

WPI transformations

WINTER 2002

A JOURNAL OF PEOPLE AND CHANGE

Meet the IBOT

Dean Kamen's other big idea
levels the playing field for the disabled

Breaking Away

Runner Christine Clifton is going the distance

Power Shift

How researchers at
WPI are helping put the future of energy in your hands

September 11

How this day of infamy affected WPI alumni

In the Spotlight

Lighting 40 candles for Lens and Lights

Profiles in Giving



On Stewardship

The desire to share, systematically and proportionately, one's time, talents and material possessions with one's community, worthy charitable causes—and one's alma mater: for many, this is the essence of stewardship. It is also the driving sentiment behind the philanthropy of Joan and David Szkutak, both members of the Class of 1979. They are active as volunteers for WPI and for the United Way in the community where they live and in the town where they recently built a second home. They feel fortunate to be able to make significant gifts to the institutions that are important to them. "We feel that giving back in this way is an obligation."

Joan and David Szkutak '79

Homes: **West Chester, Ohio; Bar Harbor, Maine**

Gift Arrangement: **Appreciated Securities**

On Gift Planning at WPI

Joan and David say WPI was a critical enabler in their careers. "The unique education we received at WPI really made a difference," David notes. Scholarships from WPI made it possible for both of them to attend the university, so they chose to give other students the same opportunity by making a commitment to the Class of 1979 Reunion Gift through a President's Advisory Council Scholarship. "By making a gift of appreciated securities, we were able to leverage the tax advantages and make a bigger gift. It allowed us to be more ambitious and generous. We funded our gift with stock we've been accumulating for a long time. It had a cost basis of \$1,000; our gift and our charitable tax deduction was based on its current value of \$5,000. With a low cost-basis comes a high capital gains tax, so it's the best asset to contribute. Our personal assets will continue to accumulate and grow. Whatever we do with our personal wealth, WPI will be factored in."

1-888-WPI-GIFT

If you would like to join the Szkutaks and the hundreds of others who are enjoying the many benefits of planned giving at WPI, please contact the WPI Office of Planned Giving at 1-888-WPI-GIFT or via e-mail at planned-giving@wpi.edu.

Starting Point

On behalf of the many people whose talents and hard work are reflected in the pages that follow, I am happy to present to you the first issue of *Transformations: A Journal of People and Change*. Though it has a new name (more on that later), this quarterly periodical continues the 106-year heritage of the *WPI Journal*, the university's first alumni magazine. The *Journal*, augmented for the past 15 years by the news tabloid *The Wire*, has played a critical role in strengthening the ties that connect this university with its many alumni and friends. *Transformations* will assume that role.

Like the *Journal* and *The Wire*, *Transformations* will serve as both the official chronicle and the family album for the WPI community, keeping readers up to date on the latest developments on campus and giving alumni a forum for sharing their own news, views and milestones. It will also be a regular showcase for WPI, helping those within and beyond the WPI family appreciate what makes this institution and its people distinctive and noteworthy.

This new publication is the product of more than a year of research, planning and creative effort. Given the many important jobs that WPI's alumni publications are asked to do, the university decided to take the time to critically evaluate those publications to see how well they were meeting the needs and addressing the interests of today's readers. We also took the time to review the kinds of publications our readers turn to for information, and to see what we could learn from some of the best examples of university and consumer magazine publishing.

From that review came the resolve to create a new publication, one that retained the qualities that endeared the *Journal* and the *The Wire* to readers, but augmented them with new features and a new, more contemporary and reader-friendly design. In short, we set out to create a magazine at the cutting edge of publishing, just as WPI and its people have always been at the cutting edge of science and technology. We've given this new publication a multipart mission. First, we want to make sure that as you peruse each issue, you discover what a remarkable place WPI is. We want you to be proud of your alma

mater—proud enough to tell your friends, neighbors and colleagues all about us.

Second, we want you to feel that each issue of *Transformations* is just the beginning of a conversation. We hope that what you read and see in these pages prompts you to talk back—to tell us what you think about the information we've sent you, about what you'd like to receive more (or less) of, about what's on your mind, and about what's happening in your life. Write us, e-mail us or visit us on the Web, where you can chat with our staff and your fellow readers in the brand new Alumni Café.

Third, we want this publication to reflect what is truly unique about WPI. We call this new magazine *Transformations* because we believe that word captures better than any other what distinguishes this university from all others. In fact, the idea of transformation is at the core of WPI's mission.

Through its innovative approach to teaching and learning, WPI transforms young men and women into productive, socially aware professionals exquisitely well prepared to apply their knowledge and skills to make a difference even before they graduate. Through their scholarship and research, WPI faculty members are transforming our planet and our understanding of it. And through their achievements, and with their imagination, their creativity, their knowledge and their irrepressible desire to make things better, WPI alumni are helping transform the world around them in positive ways.

In the pages of this new magazine, we will tell the stories of those transformations and the people behind them. And, we will paint a colorful, dynamic and informative portrait of the innovative university where those stories begin.

With that, I wish you happy reading.

Michael W. Dorsey
Editor

Up Ahead

March 9	Alumni Leadership Council Meeting
March 18–22	Second International Corporate/Academic Roundtable on Emerging Technologies; Topic: Molecular Engineering
April 10	WPI Traditions Day
April 16	Project Presentation Day
May 18	Commencement
May 21	New England-Africa Business Conference
June 6–9	Reunion
June 16–21	Seventh International Symposium on Fire Safety Science

All events take place on the WPI campus.

Contents

Volume 102, No. 1, Winter 2002

Staff: Editor: Michael W. Dorsey; Alumni News Editor: Joan Killough-Miller;
Contributing Writer: Bonnie Gelbwasser; Art Director: Michael J. Sherman;
Design: RE:Pascal; Production Manager: Bonnie McCrea; Layout: Pamela Mecca;
Department Icons: Art Guy Studios.

Alumni Communications Committee: Robert C. Labonté '54, chairman;
Kimberly A. (Lemoi) Bowers '90, James S. Demetry '58, William J. Firla Jr. '60,
William R. Grogan '46, Amy L. (Plack) Marr '96, Roger N. Perry Jr. '45,
Harlan B. Williams '50.

Transformations (ISSN 1538-5094), formerly the *WPI Journal*, is published four times a year in February, May, August and November for the WPI Alumni Association by the WPI Communications Group. Printed in the USA by Mercantile/Image Press.

features

12 Leveling the Playing Field

A sophisticated personal transportation system that can balance like a human being? No, it's not II, it's the IBOT, another brainchild of inventor Dean Kamen '73. **By Joan Killough-Miller**

16 Hitting Her Stride

Five short years ago, Christine Clifton '94 could hardly finish a marathon. Today, she is one of the best long-distance runners in the world. **By Joan Killough-Miller**

20 Clearing the Air

When Gregory Wirzbicki '68 wrote a patent application for cleaner-burning gasoline, he didn't know he'd set off a historic battle over intellectual property. **By Michael W. Dorsey**

24 Thinking Small

WPI faculty members and students are helping drive a micro-revolution that will transform the way electricity is generated and delivered. **By Laurance S. Morrison and Michael W. Dorsey**

29 Recharged

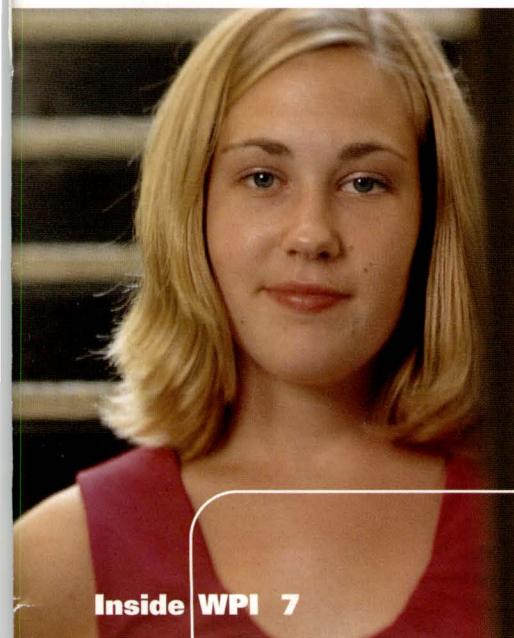
Robert Stempel '55 left his post as chairman of General Motors intent on helping make electric vehicles a reality. In a new career, he's doing that and more. **By Laurance S. Morrison**

42 September 11, 2001

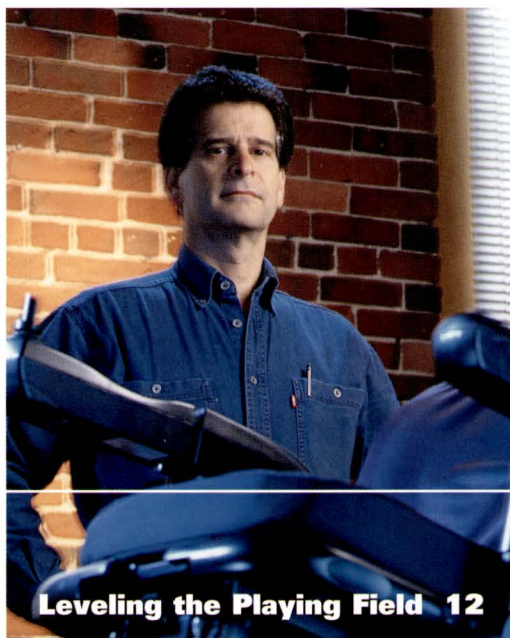
The terrorist attacks touched many WPI alumni in many ways. They were also the impetus for a moving e-mail dialog between alumni and their alma mater. **By Joan Killough-Miller**

On the cover: photo illustration by Patrick O'Connor and Steven Pascal. Special thanks to Timothy R. Roughan '82, vice president, Mass Electric Company (National Grid).

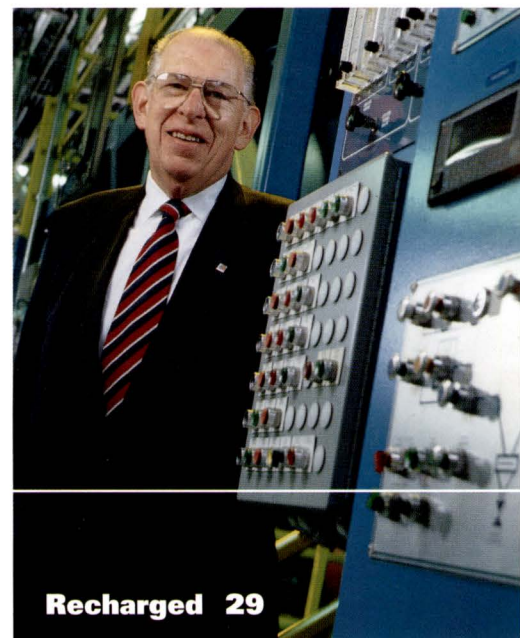
Diverse views presented in this magazine do not necessarily reflect the opinions of the editors or official WPI policies. We welcome letters to the editor. Address correspondence to Editor, *Transformations*, WPI, 100 Institute Road, Worcester, MA 01609-2280. Phone: 508-831-5609; fax: 508-831-5820; e-mail: transformations@wpi.edu; Web: www.wpi.edu/~Transformations. Periodicals postage paid at Worcester, Mass., and at additional mailing offices. Postmaster: please send address changes to address above. Entire contents © 2002, Worcester Polytechnic Institute.



Inside WPI 7



Leveling the Playing Field 12



Recharged 29

Departments

Campus Buzz 4/6

A Few Words 5

Inside WPI 7

Investigations 8/9

The Big Picture 10

Explorations 11

Class Notes 32

Time Machine 48



On the Web @

www.wpi.edu/+Transformations

The online edition of the Winter 2002 *Transformations* has a host of features and links related to the stories in this issue. Read a profile of Michael Sokal, recently elected History of Science president. Find out how a disabled writer thinks Dean Kamen's IBOT could change her life. Learn about a new fuel cell being developed by Energy Conversion Devices, the company that Robert Stempel now chairs, that might be ideal for use in vehicles. You'll also find a preview of the Spring 2002 issue. While you're online, send us your news, write a letter to the editor, or chat with fellow readers in the *Transformations* forum of the new Alumni Café.

www.wpi.edu/+Transformations



Scenes from a candlelight vigil at Reunion Plaza on Sept. 15.

WPI Gets Kudos for Networking

WPI received honorable mention for its strategically coordinated and integrated network environment at the Oct. 30 annual conference of EDUCAUSE. A pre-eminent association representing more than 1,800 colleges, universities and education organizations, EDUCAUSE addresses the complex issues attending the incorporation of information technology into higher education. The award cites WPI's success in consolidating its core information and technology functions into the Information Technology Division. Over the last two years, well-orchestrated technological advances, including infrastructure upgrades, wireless access, media-streaming capabilities and digital conversion facilities, have improved teaching, learning and research across WPI. "Our shared vision has been to unite the power of knowledge with the flexibility of technology to connect faculty, staff, students and content—anytime, anyplace," says Thomas Lynch, vice president for information technology.



Campus Buzz

A National Tragedy; A Local Response

Nothing could have prepared the WPI community for the news that flashed across campus on the morning of Tuesday, Sept. 11. In seconds, the quiet business of a late summer day exploded into anguish, pain and worry.

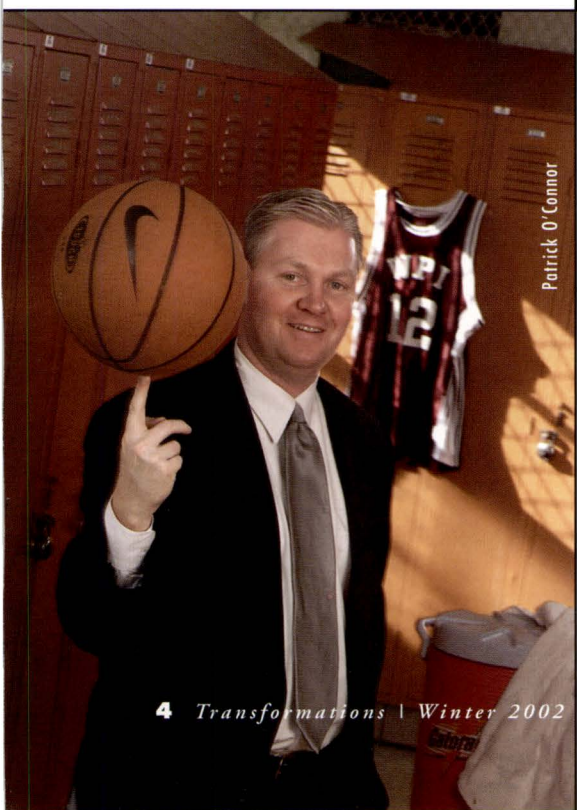
The shock was intense and mind-numbing. But somehow the campus quickly responded. TVs were set up across campus, broadcasting news updates. The Counseling and Student Development Center mobilized to offer solace and support to those closely affected by the tragedy and those finding it hard to cope with a world turned upside down. The university sent employees home to their families and cancelled classes that first day, and many events scheduled for subsequent days and weeks were cancelled or postponed, as were the travel plans of faculty and staff.

Work and study began again the following day. While striving to return to a routine, the WPI community also reached out to help meet the needs of those affected by the tragedy. Many rushed to local blood donation centers—some standing in line for many hours to make a donation. Many responded with gifts of clothing, food and other items needed by the victims and by the teams working at the sites of the disasters.

At week's end, as President Bush declared a National Day of Prayer and Remembrance, hundreds of students, faculty members and staff members gathered in Harrington Auditorium for a prayer service. That evening, they came together again, lighting candles and marching in a solemn procession that stretched in an unbroken chain of light nearly all the way around the Quadrangle. The march ended in Reunion Plaza for a moving tribute to the victims and their families. It was a memorable conclusion to a week that will remain seared in the memory.

The tragic events of Sept. 11 affected every member of the greater WPI community. To read about how they touched the lives of the university's alumni, see pages 42 and 43.

Photos by Jonathan Pesch '03



Patrick O'Connor

Kaufman Passes the Ball to Bartley

A new era began this summer with the appointment of **Chris Bartley** as WPI's new head men's varsity basketball coach. Bartley succeeds Ken Kaufman, who led the Engineers for 32 years (26 as head coach), the longest tenure of any head coach at the university.

Bartley graduated from UMass-Lowell and is completing a master's degree in education at Cambridge College. He spent the last two years as assistant coach at Babson College, where he helped lead the Beavers to a second-place finish in the New England Women's and Men's Athletic Conference in 2001 (the same year the team was named Most Improved Team in New England by the New England Basketball Coaches Association). In 1999, during his two-year stint as coach of the Medford High School boys basketball team, he received the *Boston Globe* Division I Coach of the Year award and the NBA's Greater Boston High School Sportsmanship Award.

This summer, Kaufman was elected first vice president of the National Association of Basketball Coaches (NABC). He gave up his coaching duties in anticipation of the additional responsibilities he will assume after he becomes NABC president in March 2002. He is also a member of the board of trustees of the Basketball Hall of Fame in Springfield, Mass. He will remain at WPI as assistant to the director of athletics, physical education instructor, and coordinator of summer sports camps. WPI's men's basketball team made its first appearance in the NCAA national Division III tournament in 1981 under Kaufman's coaching. The team he coached in 1984 finished with a 20-8 record and won the NCAA Northeast Regional Championship.



Michael M. Sokal, **President Elect, History of Science Society**

An Interview by Ray Bert '93

Industrial Revolution, I start with King Henry VIII wanting to divorce his wife. Because Roman Catholicism wouldn't allow this, he converted to Protestantism and created the Church of England, thereby promoting in England the "Protestant ethic" that some historians believe was the most important factor in the rise of a capitalist society. If one looks for the root causes only in technology, while ignoring large social changes, one misses a lot of the story. The two are inextricably intertwined. This is, of course, why WPI requires students to complete the Interactive Project.

Can looking to the past help us grapple with current issues in science and technology?

Too many people in Congress are either anti-science, or think it can do anything. That split plays out in some current issues, such as the much discussed missile defense shield. Both sides of that debate—the side that says it is absolutely necessary and certain to be effective, and the side that says that it is a useless exercise that will serve only to line people's pockets—are vastly oversimplified. In terms of stem cells, we can show considerable evidence that past attempts to limit research for political reasons have been counterproductive; not only does the field suffer, but the ethical concerns that prompted the limits aren't addressed. There are other ways to ensure that research is conducted ethically. We believe strongly that our field has a lot to say to policymakers, and that the history of science can be—and has been—used in a way that can benefit the country.

Are policymakers the only ones who can benefit from an understanding of the history of science?

My discipline has a lot to offer the general public, as well. Introducing non-science people to the nature of science helps produce more educated citizens. An example is Thomas Kuhn's *Structure of Scientific Revolutions*, published in 1963, which introduced the concept of the paradigm. Kuhn was a former HSS president, and his

work educated a lot of Americans on what is involved in the development of science and more general intellectual change.

Can the historian's perspective help us deal with the issues left in the wake of the recent terrorist attacks?

As a historian, I try to take a long and broad view of the events of Sept. 11. I question any explanation that relies simply on narrow and short-term factors and influences. As I hear commentators speculate as to the immediate causes of these events, I'm led to consider the centuries-long relationships between Islamic civilization and the rest of the world, and between the United States and the rest of the world. It's important to understand how these relationships have evolved and how one has helped shape the other. When asked, "What can history teach us?" I respond that although many believe that history cannot teach us what to do, it can teach us what strategies and tactics have failed in the past, and why they failed. We ignore the past, and historians' analyses of the past, at our peril.

How will your term as HSS president help WPI?

My serving as president of a national humanities society will give outsiders an idea of how the university has evolved—that WPI is something broader than it used to be. But it may also help change the institution's image of itself.

Does WPI's unique approach to education have anything to offer your field?

Quite clearly, science historians today know about WPI, which wasn't the case when I started here 30 years ago. A big part of that is the Sufficiency program, which could serve as a model for any school for introducing students to ways of thinking different from their main field. It says there are other ways of understanding the world, of coming to grips with reality. The skills that scientists and engineers at WPI develop in the humanities are useful across the board.

— Bert is a freelance writer living in Maryland.

Last fall, Michael Sokal, professor of history at WPI since 1970, was elected to the presidency of the History of Science Society (HSS), which he says is the greatest honor he has ever received. He begins a two-year term as vice president in January 2002, and will serve as president in 2004 and 2005. Sokal spoke with the *Transformations* about his field and what we can learn from it.

What do you hope to accomplish in your new post?

I hope to help the society serve its members as teachers and scholars by helping ensure that HSS has the resources—both human and financial—that it needs. I do not plan to set any teaching or pedagogical agenda; it's quite clear that there is a lot of excellent teaching going on and a lot of interest in the field. But I hope to help the field expand its influence outside academia, in part by promoting the efforts of those who call themselves public historians and independent scholars.

Why is it important to study the history of science and technology?

Here's one of my favorite examples: In teaching Introduction to the History of Technology and tracing the roots of the



From left, Rencis, Delorey and Kronrod.

Conference Brings Wireless World to Boston

Scores of international experts came together at the third IEEE Workshop on Wireless Area Networks in Boston in September, a conference organized by WPI's Center for Wireless Information Network Studies and chaired by Kaveh Pahlavan, professor of electrical and computer engineering.

The oldest IEEE workshop in wireless broadband local and ad-hoc networks, the five-year-old meeting brings together researchers, leading industry developers and end users. This year, invited speakers addressed chip development, market development and product demonstrations. Edson de Castro, best known as the founder of Data General Corporation, gave the keynote address.



People in the Spotlight

Joseph J. Rencis, mechanical engineering professor and director of engineering mechanics, was recently elected a fellow of the American Society of Mechanical Engineers (ASME) International. The highest grade of membership within ASME, fellow recognizes exceptional engineering achievements and contributions to the engineering profession. A member of the faculty since 1985, Rencis is also a fellow of the Wessex Institute of Great Britain, which recognizes leaders in the field of computation engineering and boundary element research.

WPI student musicians have something new to sing about. **John Francis Delorey** was named WPI's first director of choral music last fall. He succeeds Associate Professor Louis Curran as director of the WPI Men's Glee Club and assumes conducting responsibilities for Alden Voices (the women's chorus) and the Concert Chorus. Curran, who has directed the Glee Club since 1966, will continue to teach at WPI. Delorey, a graduate of Vassar College, is a multifaceted musician with an impressive resumé. He was most recently director of choral activities and concert band director at Clark University and was a music teacher and program coordinator at Doherty Memorial High School.

WPI senior **Yakov Kronrod** is preparing for a career in research and teaching with a double major in mathematics and computer science. Three prestigious awards attest to his academic excellence. In 2000 he received WPI's Richard V. Olson Award for outstanding performance in basic mathematics courses. Last April, he was named a Goldwater Scholar for the 2001-02 academic year. These scholarships are awarded to outstanding sophomores or juniors who demonstrate a high potential for and commitment to a career in mathematics, the natural sciences or academic research. Last summer, he was one of two WPI students (the other was senior Megan Lally) chosen to receive a Waldemar J. Trjitzinsky Memorial Fund Award from the American Mathematical Society. After graduation Kronrod plans to pursue a master's in computer science and a doctorate in mathematics.

Innovative Curriculum Receives Major Award

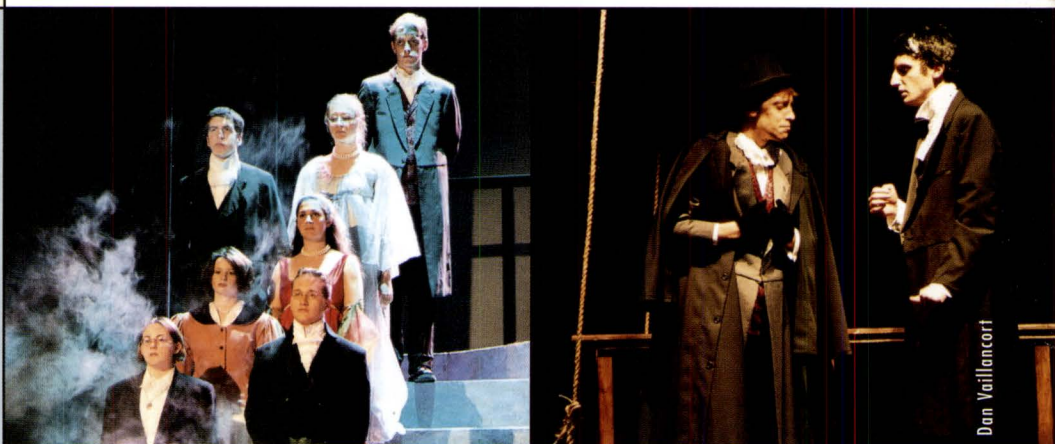
The American Society for Engineering Education presented three WPI chemical engineering professors with its 2001

William H. Corcoran Award for the best paper published last year in the journal *Chemical Engineering Education*. Associate Professor **David DiBiasio**, Associate Professor **William**

Clark and Professor **Anthony Dixon** wrote "A Project-based, Spiral Curriculum for Introductory Courses in Chemical Engineering," a three-part description of the Chemical Engineering Department's comprehensive overhaul of its sophomore curriculum. The new, yearlong sequence, which integrates topics from the four traditional core courses (material and energy balances, classical thermodynamics, mixture thermodynamics, and staged separation processes), leads students to make connections between ideas previously treated separately.



