dissertation can be a lonely undertaking. Lifting one’s eyes to understand another’s interests is a stimulating and rewarding experience. This society will allow Princeton to encourage conversation across disciplines and a broader, rather than more specialized, approach."

Woodrow Wilson joined the Princeton faculty in 1890 and served as University president from 1902 to 1910. Among his accomplishments as president were: the institution of departments of instruction; the creation of a unified curriculum of general studies during an undergraduate’s first two years, capped by concentrated study in one discipline during junior and senior years (the first program for a "major"); and the establishment of a system of "preceptorials" to supplement lectures and to allow faculty to guide students in their reading and in small-group discussion.

In an address on "Princeton in the Nation’s Service" made on the occasion of the sesquicentennial of Princeton’s founding as the College of New Jersey in 1746, Wilson described his approach to scholarship and his sense of its place in the larger society. He would not have learning “seek a place apart and hold aloof from affairs,” he wrote, but rather "a place where ideals are kept in heart in an air they can breathe; but no fool’s paradise … a place to hear the truth about the past and hold debate about the affairs of the present, with knowledge and without passion.” He envisioned a place for those hard-headed and with a will to know, debaters of the world’s questions every day and used to the rough ways of democracy."

Wilson was elected governor of the state of New Jersey in 1910 and president of the United States in 1912.

McCoish warming. The English Department celebrates the first renovation of its space since 1964 at on October 13 party honoring retiring professor and advisory council member Arthur Morgan ’44. Change include the new Tharp Library, which was dedicated, and the renovated Hinds Library, both named for former Princeton English professors. At left, acting department manager Alice Augenti (I) and department chair Elaine Shoemaker give out T-shirts designed for children of department members. The children, at right, decorate pumpkins with Brian Goldberg ’94, who works for the department.
Monday
October 21

Arts
7:00 p.m. Voices at McCarter staged reading series. Forbes College.
• 8:00 p.m. Dance at McCarter. Field Ballet. McCarter Theatre.

Lectures
• 1:30 to 3:30 p.m. Computing and Information Technology education series. "WordPerfect 5.1 for Beginners 2, 1" Laura D’Amico. G15, 87 Prospect. Registration required, call 258-6028.
3:30 p.m. Electrical Engineering/ Environmental Studies/ DeCamp lecture series in Ethics and Life Sciences. "Voluntary Active euthanasia." Daniel Brok, Brown University. 003 Lewis Thomas Lab.
4:30 p.m. Woodrow Wilson School lecture. "How To and the New World Order: A View from the Joint Chiefs of Staff." Kori Schake, special assistant to the chair of the Joint Chiefs of Staff. 8 Robertson.
5:30 p.m. School of architecture lecture. "Architecture in the Simulated City." Topy Ito, architect. Tokyo. Bette Auditorium, School of Architecture.

Notices
Noon. Women’s Center women and film planning meeting. 201 Burr.
8:15 p.m. Al-Anon support group. East Room, Murray-Dodge.

Tuesday
October 22

Arts
7:30 p.m. History Department film. Capra: War Comes to America. Dodds Auditorium, Robertson.
• 8:00 p.m. Dance at McCarter. Field Ballet. McCarter Theatre.
9:00 p.m. to midnight. Chancellor Green performance. Runaway, acoustic duo. Chancellor Green.

Lectures
• 9:00 a.m. Computing and Information Technology education series. "Introduction to the IBM Mainframe 2." Serge Goldenstein. G15, 87 Prospect. Registration required, call 258-6028.
2:30 p.m. Development Studies seminar. "Risk Insurance and Default in a Rural Credit Market." Christopher Udy, Northwestern University. 200 Fisher.
4:00 p.m. Computing and Information Technology education series. "Organizing Research Using Microcomputers." Hannah Kaufman and Mary Sproul, 011, Prospect. Registration required, call 258-6028.
4:30 p.m. Chemistry/Chemical Engineering/ Civil Engineering and Operations Research environmental and engineering seminar. "Recent Developments in the Catalytic Synthesis of Chlorofluorocarbon Alternatives." Leo Manzor, DuPont Corp. DuPont Seminar Room, Friday. Social gathering at 4:00 p.m.
4:30 p.m. Germanic Languages and Literatures lecture. "Wikon, Irgon, Metapher." Klaus Weimer, University of Zurich. 8 Woodrow Wilson School.

