

innovations

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TEKBOTS™ INC: PEOPLE, KNOWLEDGE & INNOVATION

by Professor & Department Head, Terri Fiez

When I talk to people who have been part of a successful start-up, they always say their greatest reward is the personal satisfaction they gain from their company's success. I've never been part of a start-up company, but I think I am beginning to experience what it must feel like. It all started this summer with initial venture funding from Tektronix for our TekBots™ concept....

Like any successful start-up, we needed a killer team. I don't have any hard rules for creating a really great team, but when I am part of a team that has a lot of fun working together, it feels right. Working with the TekBots team feels that way.

Let me introduce our team. Professor **Wojtek** (talks fast, thinks faster) **Kolodziej** is continually pushing the boundaries of our efforts. He has led pilot programs integrating "whiskers" into our robots. He also collaborated with the Department of Art to design a new course in "Creative Art Projects" based on the TekBots. That collaboration resulted in an art show plus an awesome recruiting video we will distribute soon. He envisions the TekBots program creating true renaissance men and women, able to do it all.

Roger (can't get the Intel out of him) **Traylor** keeps us on track to deliver tangible, meaningful opportunities for the students. As the instructor for the freshman TekBots course (ECE 112), he captivates their interest and inspires the students to go beyond what they learn in class.

THE TEKBOTS CONCEPT

Create a platform for learning used throughout the entire undergraduate program where the students *have fun* applying what they have learned. A robot constructed the freshman year becomes each student's custom companion. They add innovations and capabilities to the robot based on the theory they are learning in each class. Our goal is for all graduates to have created a personalized wireless internet controlled platform.

I think he gets nervous when we take some of his crazier ideas and run with them. For instance, as we were talking about creating the BeaverBot, he joked that it would be fun to have it dance to the OSU fight song. Before he could stop us, we had assigned it to the team for implementation.

Don (diving in for action) **Heer** is an ECE graduate student who can't help but get involved. Passionate about education and playing with robots, Don is leading our efforts to integrate TekBots into a sophomore digital logic class (ECE 272).

This summer, Don mentored three of our TekBot prodigies: **Siv Fern** (throw me into the fire) **Chang, Katy** (bubbling over with enthusiasm)



The TekBots™ team: Top row: Roger Traylor, Terri Fiez, Wojtek Kolodziej. Bottom row: Albert Levi, Levi Bennett, Siv Fern Chang, Don Heer, Gale Sumida, Missing: Chris McGlothlin, Katy Nixon, and Jim Le.



Continued on page 2

THE STUDENTS' VIEW

"I believe Tekbots will make labs a lot more fun and exciting. It will be something to actually look forward to each week." —*Siv Fern Chang*

"My favorite part of this program is the ability for the TekBots unlimited expansion, and how they grow as the students' knowledge grows. Plus I really love how the TekBots allow for hands-on exposure to classroom material. It makes learning a lot more interactive and fun!" —*Katy Nixon*

Nixon and **Jim** (when I get it working I'll smile like crazy) **Le**. Siv and Katy had just completed their freshman year when they joined us, but quickly proved they were a vital part of our team. They put our web page together, performed a complete market survey, and helped develop and test our new platform for the TekBots. We've thrown them in front of audiences and they consistently show that nobody, not even VPs of fortune 500 companies can intimidate them or dampen their enthusiasm.

Jim (now a junior) joined us later in the summer and proved to me that there is nothing more satisfying to a student than seeing their project work. He explored innovations students can add to their TekBots to extend their classroom learning. My favorite meeting this summer was when Jim demonstrated the electronics he had programmed to play the OSU fight song. He looked so serious as he plugged in the last wires but when the music played, the smile on his face said it all!

Finally, **Chris** (where the rubber meets the road) **McGlothlin** has led much of our hardware development. He started working on this project over two years ago and created the electronics for the TekBots' "whiskers." In his new role as a TekBots engineer, he is an infinite source of knowledge on what the students do and don't understand and how to put important concepts into practice.

This fall we added several new recruits to help take us to the next level in our venture (or maybe adventure better describes it). **Albert Levi** and **Levi Bennett** are creating a platform to take TekBots to "infinity and beyond." Meanwhile, **Gale Sumida** is helping us collaborate with education, art, business, and other engineering departments to make this a truly interdisciplinary effort.

Our weekly team meetings are filled with a lot of laughter and heated arguments over what our students should experience and how best to educate them. There are days when it seems like we should end the meeting with a group hug and others where going out behind the building to duke it out seems more appropriate. It just doesn't get any better than this!

Our team is a community committed to innovation and problem-solving, and this is what the department is building on in our undergraduate curriculum. I have no doubts that we will continue to grow as we increase the community of undergraduates personalizing their TekBots with innovations.