Patrick O'Connor



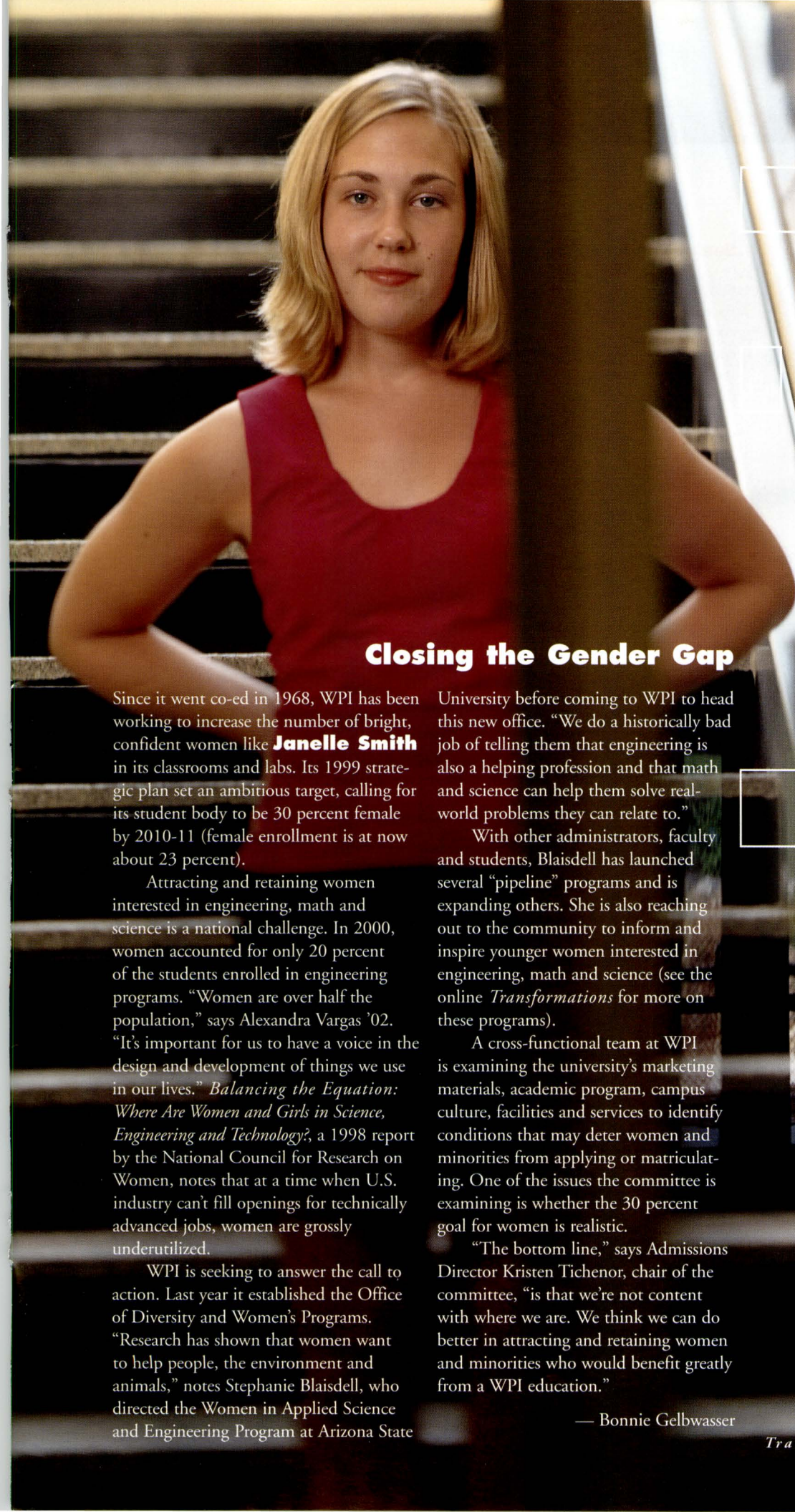
Den Vaillancourt

Scenes from *Frankenstein*, a play adapted from Mary Shelley's novel by Joseph Romagnano '01 and presented at WPI in November.

Theater Plays Well With Princeton Review

It is no secret to members of the WPI community that the dramatic arts thrive on campus. Recent recognition from the *Princeton Review* has gotten the word out nationwide. In its newest guidebook, *The Best 331 Colleges*, the Review ranked WPI 11th on its list of schools where "college theater is big." Emerson College, Ithaca College and Brown University topped the list; WPI came in just ahead of Vassar and Hampshire.

Under the direction of **Susan Vick**, professor of drama/theatre, the university has moved to the leading edge of theater production with the development of the Theatre and Technology Program and with multifaceted opportunities to learn and participate, including courses, student projects, several standing drama organizations, and a yearly festival of plays written, directed, produced and performed by members of the WPI community.



Closing the Gender Gap

Since it went co-ed in 1968, WPI has been working to increase the number of bright, confident women like **Janelle Smith** in its classrooms and labs. Its 1999 strategic plan set an ambitious target, calling for its student body to be 30 percent female by 2010-11 (female enrollment is at now about 23 percent).

Attracting and retaining women interested in engineering, math and science is a national challenge. In 2000, women accounted for only 20 percent of the students enrolled in engineering programs. "Women are over half the population," says Alexandra Vargas '02. "It's important for us to have a voice in the design and development of things we use in our lives." *Balancing the Equation: Where Are Women and Girls in Science, Engineering and Technology?*, a 1998 report by the National Council for Research on Women, notes that at a time when U.S. industry can't fill openings for technically advanced jobs, women are grossly underutilized.

WPI is seeking to answer the call to action. Last year it established the Office of Diversity and Women's Programs. "Research has shown that women want to help people, the environment and animals," notes Stephanie Blaisdell, who directed the Women in Applied Science and Engineering Program at Arizona State

University before coming to WPI to head this new office. "We do a historically bad job of telling them that engineering is also a helping profession and that math and science can help them solve real-world problems they can relate to."

With other administrators, faculty and students, Blaisdell has launched several "pipeline" programs and is expanding others. She is also reaching out to the community to inform and inspire younger women interested in engineering, math and science (see the online *Transformations* for more on these programs).

A cross-functional team at WPI is examining the university's marketing materials, academic program, campus culture, facilities and services to identify conditions that may deter women and minorities from applying or matriculating. One of the issues the committee is examining is whether the 30 percent goal for women is realistic.

"The bottom line," says Admissions Director Kristen Tichenor, chair of the committee, "is that we're not content with where we are. We think we can do better in attracting and retaining women and minorities who would benefit greatly from a WPI education."

— Bonnie Gelbwasser

Inside WPI

"I've always loved learning how things work and I've always been good at math," says Janelle Smith '03, a mathematical sciences major who hopes to focus on gender equity in the technological classroom after she graduates. The daughter of a mechanical engineer, Janelle says she feels lucky to have attended a high school where "you weren't considered a geek if you did well in class."

Patrick O'Connor



Seeing the Forest for the Trees

This chart, generated by XmdvTool from a data set consisting of attributes for several hundred cars, demonstrates a capability of the software called parallel coordinates. It shows six dimensions of the data at an intermediate level of detail. Each vertical axis corresponds to a dimension (for example, miles per gallon and number of cylinders). Each colored line represents a cluster (or correlation among a grouping of cars) within the data space. The band around each line shows the spread of values for each dimension within that cluster. For example, the purple line represents eight-cylinder cars with poor fuel economy and low acceleration. Most of the clusters differentiate themselves from others in more than one dimension, allowing the viewer to divide each dimension into ranges (such as low, medium and high) and spot trends and outliers.

Simply put, visualization is a way of taking information and turning it into images that make it easier to comprehend. Road maps, bar charts and organizational charts are examples we encounter in our everyday lives. Scientists use visualization techniques to present their results, confirm hypotheses and extract meaning from their data. In fact, visualization is becoming increasingly important in science, engineering and business because it can provide rich overviews of data and help researchers quickly see the forest for the trees.

But commonly used visualization methods are often inadequate for dealing with exceedingly large data sets—the kind that exceed millions or even tens of millions of records, each with hundreds or thousands of entries. Revealing the patterns and trends hidden in such vast seas of numbers is the specialty of Matthew Ward '77, professor of computer science at WPI, and Elke Rundensteiner, associate professor of computer science.

Their research focuses on the development of interactive visualization and data management techniques that permit scientists to explore massive quantities of data. Ward, who has been working in visualization for more than a decade, is the developer of XmdvTool, a powerful tool for the interactive analysis of large multivariate data sets. The public domain software takes advantage of the ability of the human eye to detect, isolate and classify clusters, trends and anomalies within visual patterns. It integrates a variety of multivariate data visualization techniques, including scatterplot matrices, parallel coordinates, star glyphs and dimensional stacking, along with an extensive suite of interactive tools for filtering the data and modifying the views.

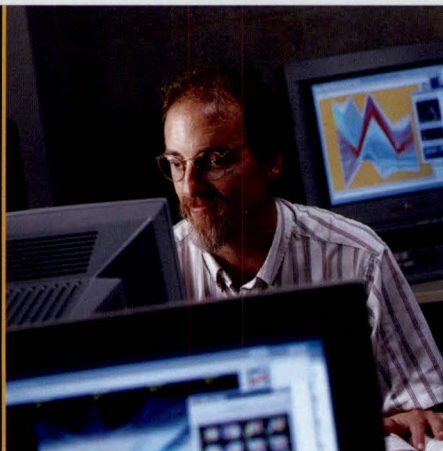
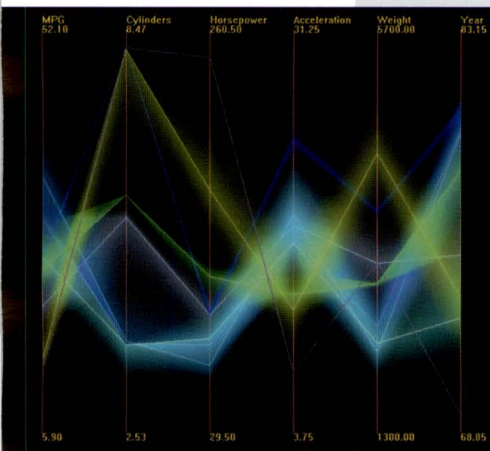
Funded by the National Science Foundation since 1998, Ward and Rundensteiner's current research is focused on three interconnected tasks. First, they are extending the visualization techniques of XmdvTool to permit it to display millions of records with thousands of dimensions in meaningful clusters that can be examined at multiple levels of detail. They also hope to improve the software's data management and retrieval capabilities and develop inter-

active tools to allow users to better navigate the data display and control the level of detail by drilling down, rolling up and zooming.

"Visualization is not meant to replace the traditional analytical or statistical methods of data analysis currently used," Ward says, "but it is a useful tool for understanding the structure and characteristics of a given data set. Visualization is 'exploratory analysis.' It allows you to use your innate visual pattern recognition abilities to spot clusters, trends, and anomalies that direct you toward the 5 percent of the data that is important, while letting you bypass the 95 percent that is not."

XmdvTool currently has hundreds of users from a wide variety of application domains, including environmental monitoring, stock market analysis and bioinformatics. It is also used in visual data mining

research and in information visualization graduate courses at several universities. Ward says feedback from users has been invaluable, as each new domain provides him, through its own unique data characteristics and exploratory tasks, new opportunities for taking visualization to yet another level of exploration.



The Air We Breathe

Just as the clearest pond water comes alive with tiny organisms when viewed under a microscope, the specialized equipment in the laboratory of Barbara Wyslouzil reveals that the air surrounding us is really an aerosol containing thousands of particles per cubic centimeter.

For the last six years, Wyslouzil, associate professor of chemical engineering, has focused on the finest of these particles, called nanodroplets because they are typically less than 100 nanometers in diameter. These droplets can impair human health, change the chemistry of the atmosphere and alter our perception of air quality, yet little is known, from a molecular perspective, about how they form when fossil fuels are burned or through incineration and other industrial and natural processes.

Wyslouzil heads three aerosol science research projects funded by the National Science Foundation and another funded by the Petroleum Research Fund. As a leading figure in this emerging field, she has been recognized by the NSF with a Faculty Early Career Development (CAREER) award and by WPI with the 2001 Trustees' Award for Outstanding Research and Creative Scholarship.

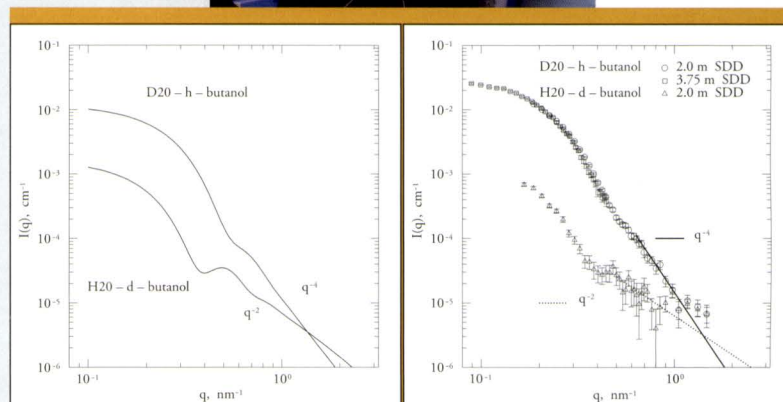
A primary focus of her research is the formation and structure of multicomponent nanodroplets. She hopes to learn how conditions in the gas phase affect the rate at which these droplets form. She is also interested in knowing whether the droplets contain regions with distinctly different compositions, since the way a droplet interacts with its environment depends on which molecules lie at its surface.

In her laboratory in Olin Hall, Wyslouzil and her team of undergraduate and postdoctoral students produce aerosols using a supersonic nozzle, then study them with conventional methods, including light-scattering. Once a year, they pack their equipment in a 15-foot truck and drive to the Center for Neutron Research at the National Institute of Standards and Technology (NIST) in Gaithersburg, Md. Over the course of four to five days, they use a highly sophisticated piece of equipment called a Small Angle Neutron Scattering (SANS) instrument. Because the wavelength of the neutrons is smaller than the size of the droplets, the neutron-scattering patterns can provide information about both the size and the internal structure of the droplets that can't be derived with other methods. The NIST campaigns are grueling, Wyslouzil says, because the experiments run 24 hours a day.

The most recent trip to NIST, in June, "was the most rewarding yet and produced exceptionally good results," she says. "For the first time, we were able to observe that some nanodroplets really are segregated and consist of a water-rich core with an alcohol-rich surface layer. It was our third attempt to get a 'signal' from this type of droplet and this time the spectra looked right!"

With this information, Wyslouzil and her team can complete a more quantitative analysis of the results—for example, determining the exact thickness of a nanodroplet's outer layer.

Having pioneered the use of SANS to investigate the properties of atmospheric nanodroplets, Wyslouzil says she and her group are keen on extending her work into other areas of aerosol science.



To develop a method for probing the structure of atmospheric nanodroplets, Wyslouzil created test droplets by spraying a mixture of water or heavy water (D_2O) and d-butanol through a supersonic nozzle. The curves to the left show that the droplets were expected to have a water-rich core and an alcohol-rich shell. The curves to the right show actual results obtained with small-angle neutron scattering. The results demonstrate the usefulness of this technique, the only one yet developed that can probe the microstructure of nanodroplets.





The **Big Picture**

Standing Out From the Crowd

By Edward Alton Parrish

Whether you live in Worcester or Wichita, you've no doubt come to realize that WPI is not exactly a household name beyond Central New England. While our faculty, staff, students and alumni have carried our name to the far corners of the globe, and while we've become widely known in some circles (fire protection engineering, for example), our reputation quickly wanes as one moves farther and farther from our own backyard.

How can it be, you may wonder, that an institution that was 30 years ahead of its time in developing the best approach to preparing students for the challenges and opportunities of tomorrow's technological world has been so little recognized for its efforts? We've come to realize that excellence in academics and research doesn't translate automatically into reputation and prestige. Those qualities are largely a function of who knows you, what they know, and how they see you in comparison to other institutions.

WPI has set out to do something about this challenge—to make a name for the university that will be known and appreciated. We've

spent the past year and a half conducting an image assessment that has told us a great deal about how we are perceived in the marketplace and what we need to do to become more visible and to be better known for our quality and excellence.

In the months ahead, we will be launching a multifaceted marketing and communications program aimed at putting that vision into action (this newly redesigned magazine is just one element). This is a serious effort, unlike anything the university has ever undertaken. It will involve every segment of the WPI family, including our alumni body.

The stakes are high, but the rewards could be higher still. I look forward to telling you more about this critical effort as it moves from the drawing board and into the public eye in the near future.

— Parrish is president of WPI.



Students Help British Museums Connect With Visitors

By Bonnie Gelbwasser

What do you expect from a museum? Information? Enlightenment? Interaction? Last spring, four teams of WPI juniors and seniors traveled to the London Project Center, the oldest site in WPI's global network, to help British museums grapple with this question. Their task was to suggest ways the museums might improve how they fulfill visitors' expectations.

"WPI's Interactive Project is perfect for museums," says James S. Demetry, professor emeritus of electrical engineering, who advised the museum projects, along with Ruth Smith, associate professor of philosophy

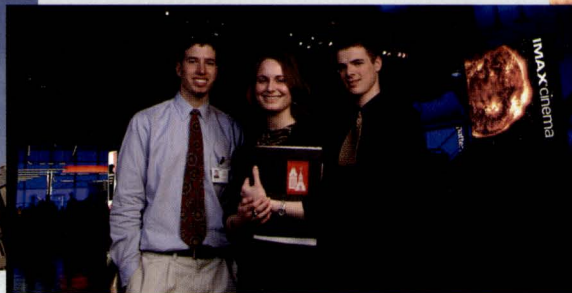
David Kirubi, Shaun McQuaid, David Spitz and David Yamartino were given the opportunity to make the first systematic study of the comments and associated data recorded by the system during its first six months. They found, for example, that though the kiosks were designed to appeal to young visitors, they are enjoyed by people of all ages. The students were asked to develop ideas for new topics, and, based on their analysis, they recommended that the kiosks ask open-ended questions aimed at generating well thought out comments. They interviewed visitors to determine which topics appealed to them, and suggested that the museum develop kiosks on euthanasia, stem cell research and Internet privacy. All three topics were approved by museum officials.

- Housed within the Victoria and Albert Museum, the National Art Library is home to many priceless manuscripts that document the history of art and of the museum.

- Supply and demand takes on new urgency in the intensifying world energy debate. To help young visitors learn about future sources of energy for the United Kingdom, London's National Museum of Science and Industry is considering the installation of wind turbines and solar arrays on its roof. To complement the exhibit, WPI seniors Elizabeth Hart, Joseph Knuble and David Tolmie designed an interactive Web site about photovoltaics and wind energy that presents the information in a colorful, clear and concise manner. The site engaged the interest of 7- to 14-year-olds in alternative energy and enabled the museum to determine the most effective way to showcase the rooftop exhibit.

- As they prepared for an expanded and improved Education Centre, staff members at the Royal Armouries of the Tower of London wanted to know more about how teachers learned of their programs and

Patrick O'Connor



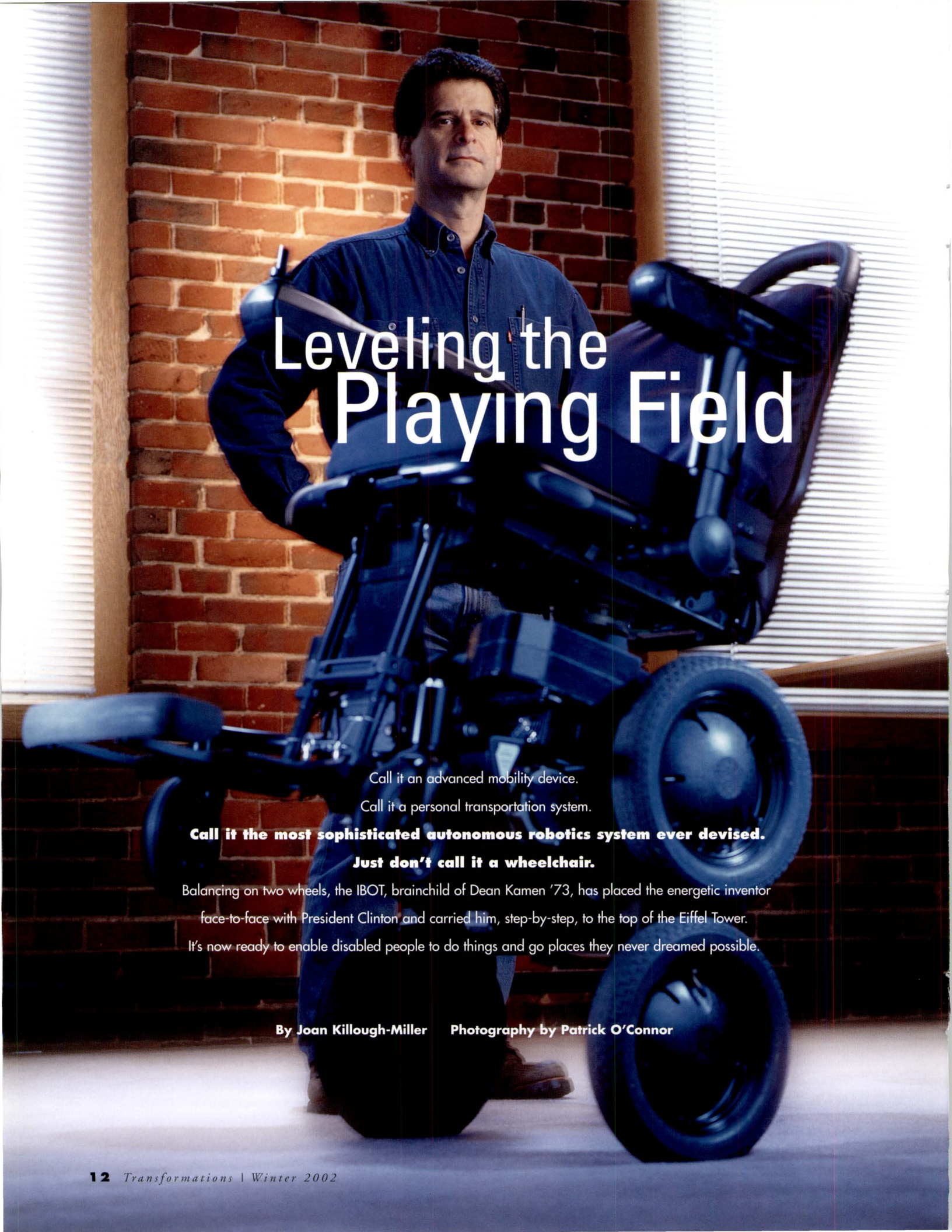
From left, Skiba, Garon and Giarnese at the Tower of London; Tolmie, Hart and Knuble at the National Museum of Science and Industry; and Spitz, Ruth Smith and McQuaid at the London Museum of Science.

and religion. "The project's focus on the interdependence of technology and society and its emphasis on teamwork is enhanced by the students' exuberance and creativity. It all comes together as team members devote an intense seven weeks to helping museum staffers organize or improve collections in ways that appeal to and enlighten visitors." Here are highlights of four of these projects:

- More and more museums are replacing lectures about their exhibitions with interactive presentations. In June 2000, the London Museum of Science, in an effort to encourage more interaction between visitors and the museum, opened the Welcome Wing, which features a series of kiosks on controversial issues in science and technology. At each kiosk, visitors receive an introduction to a topic through film clips and text; they then have a chance to offer their own observations and opinions.

However, access to the documents, which are deteriorating and becoming more difficult to decipher, is carefully controlled. Thanks to the creativity of Adam Brancato, Michael Modisett and Alex Tang, the manuscripts may soon be available online. A previous student project team designed a tagging system that allows transcribers to annotate text to identify information so it can be easily recognized by a computer. Brancato, Modisett and Tang extended that idea with their design of a comprehensive, flexible online resource that will provide scholars with faster, more efficient and more powerful access to these treasures. The system, which includes links to online resources, can be adapted for use by other art history archives around the world.

how they felt about the lessons they presented. Based on a survey they conducted of teachers, Justyn Garon, Edward Giarnese and Robert Skiba recommended that the museum focus more on hands-on activities and spend less time lecturing visiting students. They also suggested that the Education Centre add a guided tour of the tower to increase the educational value of the visit. Since the teachers said they learned about the center primarily from colleagues who'd been there, Garon, Gianese and Skiba suggested that the museum develop a database of schools to stimulate interest in the center and the tower.

A man with dark hair, wearing a blue button-down shirt and jeans, stands next to a blue, motorized, three-wheeled device (IBOT). The device has a large front wheel and two smaller rear wheels. It has a seat and handlebars. The man is leaning against the device. The background is a brick wall with windows on either side, covered with horizontal blinds. The lighting is warm, coming from the windows.

Leveling the Playing Field

Call it an advanced mobility device.

Call it a personal transportation system.

Call it the most sophisticated autonomous robotics system ever devised.

Just don't call it a wheelchair.

Balancing on two wheels, the IBOT, brainchild of Dean Kamen '73, has placed the energetic inventor face-to-face with President Clinton and carried him, step-by-step, to the top of the Eiffel Tower.

It's now ready to enable disabled people to do things and go places they never dreamed possible.

By Joan Killough-Miller

Photography by Patrick O'Connor

What if the whole world were handicapped accessible? What if a wheelchair could step over curbs, climb stairs and keep on rolling, no matter how rough the road? What if there were a wheelchair that could stand up and balance on two wheels like a person on two legs?

Dean Kamen is a master at turning "what ifs" into lucrative products. His previous inventions—which include a miniature infusion pump for diabetics and a portable kidney dialysis machine for home use—have made him a multimillionaire. Kamen entered WPI with the Class of 1973, but left before completing his degree. He was awarded an honorary doctor of engineering degree in 1992. His passion is finding ways to inspire American youth to pursue careers in science and engineering. To that end, he created a hands-on learning center called SEE (Science Enrichment Encounters) and a foundation called FIRST (For Inspiration and Recognition of Science and Technology), which sponsors a national robotics competition that teams professional engineers with high school students from around the country.

Nothing pleases Kamen more than putting his resources and the talent of his company, DEKA Research & Development Corp., behind a new pet project. So when Kamen was struck, one evening, by the sight of a young man in a wheelchair unable to get over a curb at a shopping mall, his mind would not let go of that injustice. Instead of changing the world, Kamen set out to rethink the chair.

A decade later, The Independence™ 3000 IBOT™ Transporter is undergoing FDA clinical trials. Its development has captured the attention of *USA Today*, *Scientific American*, *The Wall Street Journal*, and *NBC's Dateline*, as well as *Wired* and *InfoWorld*. Once approved, it will be marketed by Independence Technology, a Johnson & Johnson company that has been working in cooperation with DEKA, with a \$100 million investment from the health care giant. When the IBOT is rolled out—possibly later this year—it will open the door to new freedom for millions of wheelchair users and glide into a \$2 billion global market.

Although the concept of a chair on wheels is ancient, the basic design has changed little over the centuries. Most innovations in chair design have been spearheaded by users—in collaboration with their engineer friends. These advances include the first folding wheelchair in 1932, and chairs adapted for racing and basketball in the 1960s. Power-operated chairs are also benefiting from new materials and technology that make them lighter and more maneuverable. A few have been developed to scale curbs or boost the user to a standing elevation, but balance and weight become challenging considerations when an adult is raised to full height.

Kamen's IBOT doesn't just replace two legs with four wheels. It performs like the human body—using motors and wheels to do the work of muscle and bone, while a series of gyroscopes and electronic sensors carry out the advanced balance and positioning responses of the nervous system. Three Pentium-class processors act together as a brain, receiving up to 10,000 messages per second. To ensure the safety of their responses, two of the three processors must approve a given action. (Similar technology is "under the hood" of Kamen's recently unveiled Segway Human Transporter™. In fact, the IBOT code name, Fred, reveals its close relationship to the Segway, which was previously known only as Ginger or IT.)

On the ground, the IBOT doesn't look much different from the typical motorized chair. For all its high-tech powers, the IBOT is actually a bit smaller and narrower. What's revolutionary—figuratively and literally—is the action of the double set of rear wheels.

Three flights up by elevator at DEKA's Manchester, N.H., research facility is a secure-access laboratory code-named "Easy Street." It is actually a real-world chamber of horrors for a non-ambulatory person. Here, DEKA technicians and people with disabilities ranging from gunshot wounds to Parkinson's disease have pitted the IBOT against obstacles that would stop an ordinary wheelchair in its tracks.

Kamen is in his element as he demonstrates his creation, seated smugly atop this whirring mechanical throne. In Standard Function, he can do up to eight miles per hour—a moderate speed for runners. "I could have made it faster," he jokes, "but they wouldn't let me." With a touch of the arm-rest controls, he shifts into 4-wheel drive and cruises through pits of sand and gravel. Curbs, cobblestones—even a bumpy flagstone path—are no challenge for the IBOT.