Wednesday
October 23

Arts
4:30 p.m. Creative Writing reading. Peter Matthiessen, novelist, reading his work. Film Theater, 185 Nassau St.
• 8:00 p.m. McCarter Theatre drama series. Arthur Kopic: Indians. McCarter Theatre. 9:30 p.m. to midnight. Chancellor Green open mike night. Chancellor Green.

Lectures
9:00 a.m. to 11:00 a.m. Computing and Information Technology education series. "Introduction to G.A.T." David Hemington, 101, 87 Prospect. Registration required, call 258-6028.
4:00 p.m. Chemical Engineering seminar. "Structures and Dynamics of Statikhe Micelles." Alice Gast, Stanford University. A224 Engineering Quadrangle.
4:00 p.m. Computer Science lecture. "Beyond Touchstone: The Road to TeraFlips." Justine Rattner. Intel Corp. 104 Computer Science.

Notices
Noon. Diversity Table lunch meeting. "Our Stories: Race, Ethnicity and Identity.

Thursday
October 24

Arts
• 8:00 p.m. Computer and Aerospace Engineering/Applied Physics, Fluid Mechanics, Computation, and Dynamics/Control colloquium. "Back to the Future in Computational Fluid Dynamics." Earl Murman, Massachusetts Institute of Technology. C207 Engineering Quadrangle. Social gathering at 3:30 p.m., D225 Engineering Quadrangle.
4:00 p.m. Geological and Geophysical Sciences seminar. "Tectonics of the North Anatolian Fault Zone." A.M. Işıkara, Bogazici University. 115 Gayot.
4:00 p.m. Mechanical and Aerospace Engineering/ Applied Physics, Fluid Mechanics, Computation, and Dynamics/Control colloquium. "Back to the Future in Computational Fluid Dynamics." Earl Murman, Massachusetts Institute of Technology. C207 Engineering Quadrangle. Social gathering at 3:30 p.m., D225 Engineering Quadrangle.
4:00 p.m. Molecular Biology seminar.
4:00 p.m. Protein Translocation Across the Endoplasmic Reticulum." Reid Gilmore, University of Massachusetts. 003 Lewis Thomas Lab.
4:30 p.m. Development Studies seminar. "Sectors, States and Social Forces: Toward a New Comparative Political Economy of Development." Michael Saffer, Rutgers University. 11 Robertson.
4:30 p.m. Humanities/Romance Languages and Literatures/Latin American Studies lecture. "Sexes, ‘textos capitales’ de Borges." Juan Jose Saez, Argentinean writer and critic. 121 East Pyne.
4:30 p.m. Eastern Studies/Comparative Literature lecture and discussion. "Images
Arts
Notices
• Noon, International Center conversation over lunch. Murray-Dodge.
8:15 p.m. Overeaters Anonymous meeting. 201 Burr.

Friday
October 25
Arts
Lectures
Sports
2:30 p.m. Lightweight football vs. Navy. Palmer Stadium.
7:30 p.m. Women’s volleyball vs. Cornell University. Dillon Gym.

Saturday
October 26
Arts
Notices
10:00 to 4:00 p.m. Physics Lab community open house. For information call 243-2750 or 243-2106.
Sports
11:00 a.m. Women’s volleyball vs. Yale University. Dillon Gym.