Our TekBots team has reaped the personal rewards of a startup. We have watched the transformation of Siv Fern Chang, Katy Nixon, and Jim Le into successful inventive, poised, and enthusiastic contributors on our team. This is the kind of transformation we want every one of our students to experience. And I am confident that this program can make it happen!

I am also certain that continually improving quality programs like TekBots is vital to the success of our program.

To contribute your ideas and comments on the TekBots

program go to www.tekbots.com. ■



Siv Fern Chang (left) and Katy Nixon (right) proudly show their TekBots with team member Don Heer (back).

FAST FACTS

TOTAL ECE STUDENTS

	1998/99	1999/00	2000/01	2001/02
<i>Ugrad Students</i>	516	570	628	686
<i>BS Graduates</i>	85	89	130	125*
<i>Grad Students</i>	90	104	122	171
<i>MS/PhD Graduates</i>	36	33	35	37*

*Projected

Students IN THE News

ENERGIZED STUDENTS ADVANCE WOMEN'S PROGRAM

Here at Oregon State we are creating an environment targeted at increasing the number of women and other minority students in engineering.

Engineering Chicks Rule!
—Evelyn Perez
Sophomore, Computer Science

This is one of Department Head Terri Fiez's passions. She challenged the 2000-01 Freshmen Women

to help create a women's program for the department. Five bright women accepted the challenge, dubbing themselves the LEDs



Evelyn Perez

(Ladies in the ECE Department): **Siv Fern Chang, Evelyn Perez, Katie Schimmer, Thuy-Anh Tran, and Becky Van Wormer.**

The LEDs energetically embraced their mission. They researched programs at other universities. They created a brochure targeted at young women. They even created a peer-mentoring program adopted by the College of Engineering's (COE) Women's Program. Besides planning events for ECE women, they also helped plan and staff events for the College of Engineering's Women's Program like the Fall Barbeque and Chocolate Fest.

"We brought the women in the College of Engineering together. That is no small feat," said Evelyn Perez (now a Computer Science major). "It was nice to see us all together in one room encouraging and supporting one another."

So how do they feel about their first

year? "Engineering chicks rule!" smiled Perez. (With the LED's infectious enthusiasm it's hard to imagine something they can't accomplish.) Siv Fern Chang agreed. "It was cool to have a leadership role. Contributing to the ECE Department made me feel significant and helped me to feel more comfortable because I was able make good connections with other women in my class."



Siv Fern Chang

Thanks to the efforts of these dedicated women, incoming female students can now find a community of women ready and waiting to welcome them. ■

COMPUTER ENGINEERING UNDERGRAD WINS INTEL GRANT

This fall Computer Engineering student **Eriko Nurvitadhi** received a \$2000 grant from Intel's Microprocessor Research Lab for his proposal "Cellular IP and Proxies for Multimedia Data Transmission in Campus Networks." Other award winners included students from universities such as MIT, Georgia Tech, Princeton, and Cornell.

As an Intel Research Award Contest winner, Nurvitadhi will present his research findings to a panel of distinguished panelists at Intel's corporate headquarters in Santa Clara. The top three projects will be awarded cash prizes of up to \$5,000. Our congratulations and best wishes to Eriko Nurvitadhi as he prepares for the final phase of the competition! ■

Edith McDougall Scholarship

Some of you may recall former ECE Administrative Assistant **Edith McDougall**. An OSU alum, she graduated in 1930 and worked for our department for over 35 years before retiring in 1972. At the age of 96, McDougall passed away this spring.

Prior to her death, she made a provision in her will establishing the McDougall Scholarship which will provide funds for several undergraduate and graduate students each year. Thanks to her gift, many future engineers will be able to pursue their dreams. ■

Industry Impact

CORPORATE DONATIONS TRANSFORM LABS

Sun Goes the Extra Mile

How do you support education when economic times get tough? **Sun Microsystems** came up with a creative solution. Sun engineers **Bryce Shroder**, **Dan Golden**, and **Paul Pfeffer** arranged to donate 30 Ultra 10 workstations plus a server that were surplus. Then they along with **Pete Libke** and OSU alum **Harry Soehalim** loaded the workstations into vans, drove to Corvallis, and set up the equipment themselves. "Sun really went the extra mile," said Department Head Terri Fiez. "They have also secured OSU a place on Sun's top-20 university list, which will open more funding opportunities."



Sun's donated equipment directly benefits ECE undergrads.

Dave Perillo, Director of Site Operations for the company's Hillsboro office reaffirmed their commitment. "As part of our continuing relationship with OSU, Sun Microsystems is extremely pleased to contribute these computing resources to ECE," Perillo said.