As Kamen switches to Balance Function, one set of rear wheels tucks up over the other, elevating vertically challenged Kamen to a standing height of six feet. His single-axle stance looks as precarious as a unicycle rider's, but Kamen crosses his arms and challenges visitors—able bodied and wheelchair warriors alike—to knock him over.

For the grand finale, Kamen rides over to a flight of stairs and leans against the chair's backrest. In Stair Function, the IBOT backs up the stairs with the two sets of rear wheels rotating around each other. It looks perilous, but Kamen's seated figure remains steady as the wheels bump along. At the top of the stairs he pauses, then rolls down again, spreading his arms in a triumphant gesture, asking, "What else do you need to know?"

It looks like magic—and Kamen delights in telling observers that, technically, it is. The balance problem stymied him for some time, but the key to a solution came in a flash, when he slipped in the shower, then asked himself how he recovered without falling. The image of his spinning arms inspired the gyroscopic technology that balances the IBOT. It is programmed to mimic what the human does without thinking. For example, when the head gets too far ahead of the body, the feet instinctively shuffle forward to keep up.

"Magic" is about as technical as Kamen will get by way of an explanation of the IBOT's inner workings. His engineers—who include 11 WPI alumni—are guarded when answering questions about design details. Russ Beavis '94, who joined DEKA after graduation, worked on the IBOT project as a sub-system leader of the sensor design team. He says that secrecy during the design phase made him feel isolated from the rest of the company.

"The IBOT development group was always seen as a 'black hole' that engineers would enter but never leave," he says. "But on a more positive note, the IBOT development facilities have been compared favorably to James Bond's gadget gurus' labs. The excitement level has always been high." The challenge of integrating so many subsystems from the different engineering disciplines was great, but Beavis takes pride in knowing that the IBOT, like all of DEKA's products, will have such a profound effect on so many lives. "We never have to think about whether our products are valuable," he says.

The seeming insurmountable task of making a six-legged chair climb stairs fell to another WPI alumnus, Kurt Heinzmann '86. Heinzmann joined DEKA in 1992, after meeting Kamen during the first FIRST competition. Kamen hired Heinzmann away from WPI's MEAC (Manufacturing Engineering Applications Center), much to the chagrin of former president Jon C. Strauss. Heinzmann was the first engineer hired to work full time on the IBOT and has had a hand in all of the propulsion and control systems. Conquering the stair-climbing problems was a very creative, fun period in DEKA's history, he recalls.

"There are several possible approaches," Heinzmann elaborates. "One obvious one is some kind of anthropomorphic design—that is, something resembling the biological way of doing things, such as legs that articulate just like a human's. Then, of course, there are others that are more like a wheeled vehicle."

The chosen stair-climbing strategy also had to be easy for a wheelchair user to control. The perfect solution lay in a serendipitous side effect of the balance control scheme. "We had already figured out how to get the device to maintain balance on two wheels," says Heinzmann. "So one day we thought we'd try using the same scheme for rotating the whole cluster of wheels around each other, instead of just rotating the wheels that were in contact with the ground."

In stair mode, the IBOT responds the same way that it does in balance mode. If the rider leans back, the wheels rotate backwards to keep the point of contact under the center of mass. Lean forward, and the chair "walks" down the stairs. It takes a bit of practice, says Heinzmann, but it's not difficult to learn. "It's a lot less scary when you're in the seat than it looks to an observer," he says. "It's a very reassuring-feeling machine."

Making the IBOT safe for even the most fragile users was an unprecedented technical challenge. "This is, without a doubt, the most grueling project we've worked on," says Kamen. "In Balance Function, there's nothing between you and the road but software. Imagine your 80-year-old grandmother up there."

Although in demonstrations it looks like athletic Kamen is reaching back to pull the IBOT up the stairs, he notes that using the IBOT takes little strength or range of motion. An extremely weak or unstable user could have an attendant guide the chair from behind. "In assist mode, a 90-pound woman could get her 240-pound husband up the stairs, when properly trained," says Kamen. The durability of the IBOT has also been severely tested. "We've dropped it off curbs and down stairs and it doesn't bend. We just hose it down and move on," Kamen says. "Our goal was to build a machine that would go five years without any of the major systems needing replacement, and we've done that."

Future versions of the IBOT may offer head- and mouth-operated controls for quadriplegic users who cannot use hand controls, and a smaller, lighter model for children and small adults is in the works. A proprietary vendor is working on puncture-proof pneumatic tires, to alleviate the thorn in the side of all wheelchair users. Heinzmann and others on the team continue to work on design improvements to bring down the weight and cost.

Although 200 pounds may sound heavy to a manual chair user who is used to tossing her 26-pound Quickie ultralight chair into her car, Kamen contends that the IBOT's capabilities make its weight irrelevant. "What does your Buick weigh?" he counters. "You don't care, because you don't have to lift it. You don't carry the IBOT, it carries you. It lifts itself. It even puts itself away." Using the removable control panel as a remote, the IBOT could be commanded to climb a ramp into its user's van.

Price may be a bigger issue to consumers and funding sources such as private insurance and Medicaid. The IBOT's projected selling price of \$25,000 may seem high (manual

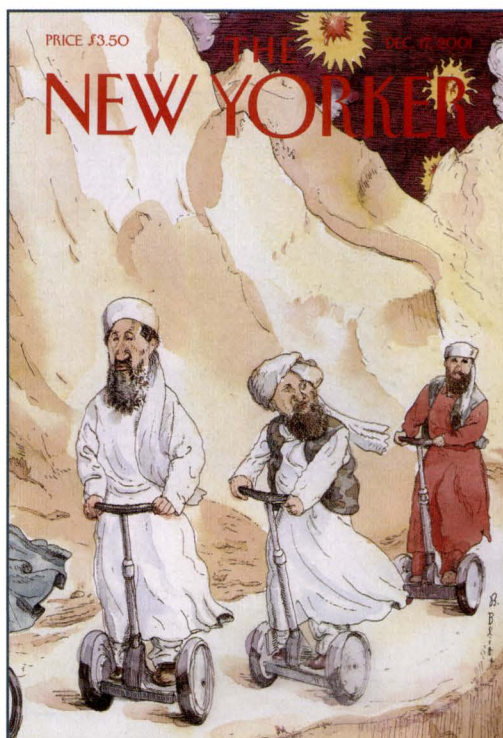
chairs start in the hundreds and motorized chairs in the thousands), but some highly specialized power chairs can cost up to \$20,000. The IBOT would save users the cost of renovating their homes to accommodate a standard wheelchair. But, given the sophistication of the technology, Kamen thinks the IBOT is a bargain. "You're looking at the most sophisticated autonomous robotics system in existence," he says. By comparison, an industrial robot capable of only a single task—such as painting parts on an assembly line—might have a price tag of \$2 million, he says. "Here is a Class III medical device that can carry a human payload over all conditions, and it will be on the market for one percent of the cost of a typical robot."

For a person who moves through the world seated at 39 inches, the ability to stand at adult height may be priceless. Kamen is succinct about the IBOT's most important ability. "If you're in a bar with friends, you're not looking at belt buckles," he says. "The hell with everything else—it's putting people at eye level that matters." It is this experience, of being tall again and approaching others face to face and eye to eye, that seems to be most moving to disabled people who have tested the IBOT.

Kamen registers no pity or sentimentality toward the people who will be helped by his invention. He fits perfectly the profile of inventors cast by journalist John Hockenberry, himself a paraplegic, who interviewed Kamen and test-drove the IBOT on a 1999 edition of NBC's *Dateline*. In his memoir, *Moving Violations: War Zones, Wheelchairs, and Declarations of Independence*, Hockenberry wrote, "Inventors weren't shy about disability, because they saw the physical details as an interesting problem in engineering. As long as the wheelchair said tragedy, everyone was inclined to stare and look away." By contrast, Hockenberry writes that his inventor friends saw his wheelchair as just another opportunity for applying ingenuity—"an uncharted reservoir" in the "vast ocean of unmet needs."

DEKA personnel will swiftly correct anyone who refers to the IBOT as a wheelchair. Johnson & Johnson promotes it as an "advanced mobility system." Kamen seems to relate to the IBOT as neither a medical device, a machine, nor a high-tech servant. He speaks of his invention almost as if it were a pal—a high-energy, fun-loving, high-living adventurer, not unlike himself. The IBOT often accompanies him on business travel. It has also been to Tokyo and Washington, D.C. Last year it went to the White House, where its owner received the National Medal of Technology.

It's not every wheelchair that sports a bumper sticker boasting that it climbed the Eiffel Tower. While in town for an international robotics expo, Kamen and the IBOT did some sightseeing, rode the Paris Metro and enjoyed an elegant dinner. At 2 a.m., neither Kamen nor IBOT were tired, so they went dancing at a French discotheque. Hours later, the IBOT was still rolling, but Kamen took it back to the hotel room to recharge. The IBOT's advanced nickel cadmium battery system



The revolutionary technology developed for the IBOT also gives the recently unveiled Segway Human Transporter, formerly known only as Ginger or IT, the ability to balance and respond to the rider's subtle movements. Months of speculation about Dean Kamen's latest invention and the national publicity accorded its launch have made the Segway an instantly recognized addition to popular culture, as this recent *New Yorker* cover makes clear.

(Cover illustration by Barry Blitt. Copyright © 2001 Condé Nast Publications. Reprinted by permission. All rights reserved.)

will run all day after 4–6 hours of charging. A lighter, cheaper, higher-capacity battery system that is now being explored at DEKA will likely spawn a new technology with much wider applications.

Scientific American cited Kamen's IBOT as one of only three examples of advanced robots that the public will be likely to see in real life, soon. Not content with conquering curbstones and staircase, Kamen is still consumed by the challenge of mimicking—and exceeding—the human organism's natural abilities. "Five years from today," he predicts, "you're going to see this machine on a basketball court. Five years from today this machine will outrun and outmaneuver and be more stable than a human being. It will surpass humans in every aspect of balancing ability."

But, one senses, it will never out-think Kamen. ■



Learn more about these and other stories in this issue at www.wpi.edu/~Transformations.

Her
Hitting

She's still

By Joan Killough-Miller

Photography by Patrick O'Connor

Christine Clifton has come a long way since she began her running career as a freshman at WPI in 1990. Back then she was a talented but undisciplined runner who once skipped a cross country meet to attend a party. **Today she is one of the nation's most promising long-distance racers.**



Five years ago, Christine Clifton (then Christine Junkermann) could hardly finish a marathon. She limped over the finish line of the 1996 Hartford Marathon with a time of 4 hours even. "God, I almost died," she later told *Runner's World* of her 26.2-mile ordeal. "It was all I could do to walk it in."

Last year, Clifton took the running world by surprise by taking seventh place in the women's division (the second American to finish) in the 2000 Lasalle Bank Chicago Marathon, with a time of 2:32:45. To put that in perspective, Joan Benoit Samuelson's 1985 course record (still the best women's marathon time on any North America race course) is only 11 minutes faster.

"A very impressive debut," said *American Track and Field* magazine. The *Chicago Sun-Times*, celebrating a comeback by American long-distance runners, proclaimed: "The one name on everybody's lips was Junkermann."

Today, Clifton is one of America's most promising long-distance runners, training under Dr. Gabriele Rosa, the legendary Italian coach who led Moses Tanui to victory in the 1991 Boston Marathon. Her performance in Chicago—the third-fastest women's marathon time for 2000, and one of the finest debuts by an American marathoner—meets the current Olympic qualifying standard.

Clifton, a Wyoming native who earned a bachelor's degree in chemistry at WPI in 1994, is genuinely awed—even giggly, at times—about her own success. At 29, she knows she's still young for a marathoner and is competing against women who have been running competitively since high school and college. She's also articulate and thoughtful about what it took for someone who didn't take running—or chemistry—very seriously in college to transform herself into an elite athlete with sights set on the world's biggest marathons and the 2004 summer Olympics in Athens.

Brian Savilonis, professor of mechanical engineering and coach of the men's and women's cross country teams, remembers a very different Christine Clifton trying out for track and cross-country as a freshman. "First day of cross-country," he says, "she could not believe we were going to run that far. In her first race she walked some and was far back. So it went through her freshman season, although she was actually running the 3.1-mile course and had earned a team spot by the end of the year."

Though she came to WPI with no cross-country or distance running background, Clifton had a strong high school track record and excelled in the 400- and 800-meter events.



Savilonis hoped that Clifton would make All-New England, but a lack of focus and an active social life hindered her success. The strain of balancing academics, track, work and parties—not necessarily in that order—left her too tired to keep up at big meets. "Then she went to a frat party rather than the NEW8 meet—a conflict that nearly tore our friendship apart," Savilonis says. "The team won the first NEW8 championship to be held, but she wasn't part of it."

After graduation Clifton joined Uniroyal Chemical and then began working toward a master's degree in chemical engineering at Yale. In 1997 she left to concentrate on running. "Somehow, I quit grad school even though I wasn't running that well," she admits. "My friends didn't tell me at the time, but everyone thought I was a little crazy." After a pause she adds, "But now they don't think I'm so crazy anymore."

The decision to abandon a promising career for a far-off dream was not difficult. "When I was in grad school I felt dumb and I didn't like it," Clifton says. "But when I ran, I felt great, I felt like I could do anything. At the time I really didn't know where it would take me. All I knew was that I felt great about running."

For a time, Clifton and her former husband, Mark Junkermann—a collegiate steeplechase champion and a two-time Olympic Trials qualifier—operated Marathon Sports in Brookline, Mass., and then Woodbridge Running Company, a specialty runner's shop in Connecticut. Christine worked part time in the store until it became clear that those hours were detracting from her racing. "It's hard to hold down a real job when you're running 70 to 100 miles a week, traveling to races—and trying to get in some naps!" she says. With Mark as her coach, she gave up working and dedicated herself to racing full time.

"Christine who?" was the question posed by sports journalists who saw Clifton emerge out of nowhere in the spring of 1999 and go on to become *New England Runner* magazine's Overall Female Runner of the Year. At the start of that season she was just beginning to gain some standing as a local runner on the south-central Connecticut circuit. Then came a series of spectacular races that transformed Clifton into a second-tier national-class racer with her own agent and sponsorship from Adidas. By shaving almost four minutes off her time on the 10K race—from a PB (personal best) of 37:25 down to 33:34—Clifton came within 14 seconds of the standard needed to qualify for the 2000 Olympic Trials. That year she outran Olympic medallist Joan Nesbit in another 10K race and

Although her contract with Adidas provided travel expenses to company-sponsored races, as well as all her running gear, racing full time meant just getting by. "I was racing for rent and groceries," Clifton laughs, explaining that depending on prize money for living expenses was more stressful than the races themselves. "My friends from WPI all have amazing careers," she says. "I'm sure they all own their own houses by now. In this country, it's only the people at the very top of my sport who make a great living at it."

The big break came in August 2000, when Clifton was selected as one of a first group of eight American long-distance runners to attend FILA Discovery USA, a high-altitude training camp at Mt. Laguna, in the mountains of southern California.

"Christine who?" was the question posed by sports journalists who saw Clifton emerge out of nowhere in the spring of 1999 and go on to become *New England Runner* magazine's Overall Female Runner of the Year.

clocked one of the nation's top five times on the half-marathon (13.1 miles), finishing in 1:13:35. At the 1999 New Haven 20K Road Race, she placed third in her division, finishing in 1:11:20.

One of the toughest hurdles for Clifton was learning to get out of her own way and let herself become the runner she was meant to be. A turning point came when she traveled to Korea in April 1999 as an alternate on the U.S. Ekiden team. For the first time she lived in close proximity to female champions. "While I was over there, I looked at all the other women and realized that they look just like me!" she says. "I could run the same pace they ran, I could do a workout with them, but they all were running much faster races than I had at that point.

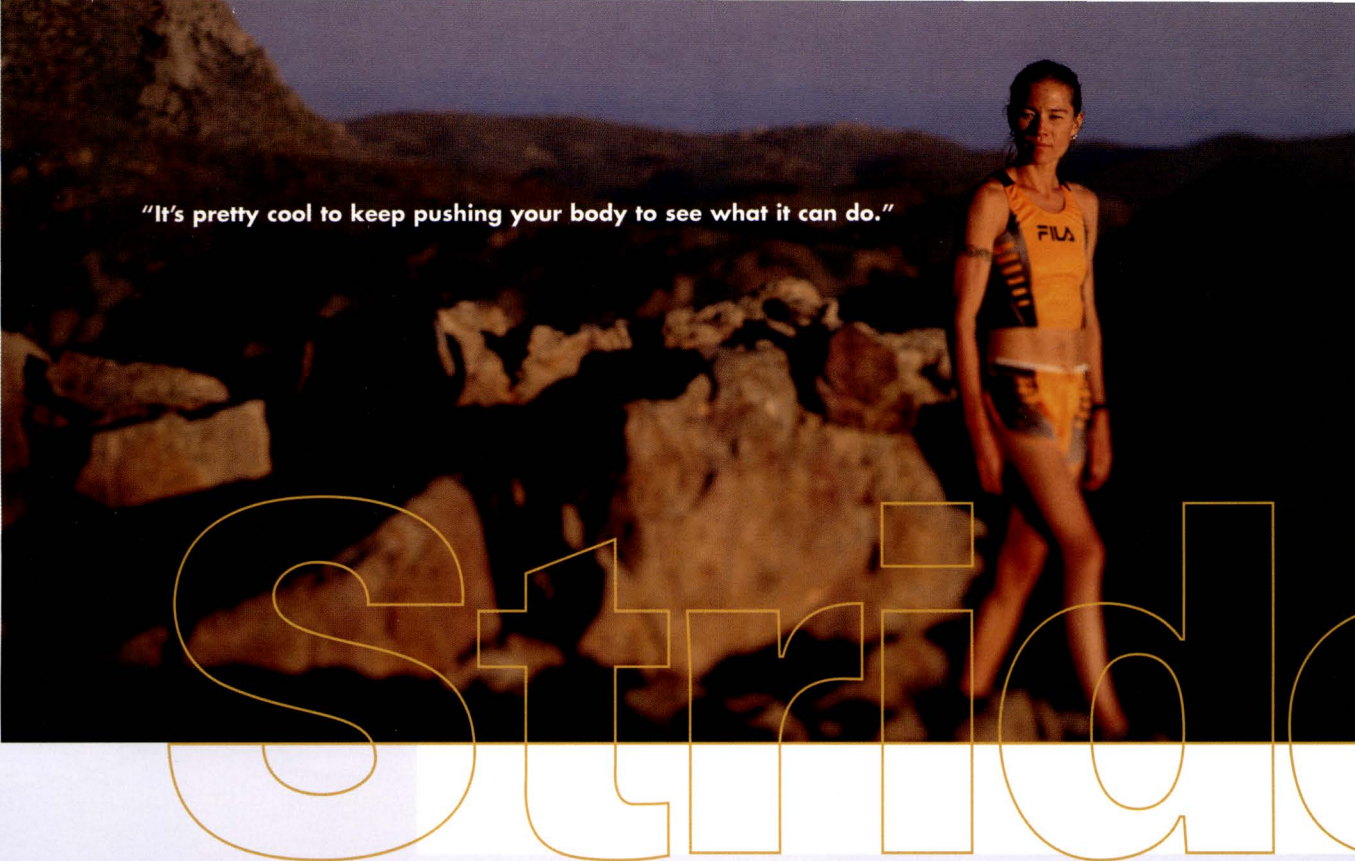
"It was after that trip, about two weeks later, that my 10K time came down to 35 minutes. I think I ran nine personal bests in a row over the summer. I think I just had to come to realize mentally that there wasn't anything different about these women. They were just ordinary people, working hard and doing exactly what I was doing. It was very hard for me to see myself as one of them. Once I got past that mental barrier, I could just let myself perform."

Discovery USA—like its counterpart programs in Kenya and Italy—aims to identify and nurture promising American athletes using the same techniques that Coach Rosa used to develop the raw talents of Elijah Lagat, Joseph Chebet and other East African runners who now dominate the international marathon scene.

Few American runners are given this opportunity to focus on intensive training, free from the pressures and distractions of ordinary life. The Discovery program's sponsor, sports manufacturer FILA, covers all expenses and provides a small stipend. The athletes—selected through extensive physiological and psychological testing, are provided with everything they need—individualized coaching, ample rest, and even massages.

Those grueling workouts—averaging 115 miles a week, on mountain roads—paid off, first at the 2000 Philadelphia Half-Marathon, where Clifton ran a PB of 1:13:23 (7th place), then in Chicago, where she was the first American 22 miles into the race, before exhaustion hit near the end of the course. After recovering from the Chicago Marathon ("It took my body a month and my mind even longer," she notes), Clifton was sent to Kenya to train with FILA's elite international athletes.





"It's pretty cool to keep pushing your body to see what it can do."

In Kenya, Clifton stayed at the home of Moses Tanui in Eldoret, and visited the various high-altitude camps established by Rosa and some of the African runners. Everywhere she went she was amazed by the beauty of the landscape and the passion and support for running shown by the Kenyan people. More than 2,000 children turned out for a local race, many barefoot, with some little girls racing in their best dresses. In their travels, the Discovery athletes were serenaded by local school children and treated to a feast of fresh mutton. The women were presented with handmade gifts, including feather headdresses, beaded neckpieces and shell-decorated halter-tops, and the group was honored with face painting and spear dancing ceremonies.

FILA also sent Clifton to train in St. Moritz in the Swiss Alps, where morning workouts took her to the snow line at 8,900 feet, and to Italy, where she competed in some local events. Her training partners included some of the top Kenyan women: Margaret Okayo, Alice Chlagat, Margaret Otodayong and Nora Moraga.

The spring season brought unexpected challenges for Clifton, including an allergy to the Italian version of ragweed. Blood tests revealed that an infection—possibly a virus or parasite she contracted abroad—was compromising her performance. Although she did not feel sick, Clifton was forced to forgo several promising races until her fitness level improved. She was selected to represent the United States in the women's marathon at the 2001 World Track and Field Championships in Edmonton, Canada, but withdrew from the team to focus her energies on upcoming competitions.

On Labor Day 2001, a faster, stronger, more confident Christine Clifton returned to Connecticut, where her dream began, to run the New Haven 20K Road Race. She placed second in the women's division with a 1:08:24 PB, beating her 1999 record by almost three minutes. Her fine showing is even more noteworthy since this year's 20K also served as the National Championship event for USA Track & Field, the sport's national governing body.

On Nov. 4, Clifton attempted the New York City Marathon, the USATF's National Marathon Championship, but dropped out at the 12-mile mark due to a severe chest cold. If all goes well, watch for her this spring in the elite line-up for the Boston or the London marathon.

Coach Savilonis, who has stayed in touch with Clifton since graduation, has watched her career with pride. "Her progress at WPI was large, although not noticeable to the outside world," he says. "She may not remember running the 5K in 26 minutes as a freshman, then 19 minutes as a senior. She was indeed driven and wanted to put everything into the sport. It just took her a while to put it together."

"I feel like I'm living my dream life right now," Clifton says. "I can go out and run six miles in a row faster than I could run a mile in college. My personal best for a mile at WPI was 5 minutes, 24 seconds, and in New Haven this year, I averaged 5:30 for more than 12 miles. It's pretty cool to keep pushing your body to see what it can do." ■

A full-page photograph of a man in a dark suit and patterned tie, standing outdoors. He is holding a red gas can with a white nozzle in his left hand. In the background, a white car is blurred, suggesting motion. A street lamp and some trees are also visible.

In 1989, two scientists at Unocal Corp. found a way to make cleaner-

chief patent counsel, protected their discovery with a patent. That might
beginning of a long, bitter court battle that would pit one company

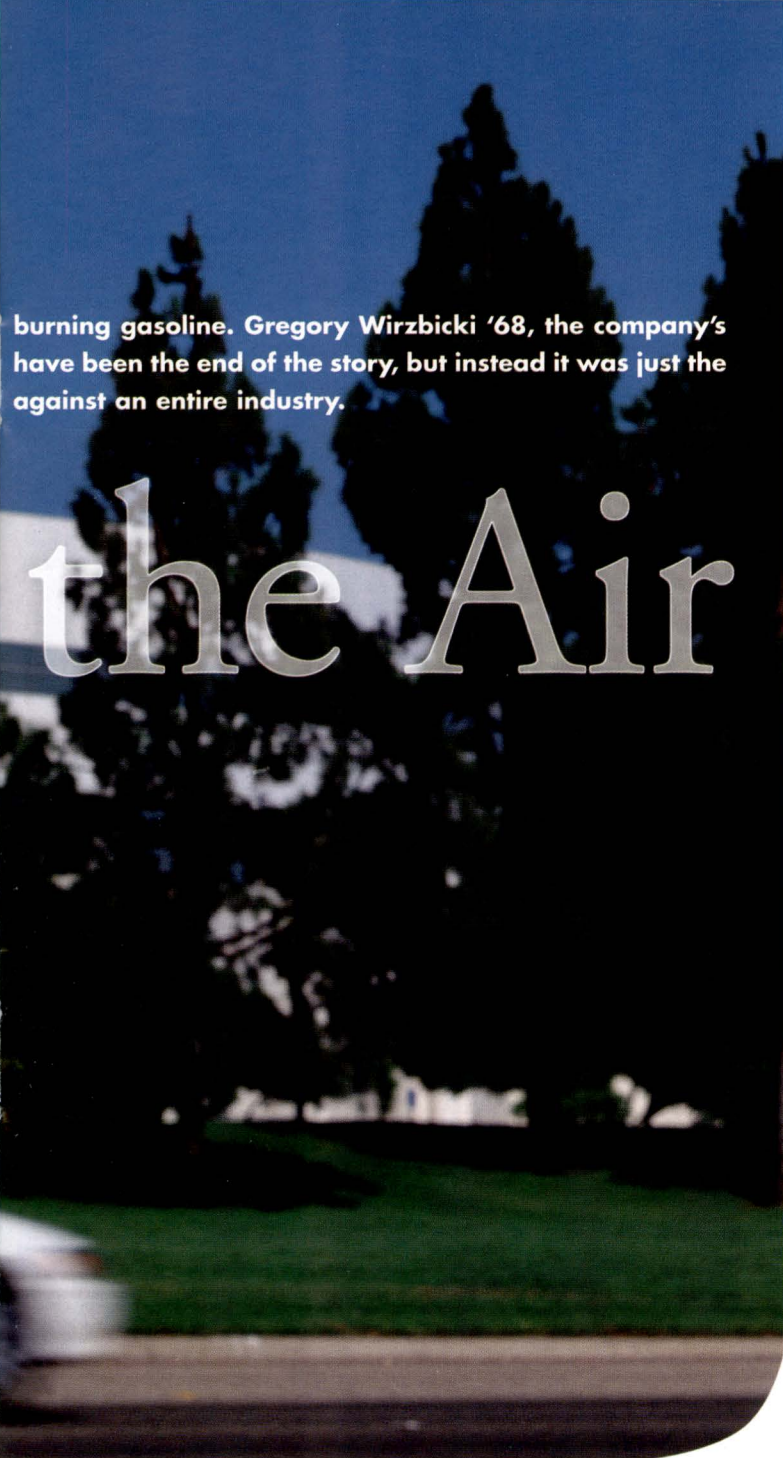
Clearing

He arrived in California in 1968 with his freshly earned WPI bachelor's degree in chemical engineering and a desire to make a new start. A native of Hartford, Conn., Greg Wirzbicki had decided, after two decades of New England winters, to relocate someplace where nearly every day brings beach weather.