Sunday
October 27
Arts

Weekly Calendar
Princeton Weekly Bulletin
October 21, 1991

Exhibits
Art Museum
Tuesday-Saturday, 10:00 a.m. to 5:00 p.m.; Sunday, 1:00 to 5:00 p.m. Closed Mondays and major holidays.
Public tours, Saturdays, 2:00 p.m. "Old Master Drawings From the Collection of Joseph F. McCrindle." Through December 8.

Firestone Library
Exhibition Gallery and Milherr Gallery for the Graphic Arts (second floor): Monday-Friday, 9:00 a.m. to 5:00 p.m.; Saturday and Sunday, noon to 5:00 p.m.

Gest Oriental Library
Jones Hall Monday-Friday, 9:00 a.m. to 5:00 p.m.; Saturday, 10:00 a.m. to 5:00 p.m.; Sunday, 2:00 to 11:00 p.m. "Carcature Art in the Onnoman Press."

Museum of Natural History
Guy Goff Hall. Monday-Friday, 9:00 a.m. to 5:00 p.m.; Saturday, 10:00 to 5:00 p.m.; Sunday, 1:00 to 5:00 p.m. "Bird Eggs."

School of Architecture
Monday-Friday, 8:00 a.m. to 9:00 p.m. "There Will Be Tears Before Bedtime." John Lindell, artist, New York. Through November 15.

Seeley G. Mudd Library

University League
11:00 a.m. to 7:30 p.m. Monday-Friday, 9:00 a.m. to 3:30 p.m. Closed weekends.

Women’s Studies
Gallery, 113 Dickinson Hall. Monday-Friday, 10:00 a.m. to noon and 2:00 to 5:00 p.m. Exhibition of prints by Martha Otis Wright. Through November 4.

Et cetera
Athletic Ticket Office
Purchase and information for 258-3538.

Dillon Gymnasium
For hours call 258-4466.

Library
For hours call 258-3181.

McCarter Theatre Box Office
For reservations call 683-8000. Monday-Saturday, 9:00 a.m. to 9:00 p.m.

Occupational Medicine
109 McCosh Health Center.
For appointment call 258-3035, Monday-Friday, 9:00 a.m. to 4:00 p.m. After hours emergencies call 258-3139.

Orange Key Guide Service
Maclean House (rear entrance) Thursday-Saturday, 10:00 a.m. and 11:00 a.m., 1:30 and 3:30 p.m.; Sunday at 1:30 and 3:30 p.m.
For information and group tours call 258-3603.

Plasma Physics Lab
For information call 258-3000, Monday-Friday, 9:00 a.m. to 6:00 p.m. and two hours before events requiring tickets.

Tiger Sports Line
For current sports highlights and upcoming athletic events call 258-3545.
**Grant Deadlines**

**American Association for the Advancement of Science**
- January 15. Congressional science and engineering fellowships for postdoctoral to midcareer scientists with interest in areas of public policy relating to science and technology. Deadline is late January. D.C. for one year, beginning September.

**American Association of University Women**
- November 15. fellowships for students and graduates in pre- and postdoctoral studies related to approved research project.

**Open Door** Petroleum Research Fund Type G ("starter") grants. Support postdoctoral fellows, graduate students or undergraduates and pre- and postdoctoral students related to approved research project.

**American Chemical Society**
- Open deadline. Petroleum Research Fund Type AC Grants. Support fundamental research. Proposals considered in February, May, August, and November. Stipend is up to $30,000.

**Institute of Early American History and Culture**
- Applicants available from College of William and Mary. Jean B. Lee, Director, IEARCH, Box 1258, Williamsburg, VA 23187-1258. November 15. Postdoctoral fellowship. Supports research in early American studies and concurrent appointment as assistant professor in appropriate department at the College. Stipend is up to $25,000 annually for two years beginning July 1, 1992.