As he traveled about the Southern California Basin, he saw the bright California sun filtered through a brown haze that stung the eyes and irritated the throat. The government was also paying attention to those brown skies. Air pollution in Los Angeles was a known problem as far back as the 1940s. California, which consumes about a third of the nation's gasoline, passed its first bill limiting tailpipe emissions in 1959. A decade later, Congress enacted the Clean Air Act of 1970, the first national law to take serious aim at pollution from automobiles.

By Michael W. Dorsey

Photography by Patrick O'Connor



burning gasoline. Gregory Wirzbicki '68, the company's
have been the end of the story, but instead it was just the
against an entire industry.

the Air

There are two basic ways to curb auto emissions: (1) build engines that burn fuel more completely—or equip them with devices that treat pollutants before they enter the air; and (2) produce fuels that pollute less when they're burned. Federal and state legislation took both of these approaches (mandating catalytic converters, for example, and banning leaded gas). But as time went on, attention increasingly focused on finding cleaner-burning fuels.

Wirzbicki didn't know it, but in a few years his career would take a sharp turn that would place him in the thick of the race to clean the air. It was a race that would begin in the research laboratory, but move quickly into the courts, blossoming into one of the largest and most fiercely waged legal battles ever fought over intellectual property in this country.

It was serendipity that brought Wirzbicki to his present position as chief patent counsel for Union Oil Co. of California, the operating subsidiary of Unocal Corp. While working as a water treatment chemist at Southern California Edison, he decided to enroll in an evening business program. Finding the classes full, he learned that Loyola University in Los Angeles had openings in its evening law program.

In 1972 he received his Juris Doctor and passed the California bar. Less than two years later, a job as a patent attorney opened at Unocal, and Wirzbicki opted for a career change. "It was a big week for me," he says. "I got a new job, I bought a house and I got married."

In Unocal's legal offices, he waded into patents for new polymers, catalysts for refining crude oil, and geothermal energy, among other areas. "I got to work with some really brilliant scientists," he says. "I enjoyed being able to take what they had discovered and protect it with patents."

Among those brilliant scientists were Peter Jessup and Michael Croudace, chemists whose specialty is the chemical formulation of gasoline. In 1989 they made a research proposal on behalf of Unocal to a coalition of 14 oil companies and the Big Three automakers, which had agreed to work together to look for ways to reduce auto emissions.

The impetus for this unprecedented collaboration was uncertainty over new Clean Air Act amendments that were taking form in Congress. There were strong indications that the new act would call for serious reductions in hydrocarbons and toxics in auto emissions, leaving oil companies little alternative but to switch from selling gasoline to making non-petroleum fuels, such as natural gas and ethanol.

The Auto/Oil Group, as it came to be known, decided to jointly sponsor research to look for new gasoline formulations that would create fewer pollutants. They hoped to show that reformulated gasolines, or RFGs, could begin to clean the air immediately, since they can be burned in existing vehicles and can be made with only modest changes to refineries.

Gasoline is a complex blend of hydrocarbons that interact to create an array of physical properties. The first question the Auto/Oil Group needed to answer was which of these many components and properties were worth studying. The answer could have a significant impact on the complexity and cost of the research.

"Jessup and Croudace brought the group a proposal to do an initial screening of 10 parameters to see which were the bad guys and which were the good guys," Wirzbicki says. "Their proposal was rejected. The consortium decided instead to run just four of those parameters."

Fearing that important relationships might be missed, Croudace and Jessup convinced Unocal to let them run independent research on all 10 parameters: aromatics, olefins, paraffins, MBTE (methyl tertiary-butyl ether, an oxygenate that helps fuel burn more completely), T10, T50 and T90

(the 10, 50 and 90 percent distillation points, or the temperatures at which 10, 50 and 90 percent of the fuel would evaporate), Reid Vapor Pressure (the vapor pressure of a gasoline at 100 degrees Fahrenheit), research octane, and motor octane. Conducting research independent of the consortium group was permitted by the joint study agreement all the participants had signed, Wirzbicki notes.

The two Unocal scientists blended 15 combinations of ingredients and burned them in a test vehicle. They found that two properties, T50 and Reid Vapor Pressure, were the primary means to controlling tailpipe emissions. Research octane number, olefin content, paraffin content, T10 and T90 also had important effects. Of these seven characteristics, only two (olefins and T90) were among the parameters included in the Auto/Oil Group study. None of the characteristics the consortium chose to investigate in its four-parameter study were found to have a primary effect on emissions in the Unocal studies.

After an independent research laboratory verified their results, the Unocal scientists were confident they had discovered keys to producing clean-burning gasoline. It was a major breakthrough with great commercial potential. They brought their discovery to Wirzbicki, who was by then the company's chief patent counsel.

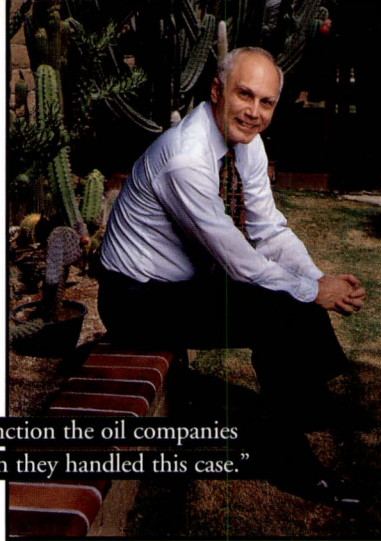
Wirzbicki began work on what would be the first of five patent applications he would file with the U.S. Patent Office over the subsequent decade to protect the work of Jessup and Croudace. While the application worked its way through the Patent Office, Unocal shared its research results with the Auto/Oil Group and with the California Air Resources Board (CARB), which was developing new clean air regulations.

"Unocal felt it was important to tell CARB about our data," Wirzbicki says. "Jessup and Croudace wanted the government to have the best data available and to reach its own conclusions as to what to do with it. But more important, Unocal was among the parties that were most interested in having the regulations be as flexible as possible."

In 1991, CARB issued its Phase 2 RFG rules, which called for oil companies to begin making RFG by March 1, 1996, and to sell only RFG after June 1 of that year. Unocal received U.S. Patent No. 5,288,393 on Feb. 22, 1994. The patent covered the combinations of factors that Jessup and Croudace had found to impact auto emissions, as well as many fuels that might be blended to achieve those factors—automotive gasolines that would meet the new CARB regulations.

The following January, the company announced it would soon begin licensing its protected formulations to other companies. In the legal offices of the nations' largest oil companies, the wheels began turning.

"The judge was seeking to sanction the oil companies for the vexatious way in which they handled this case."



In mid-April 1995, just before Unocal's licensing program was set to begin, Atlantic Richfield, Chevron, Exxon, Mobil, Shell and Texaco sued Unocal in U.S. District Court, asking that its RFG patent be declared

invalid. They argued that the claims in the patent were based on prior art (for example, that the formulations resulting from the claims resembled certain aviation and racing fuels) and obvious to one skilled in the field.

They suggested that Unocal had usurped the CARB regulatory process for its own gain because the company had narrowed the claims of the patent after the CARB regulations were released with the result that the claims "resembled" the regulations. And, they claimed that the patent was unenforceable due to "inequitable conduct" in the way Unocal had prosecuted the patent application before the patent examiner. In response, Unocal countersued, arguing that the plaintiffs (which by then were all selling RFGs to meet the CARB regulations) had infringed its patent, and were continuing to do so.

Unocal, represented by the Minneapolis-based law firm of Robins, Kaplan, Miller and Ciresi, would successfully refute all of these claims in a trial that began in July 1997. For example, Unocal demonstrated that the claims in its patent were novel and not obvious to a skilled scientist in the field. The company also addressed head-on its prosecution of its patent application and its relationship to the CARB regulations.

Wirzbicki says he filed the first patent application 11 months before CARB issued its Phase 2 regulations. During the patent prosecution, the company kept the examiner in the U.S. Patent Office apprised of those regulations. He also notes that the amendments made during prosecution narrowed the claims, so that the resulting patent actually covered fewer potential gasoline blends than the original application.

The court also learned that the other oil companies became aware of the Unocal patent a month after it was awarded, but none asked CARB to reconsider its regulations. "Instead," Wirzbicki says, "they sued us to break the patent."

In October 1997, the jury decided that the Unocal patent was valid and that the other oil companies had infringed it. A month later, it said that Unocal was entitled to damages of 5 ¾ cents for each of the 1.2 billion gallons of RFG the plaintiffs had already sold (about 29 percent of their California RFG output between March 1, 1996, and July 31, 1996), for a total award of \$69 million. The following year the presiding judge, Kim McLane Wardlaw, ruled that there was no inequitable conduct and that Unocal had acted properly and with good faith during the patent filing and prosecution process.

Wirzbicki notes that Judge Wardlaw also ordered the plaintiffs to pay nearly \$1.5 million in legal fees to Unocal. "Assessing legal fees in patent cases is done only in exceptional cases," he says. "The judge was seeking to sanction the oil companies for the vexatious way in which they handled this case. One of the things she specifically pointed to was the fact that they had tried to influence her and the jury to believe that we hadn't told the patent office about the CARB specifications, when, in fact, the record was extremely clear on that."

By the time the case ended, the company had won two more patents, covering other aspects of the original research of Jessup and Croudace. Another would be received in November 1998; the last of the five patents for which Wirzbicki had written applications was awarded in early 2000. The additional patents covered more gasoline formulations and methods for burning the fuels to reduce pollutants, delivering and dispensing them, and blending them in refineries.

In December 1998, Unocal again wrote to major refiners and offered to discuss licensing. Instead, the other companies headed back to court, this time to file an appeal of the District Court's ruling in the U.S. Court of Appeals for the Federal Circuit in Washington, D.C.

Among other allegations, the appeal asserted that the claims in Unocal's initial patent were too broad to be patented, potentially covering every gallon of gas refiners must make during the summer months under California's regulations.

in a patent. The Patent Office rejected the request to re-examine the fourth patent, but decided to re-examine the first.

In March, ExxonMobil (the companies merged in 1998) asked the Federal Trade Commission to investigate the Unocal patents, claiming the company engaged in anticompetitive practices in patenting the results of its RFG research. ExxonMobil and CARB officials allege that Unocal attempted to deceive CARB about its research and patent application to gain a monopoly on the sale of RFGs. ("This is one of the claims that resulted in the assessment of legal fees," Wirzbicki says.) The FTC investigation is ongoing.

In the meantime, Unocal, which no longer sells gasoline, having sold its refineries and gas stations in 1997, is reaping the rewards of the discoveries of Jessup and Croudace. In October 2001, the U.S. District Court of Los Angeles granted Unocal's motion for summary judgment requesting an accounting of infringement against its first patent by the plaintiffs. The motion covers the period Aug. 1, 1996, to Dec. 31, 2000. The company had already received the \$69 million (which grew to \$91 million with interest and attorneys' fees) awarded it by the court.

The company has licensed all five of its patents to oil companies not participating in the litigation. To date, none of the original plaintiffs has signed a license with Unocal. In public statements, the company says it estimates that its patents will add less than one cent to the cost of reformulated gasoline sold nationwide (or about \$10 per year per consumer).

"The real story from my point of view is these two inventors. They were seriously concerned that Auto/Oil was going the wrong way; that they wouldn't find out what the bad guys in gasoline were. The inventors thought they had a better idea. That is the name of the game when it comes to invention."

After the appeals court affirmed the lower court's ruling in March 2000, the plaintiffs filed a petition to have the case considered by the U.S. Supreme Court. Friend of the court briefs were filed on behalf of the plaintiffs by 34 state attorneys general and several industry organizations.

"The content of the amicus briefs showed a lack of understanding of the facts of the case," says David Beehler, one of the attorneys with Robins, Kaplan, Miller and Ciresi who represented Unocal at trial. "They were renewing claims that Unocal had tried to improperly influence the regulatory system, when that wasn't even part of the appeal."

In an opinion joined by two Patent Office officials, the U.S. Solicitor General recommended that the court reject the case, and within a month, the petition was denied. Ordinarily, a judgment by the Supreme Court signals the end of the road for a court battle, but the plaintiffs in this case had not yet exhausted their options.

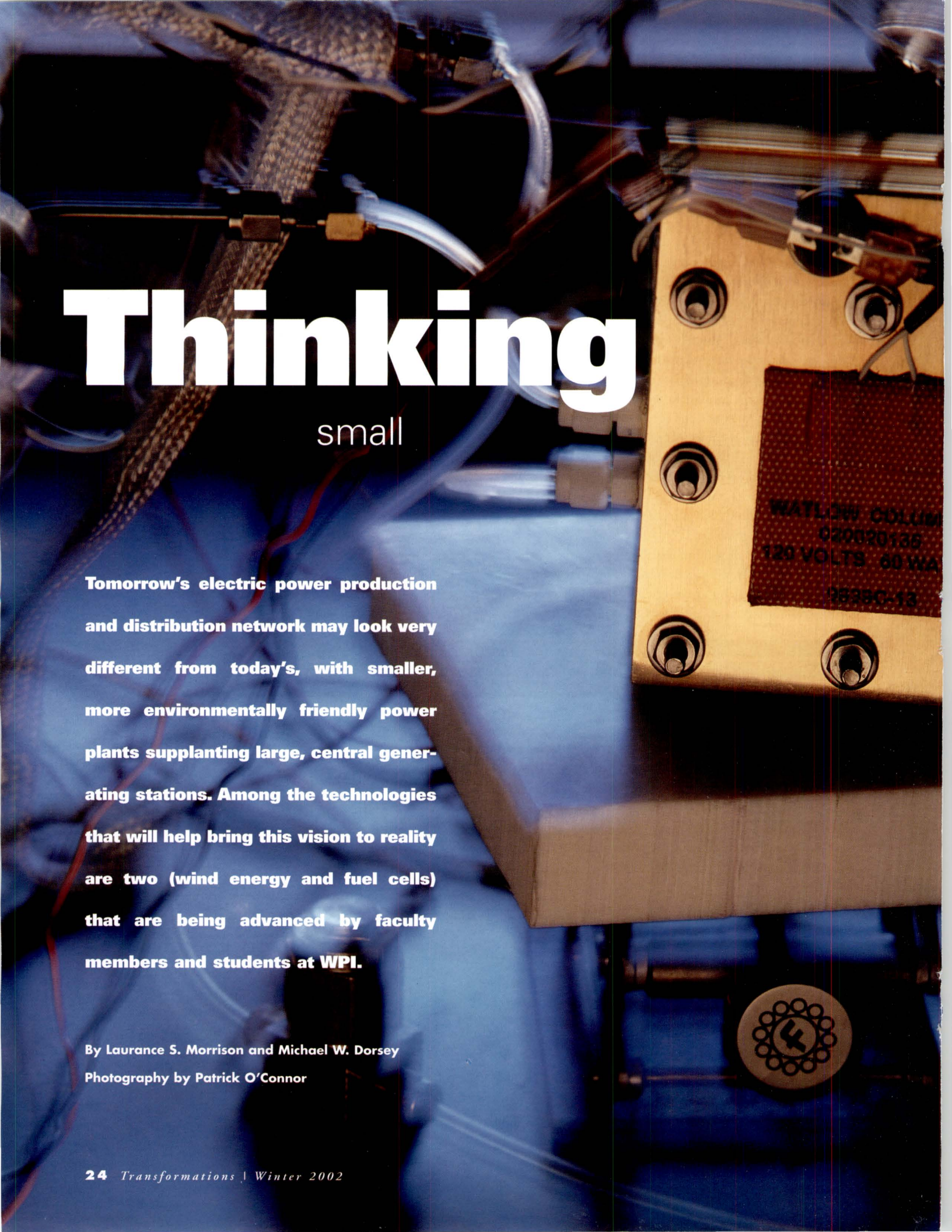
After the high court ruling, the oil companies that sued Unocal petitioned the U.S. Patent Office to re-examine Unocal's first RFG patent. (An unnamed party requested a re-examination of the fourth patent.) Current U.S. patent law entitles anyone at any time to file a request for re-examination of any claim

The file cabinets in Wirzbicki's office bulge with 10 years worth of news stories about Unocal's patent trial, most of which, he says, miss two important points.

"The real story from my point of view," he says, "is these two inventors. They were concerned that Auto/Oil wouldn't find out what the bad guys in gasoline were. They thought they had a better idea. That is the name of the game when it comes to invention. Yes, the cost of gasoline may have gone up slightly because of our patent, but every meritorious invention ends up costing the consumer at some point."

The other point is the one that Wirzbicki sees every day from his office window. In short, the brown skies are gone. The work of Unocal's scientists and the cooperative efforts of government and industry to make the widespread use of reformulated gasoline a reality have paid off in substantially cleaner air.

"From 1976 to 1989, there were at least 150 days each year in the Southern California Basin that exceeded the one-hour federal ozone air quality standard," he says. "By 1998, that was down to 65 days—a decrease of more than half. California says its Phase 2 regulations have been enormously successful. And after all, that's what this was all about to begin with." ■

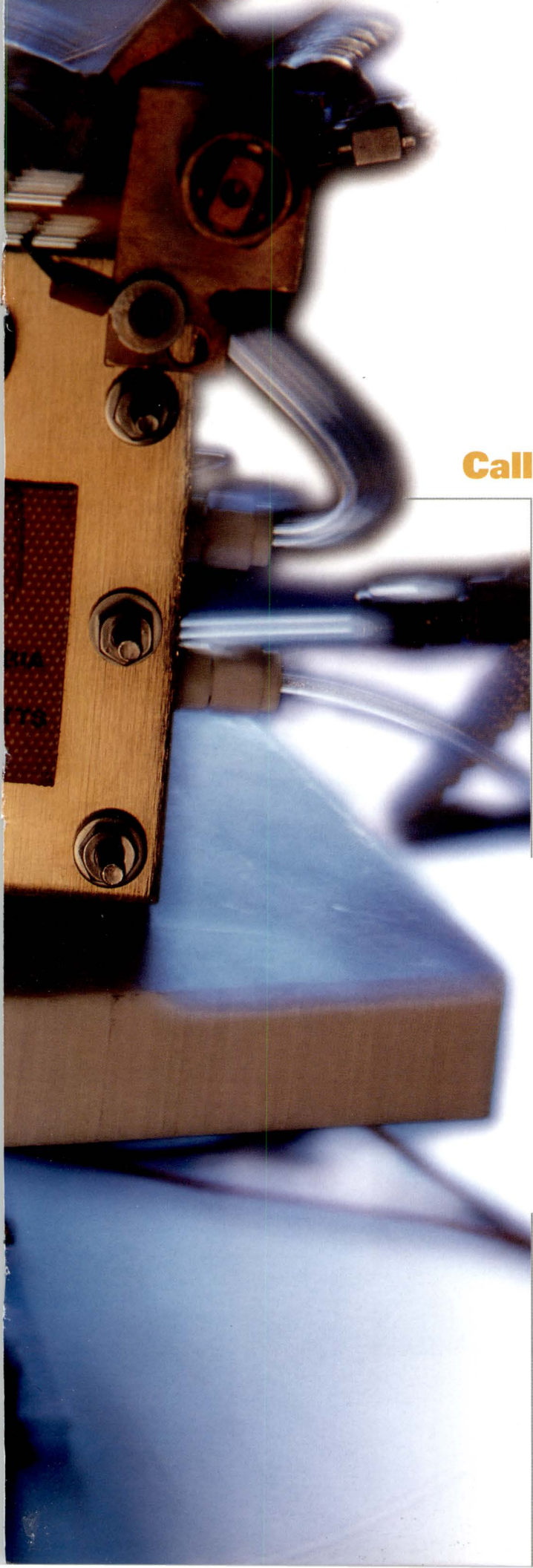


Thinking

small

Tomorrow's electric power production and distribution network may look very different from today's, with smaller, more environmentally friendly power plants supplanting large, central generating stations. Among the technologies that will help bring this vision to reality are two (wind energy and fuel cells) that are being advanced by faculty members and students at WPI.

By Laurance S. Morrison and Michael W. Dorsey
Photography by Patrick O'Connor



Call it a micro-revolution.

For over a century, electric power systems have been designed for economies of scale, with large fossil-fuel or nuclear generating plants producing electricity and delivering it through far-flung grids of transmission lines to homes and businesses many miles away. It's a system that has worked reasonably well through the years, despite its vulnerability to natural events, technological glitches and acts of terrorism.

But as the Information Age has made every aspect of modern society increasingly dependent on highly reliable supplies of electric power, as consumers have grown increasingly reluctant to support energy policies that tax the environment, finite natural resources or human health, and as recent power crises, like those in California, have made clear the complexities of managing vast interconnected power networks, a new paradigm of energy production and distribution has begun to emerge.

In this new model, power generation is dispersed, with smaller, more environmentally friendly sources of electricity located closer to where the power is needed. Sophisticated networks monitored by high-tech sensors and intelligent agents control the flow of watts and account for the movement of dollars in this "smart" energy marketplace.

One of the advocates for this new model is the Electric Power Research Institute, the electric power industry's own research and development think tank. A story in the July 2001 issue of *Wired* magazine notes that EPRI envisions smarter energy networks that "will incorporate a diversified pool of resources located closer to the consumer, pumping out low- or even zero-emission power in backyards, driveways, down-scaled local power stations, and even in automobiles, while giving electricity users the option to become energy vendors."

◀ A prototype for a new proton-exchange membrane fuel cell sits on the lab bench in the WPI Fuel Cell Center.

The new focus on smaller and cleaner sources of electric power has placed a spotlight on alternative electric power generation technologies, including two (wind turbines and fuel cells) that are the focus of research and student project work at WPI.

Stephen W. Pierson, associate professor of physics and a theoretical physicist specializing in condensed matter, has been doing research on wind power, largely through several student projects exploring one of the oldest forms of small-scale power generation. Fundamental research under way in WPI's Fuel Cell Center, a university-industry alliance headed by Ravindra Datta, professor and head of the Chemical Engineering Department, is putting research teams of graduate students and undergraduates to work to advance the state of the art in fuel cells, which are creating quite a buzz in the electric arena.

Pierson's and Datta's separate but ultimately related research pursuits typify the curiosity, fundamental research, teamwork and practicality—and sense of social responsibility—that make special the WPI brand of education. Think of it as the power of curiosity.

"Engineers," Datta says, "can assist society in improving the standard and quality of life here and in the rest of the world. Energy offers special opportunities because the planet is operating on a course that will eventually deplete the known fossil fuel resources, perhaps even in the next 50 years."

As living conditions improve and the earth's population burgeons, the result will be ever-higher energy consumption. The scenario cries out for a reasoned and sustainable plan of action, Datta says.

WPI students can help write that plan through graduate research and, at the undergraduate level, through their required projects. The Interactive Project thrusts students into practical problems that lie at the intersection of science and technology. In typically three-member teams, they work toward solutions.

"This isn't textbook work," notes Pierson, who has advised 28 Interactive Projects on topics ranging from Worcester traffic to the Iraqi missile program. **"We talk, we analyze, we question, we test the quality of the data, we press for strong spoken and written communications. We isolate the careless generalization, point out the unsubstantiated conclusion, and expect precision in each project."**

Helping students achieve those outcomes is a fine art, Datta says. "We must know when to provide guidance to a student and when to hold back. Especially with graduate students, we find that after they finish their course work and are pursuing their research, they soon wind up knowing more about their chosen topics than we do. And they are thinking independently. This is good. In fact, we learn along with them, and the relationship blossoms from teacher-student to colleagues. To be a good teacher, you first have to be a good student."

Blowing in the Wind

Acknowledging that a sustained investigation of wind energy as a practical energy resource lies some distance from his work in condensed matter, Pierson, shrugging contentedly, explains that he hails from North Dakota, "the windiest state. I've long had an interest in energy issues and challenges, and I've been looking to make my research more socially relevant."

Wind turbines currently generate less than 1 percent of the electricity consumed in the United States (compared with about 80 percent for coal, oil and natural gas), or about 3,500 megawatts per year. That output has been steadily rising as the cost of generating electricity with the wind has continued to drop and as utilities have come to see this once fringe energy source as a viable alternative to conventional power plants.

"Wind, under the right circumstances, can be cheaper than coal," Pierson explains, "and wind is inexhaustible."

He says that there are three central factors that can turn wind generation into a competitor for electricity produced with coal and natural gas. "The wind must be sufficiently strong and sustained," he says. "The turbines should be grouped in large farms to reap the benefits of the economy of scale. And the developer should take advantage of the federal governments' Production Tax Credit."

While wind turbines consume no fuel and produce no pollutants, they are not without environmental impacts. Some communities have objected to wind farms within their boundaries because of the visual impact of the tall turbines and because of the noise they make. Design refinements have reduced the noise produced by turbine blades and care taken in the design of farms can often reduce aesthetic concerns.