**Link Foundation**
- Joint fellowship in advanced simulation and training. Support of $17,000 for advanced level student in simulation and training research to enhance and expand theoretical and practical knowledge of computer technology. Applications due January 15. Peace fellowship. One-year award of $24,500 for nonacademic research on peaceful solutions to conflict or potential conflict among groups or nations. Applications due January 15. Postdoctoral fellowship. Postdoctoral award of $3,000 for summer 1992 for women historians. Preference given to scholars who do not normally have access to Boston area libraries.

**National Academy of Sciences**
- November 23. fellowships for scholarly development. Support Chinese scholars in residence with MA, PhD or equivalent from Chinese institution.

December 1. February 1, April 1. China conference travel grants. Support partial cost for travel to and from People's Republic of China to which applicants have been invited to present results of recent research.

**National Endowment for the Arts**
- December 13. Fellowships and project grants for organizations. Support projects that advance development and understanding and communication. Awards of $10,000 to $50,000 must be matched on one to one basis.

**Camille and Henry Dreyfus Foundation**
- December 15. Teacher scholar awards program. Nomination accepted for young faculty in the sciences.

**Cornell University**
- January 15. Mellon postdoctoral fellowships. Applicants must have completed requirements for PhD in anthropology, history of art, German studies, Russian literature, Romance studies, art history, or Dutch culture.

**Buck Award** is $25,000 for one year.

**Damon Runyon/Walter Winchell Cancer Research Fund**
- December 15, March 15. Postdoctoral research fellowships for basic and clinical scientists. Awards are available for up to three years of support. Up to $90,000 in salary support plus $20,000 to $25,000 for up to three years ($40,000 or $45,000 for those who have completed postdoctoral training).

**Department of Energy**
- January 7. (Earlier submission and presubmission staff assistance available.): Grants for development of software technology and environments to support high performance computing and applications related to climate change, molecular biology, human genome research, materials and chemical sciences, combustion research, waste remediation, and fusion energy.

**German Marshall Fund** (Grant applications due from the fund at 11 Dupont Circle, N.W., Washington, D.C. 20036, (202) 745-3900. November 15. Research fellowship program. Supports efforts to improve understanding of international political, trade, and social developments involving United States and Western Europe. Projects may be on contemporary or international issues. Stipend is up to $30,000.

**University of California, Los Angeles**
- December 15. Franco-American, American Indian, Asian American and Chicano studies grants. Applications are due on January 15. Support depending on rank and experience to senior and junior faculty and support Sabbatical salaries provided by institutions.

**Thaliket Foundation**
- December 9. Graduate fellowships in Arab Art and Architecture. Support by students working towards PhD or ScD in the arts. Award includes stipend of $14,500 for full-time and $25,000 for part-time on- or off-campus study in the arts and related sciences managed by MIT.

**National Endowment for the Humanities**
- January 15. Peace fellowship. One-year award of $24,500 for nonacademic research on peaceful solutions to conflict or potential conflict among groups or nations. Applications due January 15. Postdoctoral fellowship. Postdoctoral award of $3,000 for summer 1992 for women historians. Preference given to scholars who do not normally have access to Boston area libraries.

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CVC matches volunteers with projects

The Community Volunteers Clearinghouse (CVC), sponsored by the Office of Community and State Affairs, has information on opportunities for faculty and staff who would like to volunteer in communities throughout the Princeton-Trenton area.

Interested employees can ask CVC to suggest specific projects to suit their skills, interests and time constraints. Projects include delivering clothes to the homeless, driving senior citizens to medical appointments, tutoring Spanish-speaking children and adults, and reading stories to welfare-motel children.

Organizations that have recently inquired about University volunteers include:

- the Exchange Club of Lawrence, which needs volunteers with any level of time commitment to help homeless people living in Route 1 welfare motels in Lawrence Township;
- Princeton Senior Resource Center, which is looking for volunteers for a program to serve as friends to elderly people, offering conversation, transportation and excursion opportunities as part of its Home Friends program;
- the Princeton Area Red Cross Special Transportation Service, which is seeking drivers to provide transportation for seniors and disabled people;
- the Professional Roster, which needs volunteers to staff its job-information clearinghouse; and
- Isles of Trenton, an urban renewal program that uses volunteers to work with neighborhood residents to clean abandoned lots, establish community gardens and restore buildings, and also needs volunteers with office and computer experience to help with administration.