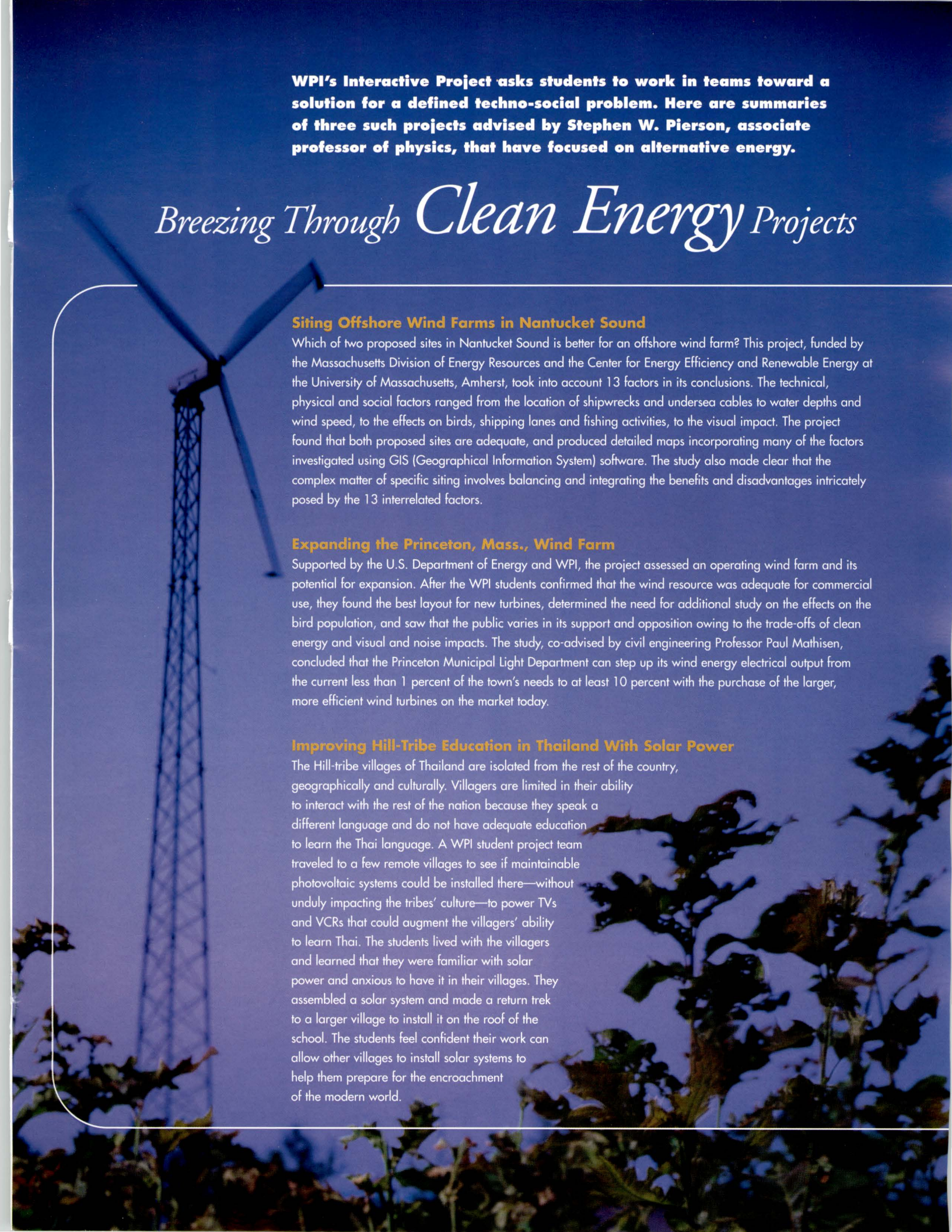
Wind farms also need to be close to transmission lines and power grids. The need for more transmission line capacity, he noted, has made odd allies of coal interests and the wind farm industry, which rallies under the American Wind

Energy Association.

Not yet mainstream in the United States, wind energy (the fastest growing reusable energy source worldwide) is meeting less than 1 percent of the electricity needs of Princeton, Mass., several miles north of the WPI campus. New England's largest wind farm is situated in Vermont, and by the scale of many European installations it is modest in size and output.



Stephen Pierson



WPI's Interactive Project asks students to work in teams toward a solution for a defined techno-social problem. Here are summaries of three such projects advised by Stephen W. Pierson, associate professor of physics, that have focused on alternative energy.

Breezing Through Clean Energy Projects

Siting Offshore Wind Farms in Nantucket Sound

Which of two proposed sites in Nantucket Sound is better for an offshore wind farm? This project, funded by the Massachusetts Division of Energy Resources and the Center for Energy Efficiency and Renewable Energy at the University of Massachusetts, Amherst, took into account 13 factors in its conclusions. The technical, physical and social factors ranged from the location of shipwrecks and undersea cables to water depths and wind speed, to the effects on birds, shipping lanes and fishing activities, to the visual impact. The project found that both proposed sites are adequate, and produced detailed maps incorporating many of the factors investigated using GIS (Geographical Information System) software. The study also made clear that the complex matter of specific siting involves balancing and integrating the benefits and disadvantages intricately posed by the 13 interrelated factors.

Expanding the Princeton, Mass., Wind Farm

Supported by the U.S. Department of Energy and WPI, the project assessed an operating wind farm and its potential for expansion. After the WPI students confirmed that the wind resource was adequate for commercial use, they found the best layout for new turbines, determined the need for additional study on the effects on the bird population, and saw that the public varies in its support and opposition owing to the trade-offs of clean energy and visual and noise impacts. The study, co-advised by civil engineering Professor Paul Mathisen, concluded that the Princeton Municipal Light Department can step up its wind energy electrical output from the current less than 1 percent of the town's needs to at least 10 percent with the purchase of the larger, more efficient wind turbines on the market today.

Improving Hill-Tribe Education in Thailand With Solar Power

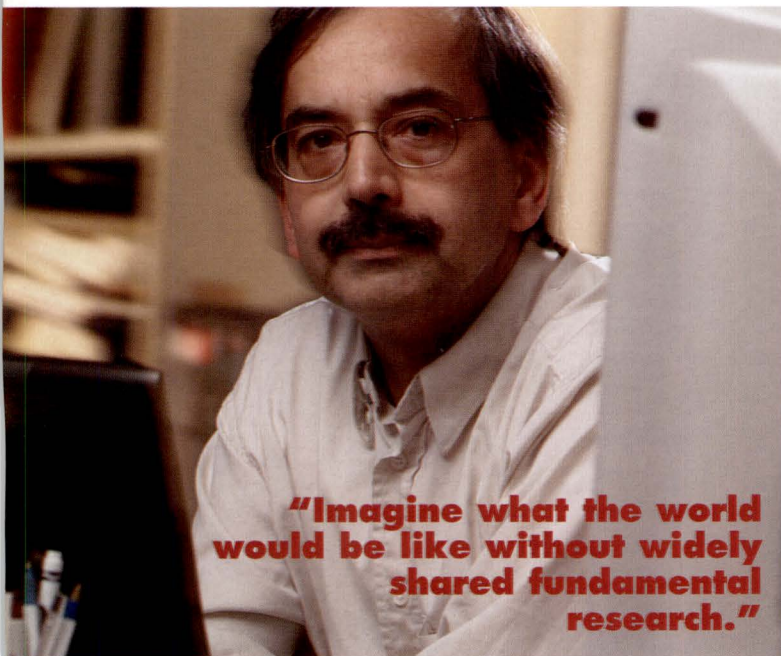
The Hill-tribe villages of Thailand are isolated from the rest of the country, geographically and culturally. Villagers are limited in their ability to interact with the rest of the nation because they speak a different language and do not have adequate education to learn the Thai language. A WPI student project team traveled to a few remote villages to see if maintainable photovoltaic systems could be installed there—without unduly impacting the tribes' culture—to power TVs and VCRs that could augment the villagers' ability to learn Thai. The students lived with the villagers and learned that they were familiar with solar power and anxious to have it in their villages. They assembled a solar system and made a return trek to a larger village to install it on the roof of the school. The students feel confident their work can allow other villages to install solar systems to help them prepare for the encroachment of the modern world.

Pierson will soon begin a year's sabbatical during which he expects to pursue public affairs issues for the prestigious American Physical Society. The direction of his sabbatical underlines the bedrock WPI idea of the integration of technology and social consequences.

Last year, in an op-ed piece published in the *Worcester Telegram & Gazette*, he spelled out causes for concern, as he saw them, in the shape of the proposed federal energy policy and direction of climate change.

Citing conclusions of the Union of Concerned Scientists, in Cambridge, Mass., where he has served as a visiting scientist, Pierson listed "the gravest consequences of global warming as more extreme weather events, a faster rise of sea level, and more heat waves and droughts that lead to more heat-related illnesses and deaths."

The choice is clear. He wrote, "With options that could save us money, reduce carbon dioxide emissions, and address the other limitations of fossil fuels, why wouldn't we pursue them?"



Ravindra Datta

Making Fuel Cells Practical

Fuel cells convert fuel directly, efficiently and continuously into electricity through electrochemical reactions. Long used as a power source in spacecraft and military vehicles, they are increasingly being eyed as a future source of clean power for homes, businesses and automobiles. They are also frequently cited as a key technology for realizing the vision of tomorrow's distributed power system. It has been estimated that the market for fuel cells could reach \$1 billion by 2006.

Most fuel cells use hydrogen as a fuel. The hydrogen splits into protons and electrons on the anode catalyst, typically platinum. The protons pass through a membrane and combine

with electrons from oxygen to generate electricity and water. Because they produce extremely clean energy and are twice as fuel-efficient as conventional internal combustion engines, fuel cells are of great interest to automobile makers. In fact, virtually every major car producer has a significant research program focused on fuel cells, and forecasters predict that cars powered by fuel cells could be available to consumers by the end of the decade.

Today's fuel cells tend to be bulky and expensive. And until there are hydrogen filling stations in every town, putting hydrogen-based fuel cells in cars and other consumer applications may not be practical. That is why a number of researchers, including Datta, are studying fuel cells that use other fuels or that can locally convert more conventional fuels into hydrogen suitable for fuel cells.

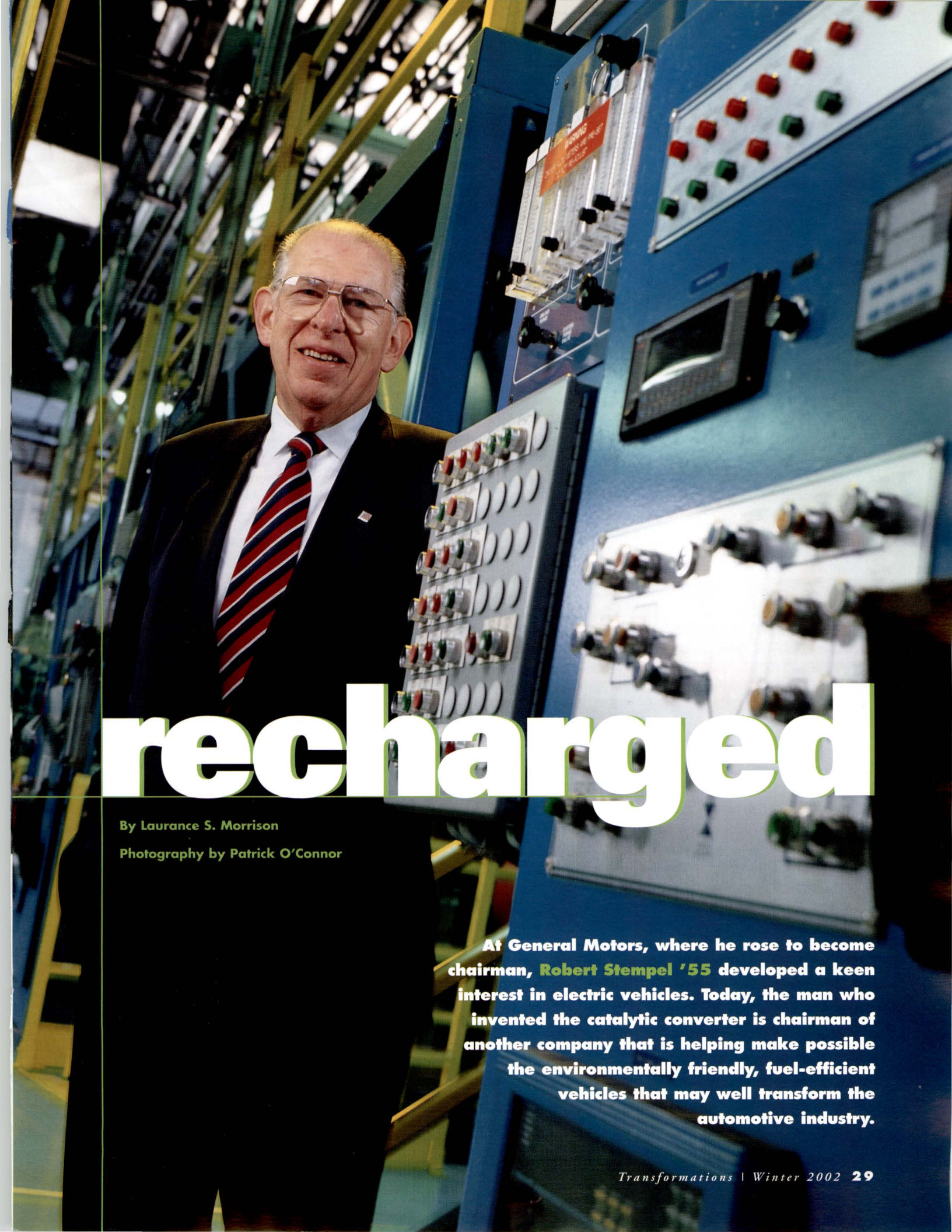
It is possible to extract hydrogen from gasoline using catalysts, but the resulting hydrogen stream has contaminants, including carbon monoxide, that can poison the fuel cell. To make fuel cells that are more tolerant of carbon monoxide, Datta and his students are working to develop more robust electrode catalysts and proton-exchange membranes for fuel cells. Nafion, a polymer membrane made by Dupont, is currently the most widely used proton-exchange membrane. To work effectively, however, it must be soaked in water, which limits the fuel cell temperature to 80° C.

Datta and his students are developing proton-exchange membranes that can operate at higher temperatures, which make PEM fuel cells better able to deal with carbon monoxide and other poisons. They have also found that they can maintain the membrane's high ionic conductivity at reduced humidity levels, which increases power output.

The WPI researchers are looking at other ways to take on the temperature-humidity issue. They are examining higher-temperature inorganic membranes and composite organic-inorganic membranes. They are also developing new catalytic electrode materials that are more robust than the conventional platinum.

Research in the Fuel Cell Center is also focusing on using watery ethanol, a renewable organic fuel made from biomass, as a fuel. Watery ethanol is less expensive to produce than fuel-grade ethanol, and can produce a clean stream of hydrogen in a reformer heated to about 500° C. PEM fuel cells powered by hydrogen produced from ethanol hold the promise of producing electricity in a highly efficient, sustainable and environmentally sensitive manner.

Datta says one of the goals of the Fuel Cell Center is to see the breakthroughs that occur in the laboratory make their way as soon as is practical into socially useful applications. "We don't hold back in widely disseminating our latest research findings," he says. "We publish our work promptly. Imagine what the world would be like without widely shared fundamental research. This basic tenet of universities is really quite a concept, one that has a profound influence on humanity." ■

A photograph of Robert Stempel '55, an older man with glasses, wearing a dark suit, white shirt, and a red, white, and blue striped tie. He is smiling and standing in front of a large, blue industrial control panel. The panel features numerous buttons, switches, and a small digital display. In the background, the yellow structural beams of a factory or industrial facility are visible.

recharged

By Laurance S. Morrison

Photography by Patrick O'Connor

At General Motors, where he rose to become chairman, **Robert Stempel '55** developed a keen interest in electric vehicles. Today, the man who invented the catalytic converter is chairman of another company that is helping make possible the environmentally friendly, fuel-efficient vehicles that may well transform the automotive industry.

Like a shimmering blue mirage, the GM Sunraycer glided silently across the Australian desert in 1987, fueled only by photons from the sun. Powered by 8,800 solar cells, the experimental car covered nearly 2,000 miles in five days to win the first World Solar Challenge.

GM's participation in the race was a turning point for advocates for solar power and electric vehicles. It was also a turning point in the life and career of Robert C. Stempel '55, who, three years later, would rise as high as a self-described "car guy" can go. Having worked his way up through the ranks at GM, he would become chairman and chief executive officer of the world's largest manufacturing company.

His experience with Sunraycer led Stempel to encourage the development by General Motors of a production-model battery-powered electric vehicle, the EV-1. It also introduced him to one of the most pressing challenges facing designers of electric vehicles—the need for lightweight, long-lasting energy storage systems.

"The only battery we had to start with," he says, "was the conventional lead-acid battery. We used 26 to produce the voltage and energy storage capacity we needed to get a range of 80 miles."

"At WPI I discovered the fundamentals of plans and preparation. I learned to work in a team. I found out how to see across disciplines and understand the roles of others in a project. At the same time, I learned the concepts of mechanical engineering. Over the years, these lessons have been the foundation of my work."

Stempel would have to pursue his growing interest in electric propulsion outside of General Motors. Soon after his election as chairman, problems flared in the Middle East over oil. Auto sales slowed. GM, having just built modern facilities, needed to close its older plants to reduce excess capacity and expenses and align capacity with market demands. The thoughtfully organized phase-out plan at 18 plants resulted in no strikes, but the GM board was hoping for a faster transition, Stempel says. Mindful of the corporation's interests, he decided, mutually with the board, to step down in 1992.

"Shortly after leaving GM," he says, "I was contacted about working on several interesting car and truck products, and was asked to consider several university assignments, as dean of engineering or head of a business school. But I wanted to continue working on alternate power trains for personal transportation. I really wanted to see electric drive have a role in future vehicle transportation."

Knowing of Stempel's search for a better battery, Walter McCarthy, CEO of Detroit Edison and a director of Energy Conversion Devices (ECD), introduced Stempel to Stanford

Ovshinsky, who, with his wife, Iris Ovshinski, Ph.D., had founded the small company in Troy, Mich., in 1960. ECD had developed a rugged nickel metal hydride battery that looked like it might be exactly what Stempel had been hunting for. It offered high energy, high power, long life and environmental friendliness.

A growing company, ECD holds more than 350 U.S. patents and more than 800 corresponding foreign patents. Its three core product areas—information technology, energy generation and utilization, and energy storage and infrastructure—are based on its proprietary, atomically engineered amorphous and disordered materials. Its products include optical memory, electronic memory and switches, protective coatings, photovoltaic systems, a solid hydrogen storage system for automotive applications, and the Ovonic Regenerative Fuel Cell, which can be used in vehicle and stationary applications.

Stempel joined ECD in 1994 and is currently chairman and executive director. "At ECD, we focus on consumer freedom and mobility because many of our products provide energy for personal transportation and home uses," he says. "People need and want environmentally sensitive energy."



Stempel oversaw the installation of Texaco Ovonic nickel metal hydride batteries in the EV-1, which can travel 160 to 180 miles on a single charge. They're also in Chevrolet's electric pickup trucks, and are being offered for use in hybrids (which use a small gasoline or diesel engine in conjunction with an electric motor). Honda and Toyota hybrids will soon be joined by vehicles from Ford, Chrysler and General Motors. GM's Precept, a full-size hybrid, achieves more than 80 miles per gallon using the Ovonic battery.

Stempel says his role at ECD is a natural extension of the work he did at GM. "Having spent a great deal of my time on emissions and pollution reduction or elimination, a second career with ECD is right in line with my own views on the environment and clean air and water. Many of my volunteer activities include clean air and water issues here in the Great Lakes Basin."

His career began right after World War II, when technology, materials and talent that had been channeled to national defense suddenly came face to face with pent-up consumer demand. Observing this practical landscape of free enterprise was a youngster who just loved cars. Stempel studied and, at 6'4", played football at his high school in Bloomfield, N.J., a community of about 50,000. He also worked at an auto repair garage.

When the WPI basketball team visited nearby Stevens Institute, a WPI alumnus invited Stempel to attend the game. While the teams grappled on the court, he heard about life at WPI. He had been considering several technically oriented colleges. In this, his parents, Eleanor, a secretary, and Carl, a banker who spearheaded the development of the leasing of airplanes in the post-war years, encouraged him. They taught their children the dignity of work and the importance of doing a job well.

Four and a half decades after he graduated with a bachelor's degree in mechanical engineering (he also holds an MBA from Michigan State University), Stempel remembers exactly why he chose WPI. **"I was swayed by the balance of the theoretical and the hands on," he says. "The Washburn Shops, the Metallurgy Labs, the electrical shops, the whole focus on engineering. For me, it was all there at WPI."**

To keep himself in pocket money, he fixed the cars of fellow students. "I carried a box of tools in the trunk and the word got around," he says. As a senior, he received the Worcester Chapter of the American Society of Mechanical Engineers Award for his paper, "Practical Fuel Injection for Automobiles."

"At WPI I discovered the fundamentals of plans and preparation," he says. "I learned to work in a team. I found out how to see across disciplines and understand the roles of others in a project. Over the years, these lessons have been the foundation of my work."

After graduation, he worked at General Electric's Wire and Cable Division and did two years' service in the U.S. Army Corps of Engineers. But, he recalls, "Car makers were styling up the 1950s body shape, which was reminiscent of the glory times, and I saw that. I was deeply interested in teamwork-based engineering. It cemented things for me. I belonged in the automobile industry. I wanted to go to Detroit."

His road to Detroit began in 1958 when he joined General Motors as a design engineer in the Oldsmobile Division, in Lansing, Mich. Over the next 13 years, he held five

jobs there, including assistant chief engineer. Chief engineer John Beltz decided to give Stempel room to do something new. "He was an inspiration," he says.

With Beltz's backing, Stempel proved instrumental in developing the front-wheel drive Toronado. His energy, insight and leadership qualities were getting noticed. GM president Edward Cole delivered Stempel's next turning point when he involved him in the creative teamwork that produced the catalytic converter. "I wondered if this was such a good idea for me," Stempel says, "but he said 'trust me,' and I did. It proved beneficial to my career; I was promoted to Chevrolet's chief engineer."

He would also play a pivotal role in developing the 1977 Caprice and the 1984 Pontiac Fiero. As he took on more responsibility, his decisions grew weightier. As president and chief operating officer and, then, chairman and chief executive officer, he was operating at the center of global commerce.

"The lightning speed of communications is probably the key factor to contend with in decision making," he says. "But you can't allow this to hurry your conclusions. I rely on experience and try to assess the impact of my decisions while making course corrections according to new information. I keep a decision checklist. And I try to see the end game."

His talent for leadership and his technical prowess have won him much recognition. In October, his name joined the ranks of Admiral Hyman Rickover, James Van Allen, David Packard, William Lear and Edwin Land when he received the Golden Omega Award. Given to "an outstanding person of science, engineering, education or industry who has made important contributions to technical progress, often related to the electrical, electronics field," the award is jointly sponsored by the Institute of Electrical and Electronics Engineers, the National Electrical Manufacturers Association and the Electrical Manufacturing & Coil Winding Association. As a mechanical engineer, Stempel is an unusual recipient.

"I think it underscores the multidisciplinary approach to solving many of today's technological problems," he says.

Stempel is also a member of the Society of Automotive Engineers and the National Academy of Engineering, a Life Fellow of the American Society of Mechanical Engineers, and a Fellow of the Engineering Society of Detroit. A trustee emeritus of WPI, he received the university's Robert H. Goddard Award for Outstanding Professional Achievement in 1980.

In November, he received the ASME's Soichiro Honda Medal, which recognizes significant engineering contributions in the field of personal transportation. At ECD, in a new leadership role, he continues a career that has placed him squarely at the front edge of personal automobile transportation for five decades. ■

— Morrison heads a full-service communications firm based in Sturbridge, Mass.

Class Notes

44 Joseph Gibson was awarded the 2000 DuPont Lavoisier Medal for Technical Achievement in recognition of discoveries made during his 45-year career with DuPont. His contributions include the discovery of a high-temperature dry-dyeing process for textiles and improvements to synthetic fibers used for hosiery and pantyhose. He later established a method for finishing photopolymer printing plates.

Gibson retired from DuPont in 1991 with numerous patents and awards. The Joseph W. Gibson Award for Technical Excellence was established in his honor.

Dwight Harris writes from his home in Woodstock, N.Y., "No news is good news, with only occasional recollections of my four years at WPI."

56 Joe Alekshun is a space systems engineer. He lives in Redondo Beach, Calif.

59 Richard Bourne is co-owner of Common Sense Computing Inc., in Belgrade Lakes, Maine, where he has lived year-round since 1987. The consulting company, founded in 1995, helps small businesses with IT solutions and advises them when technology isn't the answer.

Winthrop Wassenar retired from Williams College as director of facilities management in June 2001. He started as assistant director of the physical plant in 1964 and became director in 1983. He was the recipient of a Fulbright Fellowship for academic administration.

61 Richard Vogel regrets that professional obligations prohibited him from attending the 40th Class Reunion. He sends regards to the Class of 1961.

62 Jesse Erlich continues as a partner in the law firm of Perkins, Smith & Cohen, LLP of Boston, where he is a member of the firm's e-Commerce & Communications, Intellectual Property and Government Relations groups. His article "Mining the 'Federal Reserve' of Technology" appeared in the February 2001 issue of *Chemical Engineering*.

64 Eric Gulliksen is a MEMS analyst at Venture Development Corp. His article "The Killer Application That May Eat Its Siblings" appeared in the March 1, 2001, issue of *Solid State Technology*.

Joe LaCava and his wife, Beth, have come up with a unique business—renting out sections of their 10-acre farm to eager



gardeners, who pay \$300 for a pre-mulched plot. The LaCavas have scaled back operations at Flowering Field Farm in Colts Neck, N.J., where they used to grow and sell produce and flowers from their farm stand. Joe continues as a systems engineer at Lucent Technologies and Beth is a part-time floral designer.

Stan Szymanski retired after 37 years with Hooker/Occidental Chemical and started his own consulting business, Stan Szymanski & Associates, in Addison, Texas. He continues as chairman of the International Council of Chemical Associations' Responsible Care Leadership Group.

65 Phil Baker won San Diego's 2001 Ernst & Young Entrepreneur of the Year Award in the consumer products category. He is president of Think Outside Inc. and inventor of the Stowaway line of folding keyboards. Read more about his innovations at www.wpi.edu/Stories/Baker.

Peter Collette was awarded the ASTM Award of Merit—the American Society for Testing and Materials' highest honor. He was recognized for his work on national standards for plastic piping systems used in the distribution of fuel gas. Collette is manager of Gas Systems and Plants for PSE&G in Newark, N.J.

Walter Henry joined CRESA Partners of Boston, a corporate real estate advisory firm, as director of project management. He lives in Marshfield, Mass.

Phil Baker '65 won a 2001 Ernst & Young Entrepreneur of the Year Award.

I am grateful that WPI gave me the chance to finish my degree. I really believe that it's never too late. I hope my story shows that **perseverance is key in life.**

— **Mercedeh Mirkazemi Ward '86**, who completed her WPI degree in 1997

66 The Benoit family celebrated the 60th anniversary of Flame Treating and Engineering Co. (FTECO) last year. President **Tom Benoit** runs the company founded in 1940 by his father, the late **Leo Benoit '36**, in an old horse barn. FTECO, in West Hartford, Conn., does localized heat treating of metal parts for clients in the automotive, printing and other industries.

Robert Sinuc was appointed vice president of engineering at Plug Power Inc., a designer and developer of on-site electricity generation systems that use proton-exchange membrane fuel cells.

68 **Jack McCabe** was picked to chair Nypco Inc.'s operations in Ireland and Wales. The former WRA (Worcester Redevelopment Authority) chairman was honored by the City Council for his 17 years of continuous service. He was involved in development projects totaling \$1 billion, including the Worcester Common Outlets, Medical City and Union Station.

Gregory Sovas became vice president of governmental affairs for Spectra Environmental Group in Latham, N.Y., after retiring as director of New York State's Division of Mineral Resources within the state's Department of Environmental Conservation.

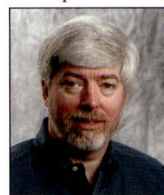
69 **Rick Follett** and his wife of 32 years, Cheryl, moved to Tampa, Fla., last year, after 15 years in New Hampshire. Rick is director of applications at PLX Technology, based in Sunnyvale, Calif. He spends at least two weeks each month in California and the rest of his working time in St. Petersburg, Fla., where he heads up the East Coast office. Their daughter, Heidi, and her husband live in nearby Lutz. Their son, Patrick, is a college student in Charleston, S.C.