For specific numbers to call about any of these projects or for other information about CVC and faculty and staff volunteer activities, call Community and State Affairs Director Pam Hersh or Associate Director Karen Woodbridge at 258-3204.

Fair offers help with preretirement plans

On October 30 from 8:15 a.m. to 2:00 p.m. the Office of Human Resources will hold a preretirement planning fair in Whig Hall especially for University faculty and staff members age 40 and over. All members of the University community are welcome.

One-hour program topics include Social Security benefits, health insurance, legal issues, financial planning and Supplemental Retirement Annuities (SRAs).

Resource people available for consultation will include representatives from the Professional Roster, Elderhostel, the Social Security Administration, the Princeton Memorial Association and the Princeton Senior Citizen Resource Center, as well as administrators from Human Resources. A representative of TIAA/CREF will calculate projected retirement income for interested contract holders (call Maxine Jones at TIAA/CREF; 800-842-8412, in advance to set up an appointment).

For more information consult the Weekly Calendar or call Nancy Fitz-Gerald at 258-5157.

Credit Union sponsors used car sale Nov. 19

The Princeton University Employees Federal Credit Union is sponsoring a sale of used cars on November 9.

The cars, part of a fleet from National Auto Rental, include models from General Motors and Chrysler. With prior loan approval the credit union will finance 100 percent of the purchase, including taxes and registration fee, with a three-year loan at 11 percent interest.

National offers its own 12-month, 12,000-mile limited power train warranty at no additional cost. Purchasers of GM cars may elect to receive instead the balance of GM's own 3-year, 50,000-mile warranty at no additional charge.

Within certain restrictions, National also offers to buy back or replace a car that does not meet a purchaser's expectations within 30 days or 1,000 miles. A range of service contracts are available at the time of sale.

The sale will take place between 9:00 a.m. and 2:00 p.m. in Lot 15 behind the Armory building off Washington Road. Credit Union members considering purchasing a car must apply for a loan in advance of the sale, in an amount equivalent to the maximum they plan to spend. Adjustments in the actual size of the loan can be made on the day of the sale.

Community players present Christmas fantasy comedy

The Princeton Community Players will present a Christmas fantasy, My Three Angels, at 8:00 p.m. on November 1 and 2, 8 through 10, and 15 and 16 at the Broadnaxd Theatre, 171 Broadnaxd.

The comedy takes place in French Guiana on Christmas eve. An impoverished family is aided by three convicts who become more involved with the problems of the family than their own bleak situation.

There will be a post-performance reception on opening night. For reservations call 921-6314.

Mammography screening available to women over 40

Mammography screening is being offered to all women over 40 and currently employed by the University.

The screening will be conducted on October 30 and 31 and November 4, 5, 7, 8 and 11 by U.S. HealthcareCheck, a subsidiary of U.S. Healthcare and the Fox Chase Cancer Center. The U.S. HealthcareCheck operates under the guidelines of the National Cancer Institute, which recommends that women begin having screening mammograms every two years at age 40 and annually at age 50.

The Reha Callaway Fund subsidizes 50 percent of the cost of the program: participants pay $42.50 for the mammogram.

Any eligible woman who did not receive a memo and registration form in the mail or who has questions about the program should call Nancy Fritz-Gerald at 258-5157. For general questions about mammography, call Dr. Ben Wright at 248-5035 or Joan Davies at 258-5025.

Steve Bethol

Trio performance. The University Concerts presents the Kalichstein-Laredo-Robinson Trio in Richardson Auditorium on October 24 at 8:00 p.m. Violinist Jaime Laredo (l), cellist Sharon Robinson and pianist Joseph Kalichstein will play music by Mozart, Brahms and Shostakovich.

U League invites kids to Halloween party

University children and grandchildren age 9 and under are invited to the University League's annual Halloween party at 3:30 p.m. on October 30 at 171 Broadnaxd.

The festivities include refreshments, entertainment and a parade. Children may wear costumes or not, as they choose.

For more information call 771-1568 or 258-3560.

Lithograph monoprint. "Dream Litho 2" is one of the recent prints by artist Martha Otis Wright on display through November 4 at the Program in Women's Studies, 113 Dickinson Hall.

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Employment

Lab and shop

Electronic specialist I. Requires ability to repair microcomputers and other equipment, and knowledge of micro networking to solve Ethernet, AppleTalk, broadband and possible fiberoptic failures. Familiarity with local area network preventive maintenance procedures, and microwave and satellite transmission, and two years of computer and networking repair experience preferred. Knowledge of theory helpful. Salary minimum: $25,375. CIT/Systems, Technical Support Req. 0718PP

Maintenance and service

*Food service worker. Prepares food and supplies for meals and performs other duties as requested. Ten month position. Salary: $8.58/hr. (probationary salary: $7.98/hr.)

Food Services Req. 1898SS

HVAC/air conditioning and refrigeration mechanic. Repairs domestic, commercial and industrial hermetic, reciprocating, centrifugal and rotary air conditioning and refrigeration systems, and maintains humidification and dehumidification systems, including electronic air filters and cleaner systems. Must have four years of journey level experience and be familiar with voltage readings, electrical testing, pneumatic controls and soldering techniques. Application due December 1. Salary: $17.06/hr. (probationary salary: $15.87/hr.)

Grounds, Building Maintenance Req. 9820 SS

Office and clerical

Bibliographic specialist. Requires reading knowledge of Russian. Previous library experience, database searching skills and bibliographic expertise preferred. Typing 30 wpm. Salary minimum: $17,832.

Approval/Continuation Unit Req. 0892

Library office assistant II. Must be able to deal effectively with people. Experience with computers preferred. Typing 30 wpm. Salary minimum: $16,054.

Circulation Req. 0894

Library office assistant II. Requires accuracy, and ability to work independently and within schedule in high production setting. Experience with data entry preferred. Typing 30 wpm. Salary minimum: $16,054.

Prebendary Unit Req. 0891; 0895

*Office assistant III. Assists clinic coordinator; serves as receptionist, file clerk, and maintenance and medical records assistant; and provides support to professional personnel. Typing 45 wpm. Salary minimum: $18,500.

Health Services Req. 1035SS

Office assistant IV. Coordinates alumni colleges, including arranging for facilities, transportation, media services, publicity and preparation of materials. Opportunity for some travel. Requires knowledge of WordPerfect, Q&A, and excellent communication and organizational skills. Typing 45 wpm. Salary minimum: $22,650.

Alumni Council Req. 0214PP

*Office specialist. Responsible for providing administrative and secretarial support to chair and assistant to chair. Requires independent judgment, strong organizational and communication skills and knowledge of WordPerfect 5.0. Salary range: $21,075-$22,650.

Office of the Secretary Req. 1461PP

Office assistant. Responsible for providing administrative and secretarial support to administrative staff. Requires experience with WordPerfect 5.0. Typing 45 wpm. Salary range: $21,075-$22,650.

Teacher Preparation, Placement Req. 1514PP

Secretary III. Requires four years of related work experience or post high school education that includes at least one year of related work experience, attention to detail, and ability to work independently and show initiative. Experience with PC and WordPerfect desirable. Typing 45 wpm. Salary range: $19,850-

Teacher Preparation, Placement Req. 1092SS

Secretary III. Requires independent judgment and organizational skills. Experience with Macintosh and WordPerfect preferred. Typing 45 wpm. Salary range: $19,850.