70 **Dom Forcella** was honored as Advisor of the Year at Central Connecticut State University. He advises the student-run radio station, WFCS 107.7, and hosts "The Road Hog," a two-hour show "playing blues to fatten your spirit." While at WPI, he was part of the first sports broadcast team on WICN, reporting on football from the second floor of Alden Memorial.

Randolph Sablich is director of commercial business development for General Dynamics Interactive in Needham, Mass.

71 **George Block** is president, chief engineer and corporation clerk of Tibbetts Engineering Corp. in Taunton, Mass.

Mike Grady is executive vice president of engineering at Chinook Communications, a startup dedicated to developing and commercializing spectrum enhancement technology initially developed in the labs at MIT. Grady was previously CEO and co-founder of Argon Networks, which was later acquired by Siemens as part of the formation of Unisphere Networks.



Bill Palmer is senior vice president for industrial marketing at Pall Corp., a provider of filtration and separation products for scientific and industrial markets.

74 **Edward Gordon** is living in Ashburn, Va., and working as a consultant for Cap Gemini Telecom. He married Linda Jayne Richardson of Plantation, Fla., in 1998, and was transferred to Virginia by his previous employer, EIS International. A senior member of IEEE, he is Partners' Program Chair for the 2002 Sections Congress. Ed also received a service award for his work as associate editor for the *IEEE NCAC Scanner*, a news bulletin for the National Capital Area Council.

Robert Lindberg was named senior vice president for defense programs at Orbital Sciences Corp.

75 **Vicki Cowart**, state geologist and director of the Colorado Geologic Survey, was elected president of the Association of American State Geologists.

Anne McPartland Dodd was honored with a Jefferson Award from her hometown, Mont Vernon, N.H., for her dedication to outstanding community and public service. An article in the *Community Messenger* cited her public work on committees and community projects, as well her quiet support for neighbors in need. Anne has sent weekly notes to encourage those struggling with serious illness and has organized everything from casseroles to e-mail chains to assist families facing crises. The Jefferson Award was created by the American Institute for Public Service to recognize "ordinary people who do extraordinary things without expectation or reward."

David Kingsbury has a new grandchild. Timothy Richard Person, born Jan. 5, 2001, is the son of **Richard '76** and **Elana (Kingsbury) Person '98**.

76 **Jeremy Jones** is vice president of new business at Cabot Microelectronics Corp. in Aurora, N.Y.

Thomas McNeice was promoted to vice president of CDM Engineers & Constructors Inc., a subsidiary of Camp Dresser & McKee. McNeice previously managed the company's North Performance Center, which encompasses New England and the Mid-Atlantic states.

77 **Farooq Ansari** is president and owner of Ansari Builders in Westboro, Mass.

Joseph Calagione and his wife, Lisa, have two daughters. They live in Milford, Mass., where Joe has been active in civic affairs.

Lindsay Joachim is an attorney with Blatz, Pyfrom & Assoc. in Agoway, Calif. He recently secured a \$1.5 million jury verdict after a monthlong trial involving a petroleum consultant judged negligent in supervising the drilling of a 7,000-foot oil well. The verdict will allow Joachim's client to recover an estimated 400,000 barrels of oil in the target reservoir. "After four weeks," Joachim writes, "the jury had bonded. When they heard that the judge used to wear a Hawaiian shirt under his robes on Friday, they all wore Hawaiian shirts on the last Friday of the case, then all of them wore black for the closing argument. That was a little unsettling."

78 **John Bourassa** joined the executive board of the Quality Assurance Association of Maryland as an advisor. He earned the professional title of Certified Software Engineer from the Quality Assurance Institute and currently works for Lockheed Martin's Management & Data Systems as a staff systems engineer. John and his wife of 20 years, Jane, live in Perry Hall, Md., with their daughters, Gillian and Alicia.

Peter Landry works for Diocesan Health Facilities as director of facilities development and planning. He lives in Little Compton, R.I.

Michael O'Hara, president of The Mountain Star Group, a Minneapolis-based FPE firm, received the Construction Specifications Institute's Advancement of Construction Technology Award. The award was presented June 21, 2001, at a ceremony in Dallas.

79 **Tom McClure** is operations manager for Techsolve Inc.'s Machining Xcellence Division (formerly IAMS—Institute of Advanced Manufacturing Sciences). He was interviewed by *Modern Applications News* for a "Management Perspective" feature in the February 2001 issue.

Don Patten holds the post of director of corporate facilities, engineering and process safety at StockerYale Inc., an optical components manufacturer in Salem, N.H.

80 **David Drevinsky** is a program/project manager with the government's General Services Administration office in Boston. He writes that he enjoys watching **Nancy Pimental '87** on Comedy Central's "Win Ben Stein's Money."

Thomas Gellrich was named vice president of Elemica's Advanced Solutions Center. Last year, he helped create Elemica, a global e-marketplace for the chemical industry. He previously spent 15 years with ATOFINA Chemicals Inc., where he served as director of e-business.

Daniel Itse is president of Christofferson Engineering in Fremont, N.H. His article on NOx emissions appeared in the June 2001 issue of *Hydrocarbon Processing*.

Andrew Pelletier works for SeaChange in Greenville, N.H.

81 **Scott Cloyd** joined the Orlando, Fla., office of R.W. Beck as a management consultant.

Roger Keilig is the new executive director of the Lake Sunapee (N.H.) Protective Association, a nonprofit devoted to identifying and eliminating pollution threats to the Lake Sunapee watershed.

Noted scientist **Olivia Pereira-Smith** (Ph.D.) left Baylor University to join the University of Texas Health Science Center at San Antonio, along with her co-worker and husband, James Smith. She will continue her molecular and cytogenetic studies on the process of cell aging, supported by a grant from the National Institute on Aging.

Jeff Trask is the new vice president, government relations, for MEMA, the Motor & Equipment Manufacturers Association. Based in Washington, D.C., he is charged with overseeing federal and state legislative and regulatory monitoring, reporting and advocacy. He will also direct the agency's newly formed Government Affairs Committee. Jeff, who holds a law degree from Georgetown University, worked at the American Petroleum Institute since 1989.

82 **Maureen Seils Ashley** is on a family leave of absence from IBM, where she was the ASICS synthesis team leader at the Burlington, Vt., facility. Maureen and her husband, Carl, enjoy living in Vermont with their "TNT" (teens 'n' toddler). Daughter Maura was born on Jan. 13, 1999, and was welcomed home by siblings Amber, Autumn and Nathan on a snowy, -20 degree day.

Michael Bagley was promoted to chief strategist of UNIX Systems at Availant, the Cambridge, Mass., software firm where he has been employed since 1992.

David Kelly, vice president of e-services for esoftsolutions, was appointed to the Accreditation Board of Engineering (ABET)'s Computing Accreditation Commission.



83 **Scott Behan** joined Xemod Inc. as vice president for product development.

David D'Addario works for the Mass Turnpike Authority and lives in Holyoke, where he has been active in local politics. He and his wife, Marjorie, have two children.

Scott Nacey and his wife, Marybeth, announce the birth of their son, Michael John, born April 11, 2001, in Palo Alto, Calif., at a healthy, happy 7 pounds 11 ounces.

Rick Vatcher was appointed vice president and general manager of PRI Automation, headquartered in Billerica, Mass.

84 **William Abbott** is operations manager for Parkinson Technologies in Woonsocket, R.I.

Betsy Barrows (M.M.) retired from Gateway Regional High School in Huntington, Mass., in June 2001. She spent her entire career teaching math there, along with her husband, Ken, a science teacher who retired two years ago. They live in Huntington and have two married daughters who live out of state.

Laurie Ortolano lives in Litchfield, Conn., with her husband, Michael, and sons Michael and Vincent.

Leslie Schur Pearson is now **Leslie Schur Gottlieb**



following her marriage to Mark Gottlieb on May 20, 2001. Leslie is a consultant for Spherion, specializing in software quality management, and Mark is a marketing and public relations consultant.

85 Attorney **Lori (Freeman) Cuomo** handles patent, copyright and trademark cases for Greenblum and Bernstein, P.L.C. of Reston, Va. Her new daughter, Alexa Madison, joined sisters Juliana, 8, and Kylie, 5, on March 23, 2001.

Mark DiNapoli directs Suffolk Construction's Special Projects Division from his office in South Boston's waterfront district. His typical day was profiled in *New England Real Estate Journal* recently.

Carl Sheeley is president of Fontarome Chemical in St. Francis, Wis. He joined the company in 1991 and was made vice president in 1997.

86 **Scott Favreau** directs engineering services at Cognex Corp. He is completing an MBA at Babson College.

Todd Vigorito chaired the annual Branford Festival and was profiled as Person of the Week in his hometown paper. A lifelong resident of Branford, Conn., (except for his years at WPI and a few years working in Wisconsin), he began helping with the weekend festival during his college days. Todd and his wife, Catherine, have two daughters, Lauren and Gabriella.

Since she left WPI for California after her junior year, **Mercedeh Mirkazemi Ward** has married, had two children, pursued a career in toy design, and finally finished her WPI degree in 1997, only 11 years after she was due to graduate! While working for Mattel toys and raising two children, she took physics and calculus courses at Cal State to satisfy WPI's degree requirements. For her MQP (done long-distance, via phone and e-mail) Mercedeh and two other WPI students did an analysis of Talking Barbie's face mechanism, sponsored by her boss at Mattel.

Mercedeh is now director of design for the Dolls/Girls Products division of JAKKS Pacific Inc. She and her husband, Bruce Ward, have two children, Kyle Alexander, and Arianna Nicole. "I am so proud to be a WPI graduate," she writes. "I am grateful that WPI gave me the chance to finish my degree, and I'm proud that my family stuck by me and helped me accomplish what I set out to do. I really believe that it's never too late. I hope my story will inspire some and teach that perseverance is key in life."

Carol Wilder is working in worldwide business development for Intel in Sacramento, Calif. On Feb. 26, 2001, she adopted her daughter, Portia Elisabeth Feng-Ting, in Nanning, GuangXi, China.

87 **Dave and Jennifer (Adams) Brunell** announce the arrival of Caterina Elizabeth on June 10, 2001, and Leia Olivia on June 11, 2001. Caterina was born at 9:26 p.m. at the University of Massachusetts Medical Center, only 11 minutes after Dave and Jennifer pulled up to the ER, and her twin was born at UMass Memorial Hospital the next day, at 1:30 in the morning.

William Carroll has returned from the Midwest with his family to become the director of operations for Danaher Tool Group in Springfield, Mass., after 12 years with GE.

Karyn VanDeMark Denker made the jump from academia to industry with a new job as associate scientist III at Biogen. She was a senior research technician and lab manager at Boston University Medical School's Cancer Research Center for almost 14 years. Her new job in Biogen's Molecular Technologies Group entails pulling out whole cDNA clones of genes involved in various disease models to provide researchers with necessary tools for developing targeted drug therapies. "It is my background in retrovirology, which began with my MQP at the Worcester Foundation for Experimental Biology, that got me this job!" she writes.

Cheryl (Delay) Glanton and her husband, George, announce the birth of Megan Elizabeth on Dec. 2, 2000. "Our four children, Nathan, Andrew, Katherine and Megan, keep us happy and active," she writes.

88 **Jeffrey LaSalle** (M.S. FPE) was appointed a shareholder at Ewing Cole Cherry Brott, where he leads fire protection engineering operations. He lives in Hatboro, Pa. with his wife and three children.

Rudolf Minar and his wife, Kara, had their first child on Jan. 19, 2001. "Hayley Catherine has rapidly changed our cosmopolitan lifestyle (and one-bedroom Manhattan apartment), which we previously shared only with our Jack Russell terrier, Topper," he writes. Rudolf works for CIBC World Markets, providing financial advice to networking and communications equipment

companies. Kara is now a full-time mom, on sabbatical from her career as a White House special assistant to the president, press secretary to U.N. Ambassador Madeleine Albright and, most recently, media consultant to Sen. Hillary Clinton and others.

Joe Musmanno lives in Medway, Mass., where he has been active in local politics. In his spare time he enjoys flying, designing robots, and playing drums in a local band called Electrum.

David Picard and his wife, Christine, are living happily in Framingham, Mass., with their son, Russell, who turned 1 in June.

Herman Purutyan is vice president of Jenike & Johanson Inc. in Westford, Mass. His article on pneumatic conveying systems for chemical process plants appeared in the April 2001 issue of the AIChE journal *Chemical Engineering Progress*.

Joshua Smith holds the post of chief technology officer at Kaon Interactive in Cambridge, Mass. He married Cherie Benoit on April 28, 2001.

Julie (Peck) Trevisan writes that she and her husband, Jay, welcomed their first child, Zachary James, on May 15, 2001. "I also made a career change last year to DataFlux, a subsidiary of SAS Institute, where I am a sales executive," she says. "We have been living in the Raleigh, N.C., area for six years now, and we are still loving the (almost) snowless winters!"

Greg Woods and his wife, Kim, were overjoyed by the arrival of their son, Nicholas Henry, on Feb. 8, 2001. Greg is co-founder and vice president of Silver Oak Partners Inc. Kim recently left her job at Oracle Corp. to spend time with Nicholas.

89 Rolf Jensen & Associates promoted **Joseph Cappuccio** to engineering manager for the Washington, D.C., office. He joined the firm's Fairfax, Va., office in 1992 and has been responsible for project management, code review and hazard analysis.

Alison (Gotkin) Cotner is a product manager for Turnkey Manufacturing at K&M Electronics, a subsidiary of ITT Industries, in West Springfield, Mass.

Jeffrey Goldmeer is a member of the Energy and Propulsion Technology Laboratory staff at General Electric's Corporate Research & Development Center in Niskayuna, N.Y., where he specializes in combustion research.

Brian Horgan was promoted to process leader in the project management area of The United Illuminating Co., where he has worked for 12 years.

William Hwang is a partner in the Roseland, N.J., law firm of Goodwin Procter, where he specializes in intellectual property and patent litigation.

Danielle LaMarre is director of development for Carney Hospital in Dorchester, Mass. She has held similar positions at YouthBuild USA and the Make-A-Wish Foundation.

Kenneth Merrow works for Trumbull-Nelson Construction in Hanover, N.H., where his projects have included work on area ski lodges and resorts.

Adam Pease's wedding to Agnes Ramos took place on the beach in Bodega Bay, Calif., in August 2000, with **David Rothkopf '90** as best man. Adam is a program manager and director of Knowledge Systems at Teknowledge in Palo Alto, and Agnes is a physical therapist.

Tenor **Jean-Pierre Trevisani** returned to Worcester last spring to perform for the WPI President's Advisory Council and to sing in a concert with the Salisbury Lyric Opera in All Saints Episcopal Church. Since completing his training in Paris, he has been appearing with the French national opera company and the Bastille Opera.

David Wright spent a year and a half on the startup of ccrd partners' new Richmond, Va., office, and was then promoted to associate and put in charge of the office's EE Department. Ccrd is a consulting firm that specializes in healthcare design. David and his wife, Lisa, had had a second son, Preston Lloyd, on May 22, 2001. His older brother, Zachary, is excited about having someone to play with.

90 **Kevin Bowen** and his wife, Janet, announce the birth of Jessica Lynn on May 13, 2001. "Big brother Ryan, now 2, continues to be helpful in caring for Baby Jess," he writes.

Renee Messier Carroll (M.S. CH) is manager of regulatory affairs at ViaCell Inc. in Worcester.

Tom Cummings works for Heidelberg as sales representative for the Northeast region. He's been with the printing company since 1989 and previously managed its South region.

Eric Lindgren was promoted to CIO at Honeywell Automotive Products Group in Danbury, Conn. He married Ellen Waychowsky last fall.

Stuart Pearson married Sarah Vertz on Feb. 10, 2001. They live in South Portland, Maine, and he works at Harding E.S.E.

Ronald Skoletsky and his wife, Marie Morel-Seytoux, announce the birth of a daughter, Freya Shai, on Sept. 10, 2000.

91 Navy Lt. **Christopher Degregory** completed a six-month deployment to the Mediterranean Sea and the Arabian Gulf aboard the guided missile destroyer U.S.S. *Stethem*.

Anup Ghosh was promoted to vice president of research at Cigital, a software risk management company in Dulles, Va. He is the author of two books on e-commerce security and a member of the advisory board of Toravis: The Digital Identity Company.

Timothy Kearney joined LandMark Design as an engineer.

Jeffrey Link earned a doctorate in organic chemistry last year at Montana State University, Bozeman, where he was named teaching assistant of the year. He and his wife, Christina, have a 3-year-old daughter, Rebecca.

David Marshall and his wife, Neha Parekh, had a daughter, Sareena, on June 27, 2001. She is their first child. David is an information specialist at Electronic Data Systems. They live in Houston.

Eric O'Connor was promoted to software architect at Avolent Inc. in San Francisco, where he has been living and working for two years.

George Oulundsen is an R&D scientist at Lucent Technologies in Sturbridge, Mass. He married Carole Sekreta in 1995. They have two sons—Ted, born in 1997, and Owen, born in 2000. George received a Ph.D. in chemical engineering from UMass Amherst in September 1999.

Jim Wilkinson is director of product support engineering at SolidWorks Corp. in Concord, Mass. He spends the rest of his time hiking, skiing and working on cars. For the latest and greatest on Jim and his wife, Pat, check out people.ne.mediaone.net/pjwilkie/home.htm.

92 **Dorothea Carraway** graduated from Harvard Business School with the Class of 2000. She is a commodity manager for airfoils at Pratt & Whitney.

Edward Connor earned an M.S. in administrative studies at Boston College and is working at the University of Massachusetts Lowell.

Rich Corley (M.S.) co-founded Pirus Networks, where he holds the post of vice president of technology and vision. The Acton, Mass., company creates carrier-class storage and IP networking systems.

David Cote was promoted to vice president of technology and operations at Tandem Financial Services. He has been with the company for seven years and lives in Stoughton, Mass.

Gregory Ghosh transferred to the Raleigh, N.C., office of Rolf Jensen & Associates, where he now serves as associate manager. He worked in the company's Atlanta office for the previous five years.

Valerie (Kschinka) Mason and her husband, Michael, had a son, Nicholas Angelo, on Nov. 13, 2000. He joins his brother, Michael, who is two years his senior.

Sean Moore married Jennifer Claus, a Michigan State grad, on Sept. 9, 2000. Attending the wedding in Falmouth, Mass., were classmates **Al Casagrande**, **Keith Picthall** and **Robert Tarr**, along with **Sharon Savage '91**.

Loan Ngo married in August 1998 and switched careers in September 2000. She received



her MBA from the University of North Carolina Kenan-Flagler Business School in August 2001, shortly after earning her Six Sigma Black Belt certification through Honeywell International Inc. Her current position is after-market business manager for the company's hydromechanical controls product line, a division of the Aerospace Engine & System business unit. She and her husband, John Jones, live in New York City.

Bill White married Tonya Russillo, a co-worker at Hasbro, Sept. 30, 2000. They live in Attleboro, Mass.

93 Christopher Arsenault works at Unisphere Networks in Westford, Mass.

Aimee Brock and Rod White announce the birth of Alesha Marie White on Jan. 18, 2001.

Tracy Coifman is earning an executive global MBA through a new joint program of the Columbia Business School and the London Business School. As part of the inaugural class of 2003, he attends one week of classes each month for 20 months, alternating between New York City and London. Tracy resides in Puerto Rico, where he is vice president of Able International/Tril Export Corp. of P.R. His e-mail address is tcoifman@compuserve.com.

Sherri Curria received her master's degree in civil and environmental engineering from Tufts in February 2001.

Shannon Gallagher and **Daniel Beauregard '94** ('96 M.S.) were married Oct. 28, 2000. They live in Acton, Mass.



Alfred Grasso (M.S.C.S.) was promoted to senior vice presi-



dent and general manager of MITRE's Washington Center for Command, Control, and Communications, also known as C³. He was formerly chief information officer, in charge of infrastructure and information resources.

Eric Keener is an actuary for Hewitt Associates of Norwalk, Conn.

Air Force Capt. **Eric Koe** has been assigned to the 7th Special Operations Squadron at RAF Mildenhall in Cambridge, England.

John Lauffer married Lisa Fontaine on Aug. 31, 2000, at Les Chapelles de Paris, Las Vegas. He works for AC Technology Corp. in Uxbridge, Mass.

Philip and Rhonda Ring Marks had a daughter, Caroline Joy, on April 23, 2000.

Kern Narva of Shrewsbury, Mass., married Heather Roubian recently.

Christopher Supple works for G.H. Bass and lives in South Portland, Maine. He married Sherri Curley on Sept. 30, 2000.

Public Eye

John B. Scalzi '38 got more publicity than he bargained for when

Amazon.com confused him with John M. Scalzi II (no relation), edi-

tor of *Rough Guide to Money Online*, which doubtless got more

hits than Scalzi's works on bridge construction. John B. Scalzi, who goes by "Jack," also wrote *Double Talk*, a self-published quiz book of

more than 1,100 colloquial American expressions . . . **Fred Costello '59**

appeared on the WCVB news program **Chronicle**, in a segment

called "Zoomers," which celebrated the new superactive retirement

generation . . . **Aram Mooradian '59**, founder of Novalux, was

profiled in a recent **Wired** article called "Beam On: Want your own

private fiber node? Has Novalux got an extended-cavity surface-

emitting laser for you!" . . . **Variety** spotlighted **Nancy Pimental '87**

in a column called "10 Comics to Watch." Nancy made a name for

herself as a writer on "South Park" and as co-host of "Win Ben Stein's

Money" on the Comedy Central cable network. She also has a movie in

the works. *The Sweetest Thing* (her screenplay), a romantic comedy

starring Cameron Diaz, is due from Sony in March . . . **John Lombardi**

'90 won his second R&D 100 Award from **R&D** magazine for

Aquacore, a water-soluble, lightweight and environmentally friendly

mandrel material designed for use in the manufacture of high-end

composites. His 2000 R&D Award (featured in the Spring 2000

WPI Journal) was for Aqua-Port, a polymer blend used in rapid

prototyping . . . **Nick Walker '95** had a hand in animating **Shrek**,

PDI-Dreamworks' summer 2001 box office hit. He's working on an

IMAX version of the movie . . . His novel job title, "First Geek,"

earned **Jason Wilson '01** newspaper coverage in the (Worcester)

Telegram & Gazette and a TV interview with **New England**

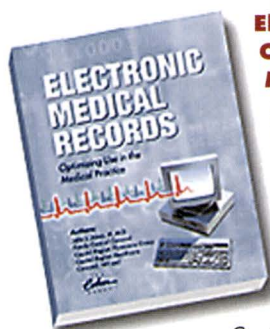
Cable News anchor R.D. Stahl on "New England This Evening."

Wilson provides IT support to the Brookline, Mass., MATCH School.

He is funded by Geeks for America, a Cambridge-based

philanthropic organization.

WPI Bookshelf

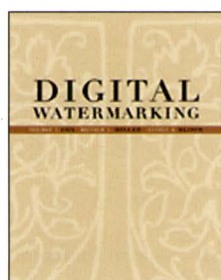


Electronic Medical Records: Optimizing Use in the Medical Practice

by John J. Janas III, M.D. '79 and
The Coker Group
Coker Publishing

Janas is a physician with Family Care of Concord and medical director, physician information services, for Capital Region Health Care in Concord, N.H.

His book is designed to help physicians improve efficiency through the advanced use of electronic medical records. Topics include choosing a system, capturing data and meeting documentation-compliance requirements.

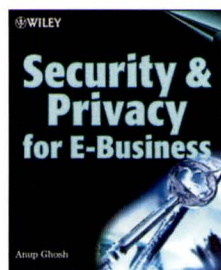


Digital Watermarking

by Jeffrey Bloom '87 (M.S.E.E. '90),
Ingemar Cox and Matthew Miller
Morgan Kaufmann Publishers

Digital watermarking technology is a vital element in the copyright protection of digital materials. It can be used to prevent illegal copying of images and video or audio files,

and also has applications in broadcast monitoring and the recording of electronic transactions. This text explains the theoretical principles that govern diverse applications of the technology and reports new research findings in the field. Bloom, who earned his Ph.D. at the University of California, Davis, is a researcher in digital watermarking at Sarnoff Corp. in Princeton, N.J.



Security & Privacy for E-Business

by Anup K. Ghosh '91
John Wiley & Sons

"When it comes to e-commerce security, it's all about the software," says Ghosh, who also wrote *E-Commerce Security: Weak Links, Best Defenses* (1998). "The solutions for privacy and security lie deeper than

the perimeter—beyond firewalls and encryption tools. E-business systems have to be engineered from the ground up with security, reliability and privacy in mind." Ghosh is Cigital's director of security research and a frequent lecturer and consultant on e-security.

94 Tracy Adamski joined the Pioneer Valley Planning Commission in West Springfield, Mass., as senior planner, environment and land use.

Kurt Asplund married Anne O'Sullivan recently. He is a structural engineer for Frederic Harris Inc. in Providence, R.I.

Bill Blanchard married Kara Giove on Nov. 4, 2000. They live on Long Island's south shore in the village of Blue Point. Kara is starting a career as a high school math and physics teacher. Bill continues as a highway designer at Dunn Engineering Associates.

Brian Card works for Allied Waste Industries as a regional engineer.

Jaret Christopher married Tracey Hare recently. He continues as CEO of True Advantage Inc., in Westboro, Mass.

Kenneth Cordio is a process engineer at BD Ophthalmic Systems in Waltham, Mass.

Peter Demarest earned his Ph.D. in aerospace engineering at the University of Texas at Austin. He works for A.I. Solutions in Lanham, Md., as a mission analyst.

Roberto Diaz was married to Megan Argue recently. He is an outside plant engineer for Verizon in Manchester, N.H.

Ted Dysart was named principal at the Greenwich, Conn., office of the executive search firm Heidrick & Struggles International. His commentaries on corporate governance have appeared in *The New York Times* and *The Wall Street Journal*, and on CNN and CNNfn.

Brandon Emanuel informed us in August of his upcoming marriage to Jennifer Harper. Following the Oct. 20, 2001, wedding, they were planning a honeymoon in Prague and Edinburgh. Brandon is a U.S. Navy flight officer.

Joseph Gifford is a development engineer with USFilter. He is working on an M.S. in

chemical engineering at the University of Massachusetts.

Steven Johnson works for the George B.H. Macomber Co., where he was recently promoted to assistant project manager. He joined the Boston-based construction company in 1997.

Brion Keagle and Pamela Parenteau of Leominster, Mass., were married in 1996. They celebrated the birth of their first child, Abigail Mary, on March 25, 2001. Brion is NT server manager at Concord Communications and Pamela is taking some time off to be a full-time mom after enjoying several years as a biotech scientist at Aventis Pharmaceuticals. Their e-mail addresses are bkeagle@concord.com and pikeagle@hotmail.com.

Jean (Henault) Kennamer and her husband, David, announce the birth of their first child, Christina Elise, on April 16, 2001. Jean is employed as a public works engineer for the town of Derry, N.H.