Psychology Req. 9496SS

Secretary III. Requires four years of related work experience, independent judgment, organizational skills, and experience with wordprocessing and database management. Typing 30 wpm. Salary minimum: $19,850.

Recording Secretary Req. 0844 SS

Office of the Secretary

Professional technical

Technical staff member. Works on lexical database and assists with general UNIX support using software related to WordNet project. Requires strong background in C development on UNIX/Sun platform; BA in psychology, computer science, computational linguistics or related fields; and three or more years of experience. Knowledge of MOTIF and WCL helpful. Send cover letter and resume to G. Miller, Psychology Department, Green Hall.

Part time and temporary

*Copy service room operator. Operates machines and does minimal maintenance; stocks inventory; delivers paper stock; and performs other duties that include heavy lifting. Position is full time for four to six months. Salary: $7.75/hr.

Send application to Mike Freeman, C134 Engineering Quadrangle.

Secretary III. Schedules appointments, updates confidential files, compiles statistics and composes correspondence. Requires discretion and sensitivity. Typing 45 wpm. Position is fifty percent of time for one year (possible continuation). Salary minimum: $8,925.

Rutgers Counseling Req. 1499PP

Secretary III. Provides clerical and administrative support for compensation staff. Requires knowledge of word-processing and spreadsheets (Macintosh or IBM) and ability to perform math calculations. Fifty percent time (hours flexible). Typing 45 wpm. Salary minimum: $9,925.

Human Resources Req. 1497PP

Secretary IV. Requires good communication and organizational skills, and knowledge of WordPerfect 5.1 and Lotus Symphony or 1-2-3. Typing 45 wpm. Salary minimum: $22,650.

Treasurer Req. 9581PP

Technical secretary II/III. Performs general research, administrative and secretarial work, which includes processing scientific manuscripts and correspondence, and working with computer graphics and data base analysis. Requires experience with Macintosh wordprocessing. Familiarity with database, spreadsheets and computer graphics desirable. Typing 45 wpm. Salary minimum: $19,850/$21,075.

Geological and Geophysical Sciences Req. 0268PP

Administrative and related staff

Network engineer. Responsible for developing and providing new network services to other organizations; routing performance and topology design of network; managing UNIX systems; developing network monitoring and performance applications; and trouble shooting. Requires BS in computer science or electrical engineering or at least two years of experience in UNIX systems administration. C programming and TCP/IP network (hardware and software). Must have good communication skills. Applicants should send resume and names and addresses of at least three people who can comment on qualifications to Bruce Finnie, Computing and Information Technology, 87 Prospect, CIT, J-NChet.

UNIX systems programmer. Operates and maintains all aspects of system administration for campus UNIX environment (Sun-4/490 and lab of 30 SPARCStations); analyzes and tunes system performance; analyzes security violations; teaches one or more UNIX courses; purchases follow-on systems and peripherals; works with internal and external hardware support; and supports CIT staff and University faculty. Requires minimum of undergraduate degree in computer science or equivalent; two years of experience with Sun Microsystems UNIX and administration procedures including file backup and restoration, NFS and NIS; experience with applications-level TCP/IP, low-level TCP/IP and Domain Name Service; experience in programming, debugging in C, sh, awk and sed; and experience with at least one windowing system at user level (OpenLook, Motif, X). Applicants should send resume and names and addresses of at least three people who can comment on qualifications to Bruce Finnie, Computing and Information Technology, 87 Prospect.

Detailed descriptions of jobs are available in job opportunities pages posted at various locations on campus and in the Office of Human Resources. For a recording of job openings, call (609) 258-3303. To apply for a current job, send application to Human Resources, Clio Hall, or call (609) 258-6130. Office hours are Monday-Friday, 9:00 a.m. to 4:00 p.m.

*New listing.

Princeton University is an equal opportunity, affirmative action employer, minority/female/handicapped/veteran.