Christopher Newell is a mechanical engineer at Smith & Nephew Inc., in Andover, Mass.

Yvonne (Bergstrom) Proulx is a senior quality engineer at Abbott Bioresearch Center. She and her husband, Jeffrey, were married Feb. 12, 2000, and live in Grafton, Mass.

Chuck Scholpp and Elaine Matson were wed April 28, 2001. After an "awesome 101-day round-the-world honeymoon," which included stops in Australia, Asia and Europe, Chuck began his first year at the Kellogg School of Management, where he is pursuing an MBA and an MEM (master's in engineering management). Elaine works from their Evanston, Ill., home as a senior project manager for Click2learn.

Todd Sullivan became an associate at the Manchester, N.H., law firm of Devine, Millimet & Branch, in the Corporate Department, specializing in intellectual property, e-commerce, patent prosecution and trademark registration.

95 **James Beardsley** married Michelle Dutremble, Oct. 8, 2000. He graduated from the University of Maine School of Law and is serving in the U.S. Marine Corps in North Carolina.

Kevin Callery is associate manager of the Boston office of Rolf Jensen & Associates.

Jennifer (Anderson) Crock and her husband, Karl, announce the birth of Nathan James, June 6, 2001.

Nathaniel Fairbanks of Worcester wed Heather Adamiak recently.

Scott Lewis is an immunology production control supervisor at Biosource/QCB in Hopkinton, Mass.

Charlie McTague works at Enterasys Networks in Rochester, N.H. He and his wife, Shana, live in Plaistow.

Katherine Mello married Jesse Tuomisto on Aug. 19, 2000. She works at Camp Dresser & McKee and lives in Cumberland, R.I.

Dominic Meringolo works for Aquatic Control Technology. He married Kelli Mahoney recently.

Eric Pearson was promoted to eCommerce officer at Enterprise Bank and Trust Co. in Chelmsford, Mass.

John Pelliccio married Laura Lasko on Oct. 8, 2000. He works for Raytheon in Marlboro, Mass., as a senior engineer.

Obadiah Plante is a graduate student at MIT doing research on a new method of oligosaccharide synthesis. He received a fellowship from the American Chemical Society's Division of Organic Chemistry, sponsored by Pfizer.

Stephanie Richard works for BICCGeneral Cable Industries in Lincoln, R.I.

Cory Shimer works for Quantum Bridge Communications in Andover, Mass.

Pamela Simmons and **Bryant Obando** were married in Acton, Mass., where they now reside. She is a validation engineer at Genetics Institute, and he is a software developer at Battelle Memorial Institute.

Scott Stoddard joined Columbia Construction Co. in North Reading, Mass., as an assistant project manager.

Matthew Tessier works for MDR Construction in Tewksbury, Mass.

96 **2nd Lt. Jason Armstrong** is a robotics engineer at the Air Force Research Laboratory at Tyndall AFB in Panama City, Fla.

Keith Barrett was promoted to vice president of technology and chief technology officer at Shareholder.com, an investment software company in Maynard, Mass.

Joseph Batcha is a financial analyst for Pequot Capital Management in Westport, Conn. He and his wife, Kelly, had a daughter, Grace Catherine, on April 30, 2001.

Lorie (Guay) Bender and her husband, Sandy, had a son, Travis Ryan, on June 19, 2001. Lorie left her job at Pratt & Whitney after five years of employment to be a stay-at-home mother. They live in Lebanon, Conn.

Joshua Bennett graduated with high distinction from Ohio Northern University's Pettit College of Law, earning his Juris Doctor.

Jason Berube runs the Somerset Creamery in Bourne, Mass., a branch of the Swansea ice cream parlor founded by his grandfather in 1937. His parents took over in 1981 and have continued making some 40 homemade flavors—including the cranberry/chocolate/walnut combination that Jason created for the Cape Cod store.

After 23 years, **Douglas Borden** (MME) left the Coast Guard, which he most recently served as a physics instructor at the Coast Guard Academy. Before the ink on his retirement certificate was dry, he was asked to become the first member of a new team assigned to the Coast Guard's Future Force 21 effort, to redesign the Coast Guard's human resources systems to meet the needs of the 21st century. He is now employed by DynCorp Information and Enterprise Technology Inc.

Greta Boynton graduated from the University of Massachusetts Medical School in June. She is now serving a three-year residency in internal medicine at Baystate Medical Center in Springfield, Mass.

Dr. Teri (Burrows) Brehio joined the medical practice at Hillsborough Family Health in Hillsborough, N.H. She is a graduate of the University of Massachusetts Medical School.

Frederick Coleman joined the family construction business founded by his father, Fred Sr., in 1979. Coleman Construction, based in Pelham, N.H., was profiled in *New England Construction's* July 9, 2001 issue.

Eric Dubois works at Promega Corp. in Madison, Wis.

Kimberlie Heath works at Medtronic Inc., in Danvers, Mass.

Daniel Horgan works for Unerectors Inc., in Dorchester, Mass. He is working on an MBA at Northeastern.

Laurie LeBlanc works for Haartz Corp. in Acton, Mass.

Todd Marks and Sara Truscinski were married Oct. 21, 2000. He is a project engineer at Barton Malow in Charlottesville, Va.

Who:

Gerry Axelrod '69 and **Patton Abbe '70** (with help from **Dick Schwartz '70**)

What:

Cabinetparts.com, an online catalog of more than 10,000 hard-to-find hinges and cabinet hardware, specializing in European cup hinges. Unique locator forms to help users match existing designs.

Where:

Deerfield Beach, Fla.

Why:

"To set to rest the age-old question, 'Honey? When are you going to fix that *#!@~* door?'"

Web site:

www.cabinetparts.com

Who:

Michael Savage '86 (MS '88) and wife, Donna Savage

What:

Savage Fitness Inc. Unique products for weightlifters and aerobic exercisers, including water holders, reading racks and mats. A new line called "Go Figure" features weightlifting equipment ergonomically designed for women.

Where:

Sutton, Mass.

Why:

"Virtually all strength equipment is designed for MEN!!! We don't need to lift as much weight as men, we don't want to get 'bulky,' and we DON'T want to exercise in a cold, damp basement on a 7 ft. contraption that takes up an entire room."

Web site:

www.SavageFitness.com

Who:

Steve Hocurscak '00

What:

Blue Pumpkin Recording Studios An offshoot of Blue Pumpkin Productions, the theatrical production company run by Marc and Susan Smith.

Where:

Lower level, Worcester Common Outlets

Why:

Originally designed to cater to the special needs of a capella groups, the 16-track studio has since expanded to handle every other imaginable recording need. Equipment rentals are available.

Web site:

www.gweep.net/~honeysmk/studio/

Marie Murphy married David Cuneo recently. She works for QCB, a division of Biosource International. After a honeymoon in Greece, the couple lives in Minneapolis.

Richard Person and **Elana (Kingsbury) Person '98** had a son, Timothy Richard, on Jan. 5, 2001. His grandfather, **David Kingsbury**, is an alum from the Class of 1975.

John Reynolds was appointed product manager at Riverdale Mills Corp., a manufacturer of wire mesh products for the marine, agriculture and construction markets. He lives in Sterling, Mass.

Sarah McIlhenny White is team leader of the nondestructive testing team at Los Alamos National Laboratory. Her group specializes in radiography.

97 Thomas Burns joined Consigli Construction as a project manager to manage construction on the East Brookfield (Mass.) Elementary School.

Michael Dell'Orfano (M.S. FPE) married Shelley Weinand, May 27, 2000. He works for the fire department in Thornton, Colo.

Joshua Gaucher joined Cutler Associates as an assistant project manager.

Katherine Horning is a design drafter at Cutler Associates. She lives in Worcester.

Jennifer Kelly and **Matthew Wingate** were married in 2000. She is a CVS pharmacist; he works for Epic Therapeutics. They live in Marlboro, Mass.

Robert King married Jennifer Costa, Jan. 1, 2000. He works for Roller Bearing Company of America.

Jeffrey Kulesza works at Allegro MicroSystems in Concord, N.H. He married Erin Krupski, a Bentley College grad, recently.

Gary Leanna (G) married Shelley Desroches recently. He works for Boston Scientific and lives in Holden, Mass.

Sean O'Hearn is a design engineer at Garrett Engine Boosting Systems in Torrance, Calif.

Philip Roy is a mechanical design engineer at US Surgical Corp. in North Haven, Conn.

Bill Spratt is director of public works in Clinton, Mass., where he lives with his wife, Dawn, and their daughter, Alison.

The Navy promoted **Nicole Treeman** to lieutenant and assigned her to the Surface Officer School at Naval Education and Training Command in Newport, R.I., as an instructor for the Division Officer Course. After a six-month deployment to the Middle East aboard the USS *Laboon* last year, she brought her mother aboard for a "tiger cruise"—a Navy tradition. Crew members returning from overseas deployments invite relatives to sail with them on an overnight cruise.

Jayson Wilbur earned a master's degree in mathematical sciences at Purdue, where he is now working on a doctorate in statistics. He married Stephanie Nuland recently.

John Woodsmall works for Sampson Engineers Inc. in Peabody, Mass. He married Amy Flynn recently.

98 Sherry Lynn Ashby is a chemical engineer at Millipore in Bedford, Mass.

Air Force 2nd Lt. **Matthew Craig** is stationed at Columbus AFB in Mississippi.

Lisa Giassi married Wayne Butler last year. She is pursuing a doctorate in chemical engineering at the University of Virginia in Charlottesville; he is a chef at the Boar's Head Inn.

David Melton earned a master's degree in civil engineering from



Tufts in May 2001 and began his medical studies at the Tulane University

School of Medicine in July. He spent the two months in between as a Paul Alexander Memorial Fellow with the international nonprofit organization Management Sciences for Health. His fellowship involved designing a system for collecting and reporting health data in the Eastern Cape Province of South Africa. As part of his master's degree, he completed a research project for the Massachusetts Department of Public Health Bureau of Communicable Disease Control and authored a report on the epidemiology of childhood pneumococcal infection.

Constance Pappagianopoulos designs air conditioning systems for aerospace manufacturer Hamilton Sunstrand.

David Smiley married Karen Mady, Sept. 16, 2001. They live in Herndon, Va.

99 Nicole Boosahda and **Algis Norkevicius '96** of

Plymouth, Mass., were married June 9, 2001. She works for Brooktrout Technology, and he works for Titleist Foot Joy Worldwide.

Brendan FitzPatrick earned a master's degree in civil engineering at Virginia Tech in February 2001. He is now a staff engineer at Geopier Foundation Co. in Blacksburg, Va.

Patricia Gray ('01 MBA) joined Gene Machines as vice president of development.

Misha Katz left 3Plex.com to finish his degree in computer science at WPI.

Jennifer Kimball and **Justin Robbins '00** were married last year. She is a chemical engineer at IBM Micro Electronics; he is a member of the bioengineering department at the University of Vermont in Burlington, where he specializes in toxicology research.

Mark Manasas (M.S. ME) is a team leader of spinal device development at Tensegra Inc., a medical device startup in Norwood, Mass. He and his wife, Sarah Felton, were married on June 23, 2001.

00 Jennifer Cobb works for Teradyne as a planner in the Nashua, N.H., office.

Carla Corrado continues at Sun Microsystems, where she graduated from its Best of the Best training program and was promoted from product support engineer to high-availability support engineer.

Greg Halloran is a mechanical engineer in the Nashua, N.H., office of Teradyne.

Joseph Hausmann lives in West Bath, Maine, and works for Wright-Pierce as an environmental engineer.

Efthemios Kotsiopoulos joined George B.H. Macomber Co. as a project engineer.

Jesse Mattern works at Eprise in Framingham, Mass. He married Sarah Haynes last year.

Jason Tomforde (M.S. CS) of Billerica, Mass., works for Cisco Systems.

Our daughter's birth has rapidly changed our cosmopolitan lifestyle (and one-bedroom Manhattan apartment), which we previously shared only with our Jack Russell terrier, Topper.

— Rudolf Minar '88

Graduate Management Program

Retired U.S. Army Corps of Engineers Lt. Col. **Dennis Webster '83** (MBA) lives in Jamestown, R.I. Since retiring from the COE in 1991, he has been active in local and civic affairs.

Donna Akiyoshi '97 (MBA) is a research assistant professor in the Division of Infectious Diseases at Tufts School of Veterinary Medicine. She is working on two projects funded by the EPA and the NIH.

Master of Natural Science

Jerry Jasinski '68, chemistry professor at Keene State College, was the first recipient of the KSC Award for Faculty Distinction in Research and Scholarship. A faculty member since 1979, he also coaches the track team.

Judith Kiernan Sweeny '81 joined the faculty of Illinois Institute of Technology as a senior lecturer in the newly formed department of math and science education. She collaborates with the Chicago Public Schools to create a model program for secondary math and science education in urban public schools and works closely with the Young Women's Leadership Academy, a newly formed charter school on the ITT campus.

Mark Siemaszko '90 chairs the science department at Leominster High School. His efforts to keep his classes entertaining, and the countless hours he dedicates to the FIRST robotics competition, led his principal to dub him a "Pied Piper" when it comes to kids. The *Worcester Telegram & Gazette* reported on some of his unusual teaching tactics in a May 7, 2001, profile.

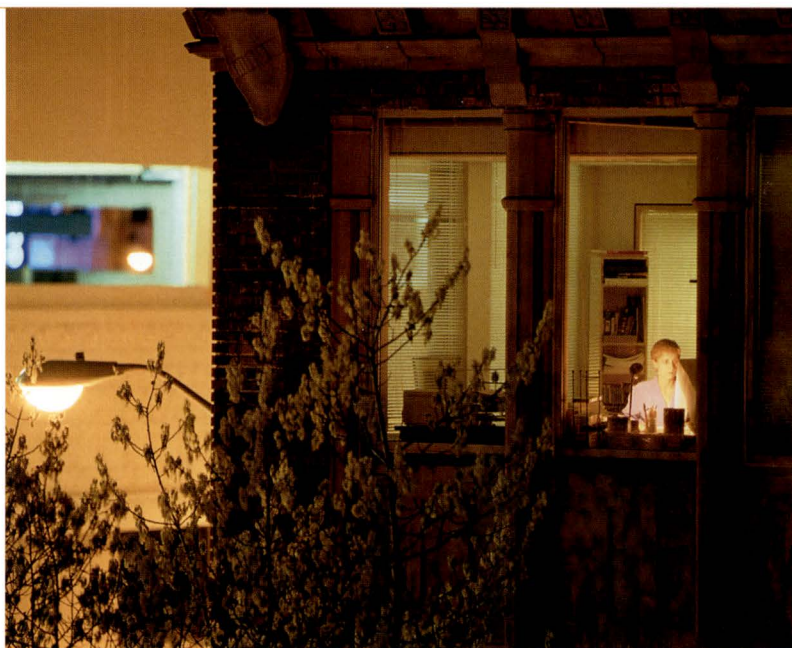
School of Industrial Management

Earl Berry '67 of Holden, Mass., was elected chair of the Service Corps of Retired Executives, Worcester Chapter 173. He is the retired treasurer of Woodbury & Co. of Worcester.

Barry Huston '81 is vice president and director of field operations for National Grid USA's Distribution Group.

James Rouse '97 was appointed president of Micron Products, a subsidiary of Arrhythmia Research Technology. He joined the company from Jarvis Surgical in 1996 and previously served as plant manager.

Douglas Johnson '00 is chief operating officer and managing director of Newcare Inc., a disposable medical products company in Cheshire, Conn.



What's News?

Please let us hear from you with news of your career, marriage, family, address change—whatever. Why not send us a photo of yourself for publication. And, please include your spouse's full name when sending wedding or birth announcements.

Check preferred mailing address.

Name _____ Class _____

☐ Home Address _____ ☐ Check here if new

City _____ State _____ ZIP _____

Job Title _____ Home Phone _____

Company _____ Work Phone _____

☐ Business Address _____ ☐ Check here if new

City _____ State _____ ZIP _____

Corporate Parent Company _____

E-mail Address _____

Personal/career news for **Transformations**

Mail—Alumni Editor, Transformations, WPI, 100 Institute Road, Worcester, MA 01609-2280

Fax—508-831-5820 **E-mail**—jkmiller@wpi.edu

Web—www.wpi.edu/+Transformations (Class Notes are automatically forwarded to the editor)

Due to publication schedules, your news might not appear in print for 3–6 months from receipt.

September 11, 2001

By Joan Killough-Miller

Treading Lightly at Ground Zero

On the morning of Sept. 11, **Tom Carr '96**, a volunteer with the Urban Search and Rescue Team of Massachusetts Task Force 1 (MATF-1), was summoned to the unit's Beverly, Mass., post to await orders from FEMA. By afternoon, he was on his way to New York City for a weeklong deployment at Ground Zero.



From the eerie quiet of the bus ride into the city, under police escort, to his first glimpse of the now unrecognizable remains of the World Trade Center, the experience changed him to the core of his being—in ways he is still discovering.

MATF-1 trainee Chad Council '96, who was recruited by Carr, stayed behind to maintain 24-hour telephone and e-mail contact between families and task force members. Dave Andrade '92, a paramedic with American Medical Response, treated injured civilians and rescue workers from a makeshift field hospital at the Staten Island Ferry's Manhattan terminal. (Read his story at www.sikorsky.com/news/20010913g.html.) Others waited on standby to treat casualties at their local hospitals. "As the day unfolded," says Dr. Bruce Minsky '77, "we realized that we would not be receiving any patients and we understood what that meant. Nothing is more difficult for a physician than to not be able to offer assistance."

Rather than digging through the rubble, Carr, who is trained as a technical information specialist, was assigned to observe and document operations at Ground Zero in a detailed record. "My job can breed a sense of helplessness at times," he admits. "There isn't a person on the crew who didn't want to get in there and make a find." As he stood by taking notes, Carr struggled to remember the importance of his role. "I exist to make sure that we learn as much as possible from this operation," he explains. "By doing my job, I'm going to enable us to do things better later on."

Carr quickly realized that it takes great sensitivity to be pointing a camera around so much death and destruction. "Those on the scene needed to know that we were doing this as documentation for the permanent record—not as a bunch of tourists snapping pictures," he says. Only during breaks and downtime did the emotional impact of the tragedy creep in. "You reach a certain point when you stop consciously thinking about it, because it's so overwhelming," says Carr. "Training and autopilot kick in, and you just go and do what you have to do. After a few hours of downtime, things would flash back, like the stench and char and chaos. None of us really slept well the first part of the week."

Back home in Massachusetts, Carr first took a long shower—after a week of washing in a forest service trailer. Next, he spent some quiet time alone. His weekend plans—to attend Homecoming with his WPI friends—seemed as if they'd been made years ago. Instead, he attended a Critical Incident Stress Debriefing on the weekend after his return. The less-glamorous task of filling out paperwork and putting together an incident report followed.

For more information on MATF-1, go to www.matf.org. The site includes an online application, but cautions that there is already a waiting list for many positions. FEMA's Web site is www.fema.gov.

A case of star-crossed lovers . . .

Bob Beliveau '91 was grateful to have been only "inconvenienced" when the return flight from his Paris honeymoon was diverted to Newfoundland on the morning of Sept. 11. "Sleeping on a mat on the floor of the band room at Holy Heart of Mary High School in St. John's with 30 other people is not my idea of a honeymoon," he says. "Upon hearing of our plight, some thoughtful volunteers surprised us with a card, a bottle of champagne, and something 'special' for Deborah to wear. They even found us a private room for the night." Ironically, this was the couple's second attempt at a honeymoon. The first was aborted

shortly after their June 9 wedding, when Bob jumped over a rock and broke his leg while getting the house ready for a gathering of close friends following the wedding reception.

. . . and mistaken identity

Alumni were concerned about **Chris Mello '96**, until it was learned that the Christopher Mello who was aboard American Airlines Flight 11 on Sept. 11 was a 1998 Princeton University graduate. The two were close in age, had similar job titles, and lived in the Boston area. Oddly enough, WPI's Chris Mello would have been on one of the other hijacked planes—United Airlines Flight 175—had a business trip to Los Angeles not been postponed by two weeks.

In the weeks following the Sept. 11 attacks, the WPI community drew closer, through e-mail exchanges between President Edward Alton Parrish and the alumni e-mail list. Almost 200 alumni—from New York, Washington, Denmark, Hong Kong, Guatemala, and all over the globe—responded via alumni-hotline@wpi.edu to report how they and their loved ones fared during the national tragedy. Many checked in with their WPI roommates and classmates, then relayed their status to the hotline. Sadly, the death of one alumnus—Leonard Taylor '79—was reported. His obituary appears in this issue.

Along with eyewitness accounts, many close calls, and some losses, came comments that showed the true nature of the WPI family. We are proud to share a sampling on these pages.

More responses, along with the text of Parrish's original letters and coverage of the campus response to the events of Sept. 11, may be read at www.wpi.edu/+Transformations. If you would like your e-mail address added to WPI's database, notify alumni-office@wpi.edu. Your comments and reactions are always welcome at alumni-hotline@wpi.edu.

“Thank you for sending out a letter of deep comfort and deep concern.”

— Sang Ki Lee '60

“As one of the first few women on campus back in the '70s, I had a wonderful experience at WPI and will never forget it. I chose WPI over other engineering schools because the spirit on the campus was 'wholistic.' By that, I mean that the students I met seemed to have a complete life perspective . . . they were involved in all levels of society, not just their books and technical interests. Your note and follow-up make me believe that my initial impression still stands.”

— Karen Chesney Honold '78

“After the Worcester warehouse fire in 1999, I was proud to call myself a WPI alumnus in light of all the actions taken by Worcester's educational community on behalf of the fallen firefighters. Once again, I ask what we (WPI) could do for the families and children of the victims as well as fallen emergency personnel in the NYC attack?”

— Paul Paulino '94

“Please don't forget those alumni who are in the military gearing up to defend and protect our country. They need prayers and support also. WPI was and continues to be a very close, special family.”

— Jennifer Atkins '93

“On Homecoming Day, I stood on the quad, thinking back on how many classes have been touched by war, and wondering how many more classes will be. WPI is truly a role model, with people from all countries, religions and socioeconomic standings living together in harmony. It gives me hope to know it can exist on a small scale.”

— Sherri Curria '93

“I am deeply saddened by the loss of my classmate and friend Lenny Taylor. Even though it's been 20 years or so since we were housemates down on Trowbridge Road, I remember it like it was yesterday. The world will miss Lenny because he was a genuinely nice person. The tears are bouncing off the keys. Lenny, you are in our thoughts, and your loved ones are in our prayers.”

— Sidney Afonso '79

“My husband received the e-mail today from President Parrish. I work as an educational consultant helping high school juniors and seniors with the college search process. I have forwarded the letter to all my students who are considering WPI to let them get a sense of the caring and concerned nature of your university.”

— Susan Piqueira, wife of Philip Piqueira '72

“I've been expecting an attack like this for years now. It was just a question of when, where and how bad. Perhaps if history was better taught by our schools, including WPI, then people, our government included, would not have been caught by surprise by this attack. The fundamental lesson of history is that the world is full of desperate, hateful, deluded people who cannot or will not be helped or reasoned with. We need to admit that reality now and take the serious steps needed to make these atrocities less likely in the future.”

— Jeff Barry '74

Trustee emeritus **Chandler W. "Jigger" Jones '26** of Sharon, Mass., died June 3, 2000. He was the oldest member of the board at the time of his death, according to a resolution of sympathy passed by WPI trustees, and a 1970 recipient of the Herbert F. Taylor Award for Outstanding Service to WPI. Jones worked for New England Electric System for 40 years, retiring as vice president of engineering and operations for the New England Power Co. Husband of the late Dorothy (Minnick) Jones, he was predeceased by a son and is survived by a grandson, a granddaughter and four great-grandchildren.

William A. Russell '26 of North Branford, Conn., died Sept. 6, 2000. Predeceased by his wife, Elvie (Need), he leaves a son, two daughters, 11 grandchildren and 18 great-grandchildren. Russell began his career with the New Haven Railroad and retired as a consultant to the Connecticut Department of Transportation in 1988. He belonged to Lambda Chi Alpha and Tau Beta Pi.

Victor E. Hill '27 of Sun City, Fla., died Aug. 31, 2000. He was the husband of the late Lois Hill and the father of two children. Hill was retired from Duquesne Light Co. He belonged to Sigma Xi and Tau Beta Pi.

Francis E. R. Johnson '29 of Keene, N.H., died Oct. 29, 2000. He leaves his wife, Mary (Love), a daughter and a son. Johnson was retired from Allied Corp., where he held a number of administrative positions. He belonged to Sigma Xi and Tau Beta Pi.

Raymond V. Pollard '29 of Tampa, Fla., died July 20, 2000. He is survived by his wife, Elizabeth "Bette" (Hoffman). An Army veteran, Pollard was an assistant state service officer in the Florida

Alumni who wish to make contributions in memory of classmates and friends may contact the office of Development and University Relations at WPI.

Department of Veterans' Affairs and a member of American Legion Post 5 of Tampa. He belonged to Phi Sigma Kappa.

Raymond H. Guenther '31 of Longmeadow, Mass., died April 2, 2001. He leaves his



wife, Hilda (Poehlman), two daughters, three grandchildren and three great-

grandchildren. He was the grandfather of Deborah Murphy Allen '88. Guenther was the retired owner and president of the former Guenther & Handel German Delicatessen in Springfield; he later worked at The Deli in East Longmeadow. He belonged to Sigma Alpha Epsilon.

Howard P. Lekberg '32 of Douglas, Mass., died Oct. 3, 2000. Widower of the late Helen (Carlson), he leaves a daughter, two grandchildren and a great-grandson. Lekberg earned a master's degree in education from Worcester State College in 1967. He taught mechanical engineering at the University of Maine and Central New England College, and later retired from Worcester Junior College as an assistant professor. He was also president of Mumford Motor Sales in Whitinsville. He belonged to Lambda Chi Alpha.

Francis C. Moore '33 of Portsmouth, N.H., died June 18, 2000. Predeceased by his



wife, Lillian (Wolfe), and a daughter, he is survived by a son, a daughter, five grand-

children and a great-grandchild. After retiring from the New Hampshire Water Resources Board as a civil engineer, Moore kept active with surveying and septic design projects.

James B. Rafter '33 of Boca Raton, Fla., died May 16, 2000. Predeceased by his first wife, Julia (Meleski), he leaves two sons, two grandchildren and two great-grandchildren. In 1980 Rafter married Virginia Roundy, who survives, along with a stepdaughter, a stepson and three step-grandchildren. Rafter was retired as divisional managing executive of Armco Steel Co. A member of Pi Kappa Theta, he served WPI as a Class Agent and as vice president of the Northern New Jersey Regional Club.

Warren C. Saltmarsh '33 of Hampton, N.H., died July 1, 2000. He leaves his wife, Doris (Shubert), a son, two daughters and two grandchildren. Saltmarsh was a retired insurance executive who worked for Johnson & Higgins and Factory Insurance Association.

Clarence R. Streeter Jr. '33 of Newnan, Ga., died June 28, 2000. He leaves his wife, Margaret, two sons and two daughters. Streeter retired as president of Dunco Mines Inc., and later ran Mount Whitney Collectables. He held an MBA from the Amos Tuck School of Business Administration.

Warren H. Davenport '34 of Worcester died Feb. 25, 2001. He is survived by his wife, Helen (Thiderman). Davenport received a master's degree in electrical engineering from WPI in 1935 and worked for Norton Co. until he retired in 1974 as chief product engineer, abrasive materials. He was a World War II veteran and a member of Tech Old Timers.

Luther C. "Luke" Leavitt Jr. '34 of Cleveland Heights, Ohio, died April 22, 2001. He leaves his wife, Alma, three daughters and eight grandchildren. Leavitt joined the Otto Konigslow Manufacturing Co. in 1946, became president in 1961, and



retired as chairman in 1977. He later became vice chairman of Melinz Industries. A PAC member and a 1974 recipient of the Herbert F. Taylor Award for Outstanding Service to WPI, Leavitt was active in the Cleveland Regional Club, the Alumni Council and the Alumni Fund.

John B. Coyle '35 of Westland, Mich., died Jan. 18, 2001. His wife, Edna (McGee), died in 1961. Survivors include two sons, two daughters and seven grandchildren. Coyle was an aeronautical engineer who worked for the federal government and United Technologies.

Carl F. Benson '36 of Waterford, Conn., died Dec. 13, 2000.



He leaves his wife, Doris (Peterson), two daughters and three grand-

children. Benson worked for The Torrington Company for 43 years and retired in 1979 as director of research. A skilled woodworker, he learned to build violins in retirement and used his talents to repair and maintain the local senior center.

Walter G. Dahlstrom '36

of Worcester died Dec. 21, 2000. He leaves his wife, Greta (Lindahl), a son, Rodney Dahlstrom '69, a daughter, a step-daughter and seven grand-



children. His first wife, Muriel (Johnson) died in 1967. Dahlstrom earned a master's degree in chemistry at WPI in 1938 and graduated from the School of Industrial Management in 1954. He retired from U.S. Steel Cable Works as chief development engineer after 33 years of service with several patents in his name. A recipient of the 1986 Herbert F. Taylor Award for Distinguished Service to WPI, Dahlstrom was a former president of Tech Old Timers and received its Distinguished Service Award. He belonged to Sigma Xi and Lambda Chi Alpha.

Richard S. Howes Sr. '36 of Sharon, Conn., died Oct. 18, 2000. He leaves his wife, Bettina, a son, and two grandchildren. He was predeceased by a daughter. Howes retired from Lunkenheimer Co. in 1973 after 27 years in the valve business. He belonged to Sigma Phi Epsilon and Skull.

John T. McGrath '36 of Mesa, Ariz., died June 23, 2000. Predeceased by his wife, Katherine (Rafferty), in 1991, he leaves a daughter, two sons, seven grandchildren and four great-grandchildren. McGrath was a teacher, principal and superintendent in Arizona public schools for more than 25 years. He earned a B.S. in education at Arizona State College and an M.A. and Ph.D. from Arizona State University. In 1959, ASU awarded him its first education specialist degree in public school administration. He belonged to Sigma Alpha Epsilon and Skull.

Dana W. Woodward '37 of Marblehead, Mass., died Oct. 20, 2000. Widower of the late



Catherine (Hopkins) and husband of Helen (Morgan Stratton), he also leaves a son, four daughters, nine grandchildren and a great-grandchild. A former vice president of marketing for United Shoe Machinery Corp., he was the retired president and director of American Shoe Machinery Corp. He belonged to Phi Gamma Delta and Skull.

J. Harper Blaisdell Jr. '38 of Lexington, Mass., died Aug. 22, 2000. His wife, Marjorie, survives. Blaisdell was a former Class Agent and a member of Phi Sigma Kappa.

Eric L. Mager '38 of Beverly, Mass., died July 1, 2000. He leaves his wife, Irma (Gourley), three daughters, and a granddaughter. Mager earned a master's degree in chemistry at WPI in 1940. His 43 years of research and development work at GTE Sylvania Lighting resulted in 12 patents. He belonged to Sigma Xi.

Paul M. "Mike" Murphy '38 of Atascadero, Calif., died Nov. 23, 2000. He leaves his wife, the former Margaret "Juddie" Judd, two daughters and a grandson. Murphy earned a master's degree in electrical engineering at MIT and worked at the U.S. Naval Ordnance Laboratory during World War II. He then joined General Electric, where he specialized in nuclear design projects. Murphy retired from G.E. Nuclear Energy Division in 1978 as manager of advanced engineering in the Fast Breeder Reactor Department. A Presidential Founder, he established the Paul M. and Margaret J. Murphy Scholarship Fund.

Leonard Taylor '79

Victim of Pentagon plane crash

Leonard E. Taylor, 44, of Reston, Va., was a passenger on American Airlines Flight 77, bound for Los Angeles from Washington, D.C., on the morning of Sept. 11, 2001, when the hijacked plane was crashed into the Pentagon. He was a technical group manager in the Washington-area office of XonTech Inc., a California-based contract firm that specializes in the design of radar, optics and acoustics sensors for defense and industrial applications. Taylor leaves his wife, Karyn (Orman), two daughters, Jessica and Colette, his mother, his father, two sisters and two brothers.

Born in Pasadena, Calif., Taylor was a graduate of Andover (Mass.) High School. After receiving a bachelor's degree in physics from WPI, he joined XonTech as an analyst in the Special Studies Division in Van Nuys, Calif.

"He was the only one who mentored individuals who had been forsaken by everyone else because they either had little motivation or just never got it. He was able to get productive work out of many of these languishing lost souls," recalled a colleague in his eulogy. Taylor later transferred to the company's Arlington, Va., office. An avid bicyclist who rode in charity events, he formed close friendships with co-workers who enjoyed after-hours sports and commuting to work by bicycle over distances ranging from 15 to 20 miles each way.



George E. Feiker '39 of Niskayuna, N.Y., died July 24, 2000. He leaves his wife, Hazel, two daughters, a son and five grandchildren. Feiker earned a master's degree in electrical engineering at Harvard University. He spent most of his career with GE's Advanced Technology Laboratories, where he managed the electromagnetic radiation and microwave engineering sections. A member of Sigma Alpha Epsilon, Tau Beta Pi and Sigma Xi, he received the Robert H. Goddard Award for Outstanding Professional Achievement in 1964.

Robert J. O'Malley '39 of Davis, Calif., died Jan. 8, 2001. He is survived by his wife, Edna (Moran), two sons, a daughter and four grandchildren. O'Malley joined the Army during World War II and completed his bachelor's degree at Syracuse University in 1954. He went on to earn a master's degree at George Washington University in 1962. In 1968 he retired from the U.S. Air Force as a colonel after 27 years of service. He then became hospital administrator of the Cowell Student Health Center at the University of California, Davis, where he served until 1978. He belonged to Sigma Alpha Epsilon.

Frederick J. Benn Jr. '41 of Plano, Texas, died Feb. 4, 2001.



He is survived by his wife, Lelia (Buaas), a son, a daughter and three

grandchildren. Benn received an MBA from Case Institute of Technology and worked for Norton Co. for 36 years. A former drummer with the Boyntonians, he contributed photographs and anecdotes from his student years to recent WPI publications. He belonged to Theta Chi.

Arthur L. Sullivan Jr. '41 of Monroe, Wis., died June 14, 2000. He leaves his wife, Lorna (Marchant), three sons, four grandchildren and five step-great-grandchildren. Sullivan began his career as a chemist in the radiation department of Arthur D. Little Research Development Co. at MIT. He worked for Atwell Autograph Co. for 33 years and later became a district manager for Dictaphone Corp. He belonged to Theta Chi.

Robert D. Wood '42 of Vestal, N.Y., died March 6, 2000. He left WPI in 1941 to earn his bachelor's degree at Northeastern University and also attended the University of Chicago. Wood spent four years as a meteorologist in the Army Air Force. A former sales engineer for Westinghouse Electric Corp., he belonged to Sigma Alpha Epsilon.

Warren H. Chaffee '43 of Longwood, Fla., died May 5, 2000. He leaves his wife, Barbara (Smith), two sons, a daughter, his mother and four grandchildren. Chaffee was a vice president of Chaffee Bros. and the owner of Cameron Lumber Co. He belonged to Sigma Alpha Epsilon.

William S.C. Henry '43 of Venice, Fla., died Oct. 12,



2000. He leaves his wife, Nancy (Barrows), three daughters and five grandchild-

dren. Henry was a senior electrical engineer at New England Electric Systems' subsidiaries Massachusetts Electric Co. and New England Power Service Co., where he worked since 1965. A senior member and former committee chair of the Institute of Electrical and Electronics Engineers, he authored papers and lectured in his field. He belonged to Alpha Tau Omega.

Samuel H. Coes '44 of Hampton, N.H., died Nov. 11,



2000. He leaves his wife, Nancy (Smith), four sons, five grand-

children and six great-grandchildren. A longtime research engineer for Norton Co., he held 12 patents with the company. He was also a retired lieutenant commander in the U.S. Naval Reserve.

Robert A. Stengard Sr. '45 of Rocky Face, Ga., died Nov. 30, 2000. He leaves his wife, Gwendolyn, three sons, two daughters, several grandchildren and a great-grandchild. Stengard was a technical supervisor at Shaw Industries. He earned a master's degree in chemical engineering at WPI in 1950 and belonged to Lambda Chi Alpha.

Alvin Y. Broverman '46 of Knoxville, Tenn., died Dec. 8, 2000. Family members include his wife, Ann, and a daughter. Broverman was a transformer design specialist who retired from Martin Marietta and continued working as a self-employed consultant.

Garabed Hovhanesian '46 of Worcester, Mass., died May 27, 2001. He is survived by his

wife, Nancy (Sahagian), his son, Jeffrey '78, and a daughter, Nancy. Hovhanesian graduated from the U.S. Navy's V-12 program at WPI, and earned an MBA at Northeastern University in 1954. He retired from General Electric Co. in 1984, after a management career that included establishing GE Housewares in Singapore and serving as the division's president and managing director. He was a former Class Agent and a member of Lambda Chi Alpha.

Jack H. Shank '46 of Berea, Ohio, died on Feb. 18, 1999. A NASA aerospace engineer and a member of Lambda Chi Alpha, Tau Beta Pi and Sigma Chi, he leaves his wife, Jeanne. *Transformations* recently received notification of his death.

Edward R. Stokel '46 of Birmingham, Mich., died Aug. 18, 2000. He leaves his wife, Barbara, two sons, three daughters and 11 grandchildren. Stokel was known as "Mr. Bus," for his longtime career with General Motors Corp., which began on a bus assembly line in the early 1940s. He later became an advocate for public transportation, lobbying for more federal funding to support quality buses. Stokel retired in 1986 as director of public transportation and was inducted into the American Public Transit Association Hall of Fame in 1991.

Irwin T. Vanderhoof '48 of Towaco, N.J., died Sept. 24, 2000. He leaves his wife, Ruth (Green), a son, a daughter and a granddaughter. Vanderhoof was a clinical professor of finance at New York University. He was best known for his application of the quasi-Monte Carlo method (a modification of the standard calculation) in figuring the worth of financial derivatives. Vanderhoof's adaptation of Monte Carlo methodology, since used in physics, earned him a patent. He also served as an actuary and a consultant and was the author and editor of numerous publications, including finance books and actuarial and scientific journals. He belonged to Alpha Tau Omega.

Harvey L. Pastan '49 of Chestnut Hill, Mass., died Sept. 12, 2000. Survivors include his wife, Barbara B. Pastan, two daughters, and two grandchildren. Pastan was predeceased by his first wife, also named Barbara. He was a vice president at Arthur D. Little Inc. and a member of Alpha Epsilon Phi and Sigma Xi.

Donald R. Skeffington '49 of Ipswich, Mass., died Feb. 21, 2001, after a six-month battle with cancer. He leaves his wife, Barbara (Farquhar), a son, a daughter and two grandchildren. Skeffington worked for United Shoe Machinery Corp. and MacMillan Labs, and later retired from GTE/Sylvania. He belonged to Theta Chi.



Jeremy Welts '50 of Waltham, Mass., died Oct. 31, 2000.

He leaves his wife, Eve (Primpas Harriman), four sons, two daughters and 11 grandchildren. Welts was an electrical engineer at Raytheon Research Division for 40 years. A trombone player, he founded the Middlesex Brass Quintet and a family group called The Welts Winds. He belonged to Phi Sigma Kappa.

Rafael R. Gabarro '51 of Lowell, Mass., died March 1, 2000. He leaves his wife, Teresa (Skorupski), two sons, four daughters and 12 grandchildren. Gabarro was retired from Union Carbide Corp. as manager of site operations and technology.

Albert H. Lorentzen '51 of Natick, Mass., died on Feb. 21, 1999. He was retired from the U.S. Air Force as an electrical engineer. *Transformations* recently received notification of his death.

Carl J. Luz Jr. '51 of Bedminster, N.J., died Aug. 26, 2000. He is survived by a daughter and two grandchildren. Luz was president of Esco Plastics, which he founded in 1975. He belonged to Sigma Phi Epsilon.

Joseph S. Vitalis Jr. '51 of Manassas, Va., died May 24, 2000. He leaves his wife, Janet, three sons and two grandchildren. Vitalis was a chemical engineer with the Environmental Protection Agency. A former mayor of Crestwood, Mo., he earned an MBA at Washington University and belonged to Sigma Alpha Epsilon.

Warren A. Ellsworth Jr. '52 of Panama City, Fla., died June 16, 2000.



He leaves his wife, Edith, two daughters, a stepson, two stepdaughters, 12 grandchildren and a great-granddaughter. Ellsworth worked for M.B. Electronics, where he managed projects involving underwater sonar equipment for the Navy.

Roland E. Walker '52 died on Nov. 8, 1999. A member of Lambda Chi Alpha, he worked for Polaroid Corp. He and his wife, Constance, had three sons. *Transformations* recently received notification of his death.

R. Taylor Holmes Jr. '53 of Holden, Mass., died Dec. 7, 2000. He leaves his wife, Helen (Gustafson), four daughters and six grandchildren. Holmes was a mechanical engineer for Baystate Abrasives. He belonged to Sigma Alpha Epsilon.

Kenneth W. Shiatte '53 of Glenmont, N.Y., died July 22, 2001. He leaves his wife, Norma (Jewell), a daughter and two grandchildren. He was predeceased by a son, Wayne Shiatte '78, and established a scholarship in his name in 1979. Kenneth Shiatte began his career in transportation engineering with the California Division of Highways in 1953. He joined the New York State Department of Transportation in 1962 and retired in 1998 as assistant commissioner for engineering and chief engineer. Shiatte belonged to the President's Advisory Council and Lambda Chi Alpha.

Dennis F. Sullivan Jr. '53 of Sutton, Mass., died July 5, 2000. He leaves his wife, Jean (Davidson), and a son. Sullivan graduated from WPI's School of Industrial Management in 1974. He worked at the Heald Machine division of Cincinnati Milacron for 38 years.

Forrest E. Marcy '54 of Bedford, N.H., died Aug. 1, 2000. Survivors include three nieces, a grandniece and nine grandnephews. A member of Sigma Xi and Eta Kappa Nu, Marcy held a master's degree from Yale University. He worked for IBM as a software engineer for 30 years.

Roy E. Peterson '54 (SIM) of Worcester died Nov. 22, 2000. He was 90 years old. He leaves his wife, Vera (Holger), a son and three grandchildren. Peterson, a retired industrial engineer, was a graduate of the Mechanical Arts School of Boston.

Warren T. Munroe '60 of Windham, N.H., died Oct. 14, 2000. He leaves his wife, Ruth (Wiesel), a son, two daughters and two grandchildren. Munroe was a computer programmer at Liberty Mutual Insurance and a former employee of Lucent Technologies. He belonged to Alpha Tau Omega.

Peter J. Piecuch '60 of Bethesda, Md., died Oct. 31, 2000. He was the retired executive editor of *Water Environment Research*, a professional journal for the water quality industry, published by the Water Environment Federation. Piecuch also held a master's degree from Stevens Institute of Technology and a bachelor's degree from Columbia University. He began his career as a chemical engineer for E.I. duPont de Nemours & Co., and also served as a correspondent for the American Chemical Society and the editor of *Environmental Science and Technology*. Survivors include his wife, Kathleen, a son, two daughters and eight grandchildren.

Richard H. Tremper '61 of Lewiston, Calif., died on March 25, 1999. A former marketing researcher, he married Susan Grady in 1960. *Transformations* recently received notification of his death.

Nishan Teshoian '63 of Charlotte, N.C., died Aug. 28, 2001. He leaves his wife, Anna, a son and two daughters. Teshoian was the retired president and chief operating officer of Coltec Industries. A graduate of General Electric Co.'s Manufacturing Management Program and Stanford University's Executive Program, he was honored with WPI's Robert H. Goddard Award for Outstanding Professional Achievement in 1998.

William M. Lawler '65 (SIM) of Paxton, Mass., died March 21, 2001, at the age of 81. He is survived by his wife, Virginia (Finneran), a son, two daughters, six grandchildren and a great-grandchild. A graduate of Worcester Junior College, Lawler was an industrial manager who worked for George J. Meyer and several other area companies before retiring in 1989.

Michael R. Mauro '66 of Old Saybrook, Conn., died Oct. 22,



2000. He is survived by his wife, Elaine (Shepard), a son and a daughter. Mauro worked at Electric Boat for 34 years. He belonged to Phi Kappa Theta.

Jack L. Cristy '71 of San Jose, Calif., died May 8, 2000. Husband of Mary Ann Cristy and founder of Christy Associates, he was also a quality engineer for Litton-Amecom and a senior industrial engineer for Fairchild Industries.

Charles "Ray" Chase '72 of Thomaston, Maine, died June 3, 2001. Son of Charles C. Chase '49, he also leaves his

wife, Jeannine (Boudoin) and two daughters. Chase's career included posts as superintendent of the Brewster, Mass., and Camden, Maine, water departments. He later worked at Consumers Maine Water Co., Maine Sport and Summit Geo-Engineering.

James D. Hall Jr. '72 of Lincoln, R.I., died Jan. 21, 2001, after a battle with leukemia. He leaves his wife, Lori (Hebert), two daughters and two stepdaughters. Hall was senior vice president for product development and chief marketing officer of Aero Co. He held an MBA from Harvard University and belonged to Alpha Epsilon Pi and Skull.

Montri Viriyayuthakorn '72 of Norcross, Ga., died Oct. 28, 2000. He received a master's degree in mechanical engineering from WPI in 1975 and worked for Norton Co. for 21 years. An expert in the field of fiber optics, he held 11 patents and had three more pending at the time of his death.

Donald E. Gilman '76 (SIM) of Warren, Mass., died June 12, 2000, at the age of 65. He leaves his wife, Alice (Mallon), three sons and a grandson. Gilman worked at Warren Pumps as a systems analyst for 35 years.

Raymond A. Beauvais '78 (MNS) of Taunton, Mass., died Nov. 15, 2000, at the age of 56. He is survived by his wife, Sandra (Benoit), two daughters and a grandson. A graduate of Southeastern Massachusetts Technical School, he taught physics at Attleboro High School for 30 years.

William E. Penniman '78 (SIM) of Acton, Mass., died Sept. 15, 2000. A graduate of Boston University, he spent 45 years with Lund International, most recently as a marketing manager. Surviving family members include his wife, Shirley (Olsen), six sons, a daughter, and 17 grandchildren.

Forty Years of Lighting the Lights

By Amy Marr '96

Hundreds of student organizations have come and gone since WPI's founding. Only a few can measure their histories in decades. Among them is Lens and Lights, which hit the 40-year mark in 2001.

The Worcester Tech Lens and Lights Club was formed in 1961 by James A. Day '62, who borrowed the organization's name from his high-school AV club. With Robert Gardner '62, Stephen Noble '64,

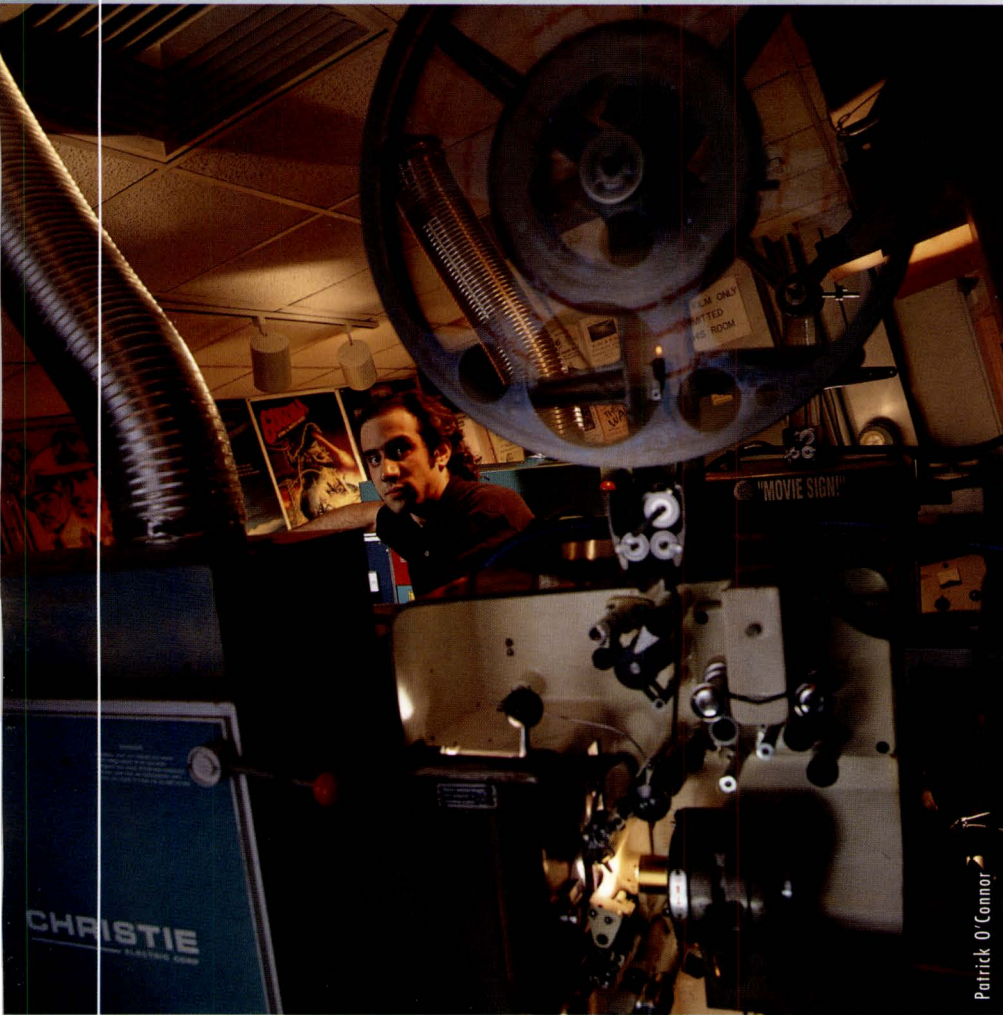
The club's early projects focused on making improvements to the performance and film projection facilities in Alden Memorial. A 1961 document outlines more than a dozen projects in progress, including repairs to permanent lighting fixtures, ways to address fire protection issues in the main hall, and a complete overhaul of Alden's 16mm projection system.

By April 1962, the club had assumed responsibility for the Alden projection booth, which at that time housed a pair of 35mm Simplex projectors left to WPI in the 1940s by the U.S. Navy, which had used them to show recruitment films. The club cleaned and repaired the projectors and returned them to service. It also started a weekly film series and a program for projectionists.

Some things have changed since those early days. About a decade ago, the projection booth moved to Fuller Laboratories, and the Alden booth was closed permanently. The Simplex projectors have been taken out of service; one is on permanent display on the main floor of Gordon Library, part of an exhibit celebrating the club's history. The WPI Social Committee now sponsors the film series started by Lens and Lights, but club members man the projectors behind the scenes. In 2001, the club moved its base of operations from Alden to the new Campus Center.

But Lens and Lights still provides lighting, audio and projection services to the community, as it did 40 years ago. What's the secret of its success? In a letter to the club some years ago, Kent Multer '75 summed it up: "I have many fond memories of the time I spent with L & L. It had (and I imagine it still has) the distinction of being more than a typical student club; it's more like a business that takes responsibility for serving the community, as well as providing its members with a lot of good times and neat techno-toys to play with."

With the advent of DVDs and digital projection technologies, the club should have no shortage of neat toys to play with or new services to offer the community. Though the technology may change, the club will likely remain true to the vision that has kept it going strong for four decades.



Lens and Lights head projectionist Zac Mouneimneh '01 shows off the club's modern-day projection facilities in Fuller Laboratories.

John Schmidt '64 and William Swiger '64, Day founded the club on the model of an audio-visual services business, providing lighting, audio and film projection services to the campus community, and funding repairs and equipment purchases by collecting fees.

Marr, who holds a bachelor's degree in technical communications and a master's in marketing from WPI, is manager of Web development for the university and advisor to Lens and Lights. You can reach her at trek@wpi.edu.

COME BACK TO WPI WITHOUT LEAVING HOME.

Faded sweatshirts look great as they get older, but eventually they do fade away. That WPI mug won't last forever, and eventually you will lose your cap...but you don't have to lose faith.

This is not a problem of engineering proportions...not when your WPI bookstore has all those things and a whole lot more.

wpibooks.com

Jackets, diploma frames, alumni chairs, even afghans and stadium blankets are just a click away at wpibooks.com.

If it's easier for you to call, our toll-free number is 1-888-wpi-books... and if you happen to be nearby, come visit us at our new location in the Campus Center.



TATNUCK BOOKSENER @ WPI

508-831-5247 • 1-888-wpi-books • Fax: 508-459-6298

HOURS: Monday-Thursday 8-7 • Friday 8-5 • Saturday 11-5

A Future **Odyssey**

Sir Arthur C. Clarke, the noted science fiction author and screenwriter for the 1968 film *2001: A Space Odyssey*, made his second visit to campus on Nov. 30. He first came to WPI in 1969 to deliver a lecture to an audience that included Esther Goddard, widow of rocket pioneer Robert Goddard '08. His latest visit was a virtual one. He appeared in a videotape (seen here) offering his predictions for the next century, and then answered questions by telephone from his home in Sri Lanka as part of "Imagining the Future: Visions of the World to Come," a multimedia voyage into the future held in the Campus Center Odeum. The event also featured a wide-ranging discussion by three panelists: best-selling author and artificial intelligence pioneer Ray Kurzweil, Alison Taunton-Rigby, a leader in the biotechnology industry, and David Cyganski '75, professor of electrical and computer engineering at WPI. Scott Kirsner, columnist for *The Boston Globe*, moderated. Streaming video of the event can be viewed at www.wpi.edu/News/Events/Future/. To request a copy of the complete video, contact *Transformations* (see the masthead on page 2 for contact information). A report on the event will appear in the Spring 2002 issue.