HP Funds Mobile Learning Solutions

Universities have long encouraged small-group collaborative learning. Now with a \$220,000 equipment grant from **Hewlett Packard (HP)**, **Dr. Ben Lee** and IME faculty Drs. Rick Billo, Toni Doolan, and David Porter are working towards taking that concept to the next level. Their "Mobile Technology Solutions" research is working to enhance learning using wireless technology in classrooms. They are also

It is **Exciting** to see an **interdisciplinary** team... **working together** toward a **common goal.**

—David Hackleman
Chief Technology Officer, Hewlett Packard

developing wireless, mobile solutions for industrial problems and improving the wireless network's infrastructure for transmitting multimedia. Lee's portion of the research focuses on ways people can seamlessly connect to a wireless network that delivers media-rich content to a resource-poor platform.

"It is exciting to see an interdisciplinary team of engineering departments working together toward a common goal," said **David Hackleman**, HP Chief Technology Officer. "We are looking forward to a continued mutual learning process over the grant term and beyond." ■

COMPANIES PROVIDE NEEDED EQUIPMENT

Over the past few months, industry has generously donated several items to our department. We are grateful for industry's continued support of our program. Thanks in part to the dedication of these and our other industrial partners we continue to improve the quality of our education and research as we move towards Top-25 ranking. ■

Company	Donation	Value
Cypress Semiconductor	PSoC designer development kits, software, equipment set-up and support, etc.	\$15,000
Elanix	System View communications design software & license	\$52,500
HP	Thickness meter, scopes, x-ray fluorescence machine, nano equipment, etc.	\$472,000
Intel	Computer workstation with 3 years hardware support	\$12,100
Intersil	Wireless LAN kit with PCMCIA cards and hub	\$2,500
Tektronix	Oscilloscopes, power supplies, multimeters, logic analyzers, etc.	\$70,350
Xilinx/Digilent	Xilinx software and Digilent boards	\$40,000

GRAD STUDENT HELPS BROKER INTEL DONATION

This summer OSU grad student **Jeff Bender** went above and beyond the call of duty, making a positive difference for current and future students. While interning at **Intel**, he discovered the company was going to get rid of two rapid thermal processors plus two RF generators. Bender knew his advisor **John Wager** could use that equipment in the OSU electro-luminescent research lab, so he discussed the donation with

Intel is excited to assist the ECE department as it works on world class research.

—Paul Kingzett
Yield Engineering Manager, Intel

Paul Kingzett, Intel Fab 15 Yield Engineering Manager and Wager. Thanks to Bender and Kingzett's efforts, ECE was able to acquire the equipment worth \$300,000 at no cost.

Kingzett, an OSU alum himself, was happy to help. "Intel is excited to assist the ECE department as it works on world class research," said Kingzett. "This is one of

several gifts Intel has made this year to assist OSU's pursuit in becoming a tier-one engineering school." ■

INDUSTRY SPONSORS SECOND IEEE DINNER

This past October, nearly 180 students, industry representatives, and faculty filled the Memorial Union Ballroom for the second annual IEEE Industry-Sponsored Dinner. Sixteen companies sponsored 20 tables at the event which took place the evening before OSU's Fall Engineering Career Fair.

This year, the seniors displayed posters showcasing their design projects at the dinner. **Dale Klotz**, Senior Manager of **Intersil**'s Kent, Washington office, found this "ice-breaker" to be quite valuable. "We talked with several seniors that are conducting projects very much in-line with our products. [But] the best part of the evening is seeing so many qualified and ambitious students that know how to conduct themselves as professionals."

OSU IEEE President **Charlie Myers** feels the event is very important for students.

"The networking [opportunities] and exposure to industry is invaluable in preparation for finding jobs and making educated decisions about those jobs." Klotz agreed. "The entire event is well planned and leaves the participants free to discuss career opportunities. At the end of the evening you have a good idea of who will be stopping by your booth at the Career Fair."

Plans are already in the works for the next IEEE recruiting activity, scheduled for Feb. 19. Mark your calendars and stay tuned for more information! ■



IEEE Dinner Introductions: Barry Baril (Credence/IMS) meets ECE Seniors Deidra Bond and Elysabeth Cavin.

Six ECE Alums Honored by College of Engineering

This fall, six illustrious ECE alums received Oregon Stater Awards from OSU's College of Engineering. Formerly known as the Distinguished Alumni Awards, the Oregon Stater awards are given annually to engineering alums that have significantly impacted their professional community and/or Oregon State. Please join us in congratulating these folks on this well-deserved honor!

(For more information on the awards visit: <http://www.engr.orst.edu/oregonstater/>.) ■

Hall of Fame

Robert B. Johnson
Lee S. Ting

Academy

David Hackleman
Jen-Hsun Huang

Council

Abhijit Talwalkar
Howard C. Yang

On THE Cutting Edge

TAKING RESEARCH TO THE NEXT LEVEL: *SEE-THROUGH ELECTRONICS*

ECE faculty **Dr. John Wager** is working with chemists, physicists, and people in industry to develop new types of thin-films. These projects have gained interest from several groups including, the **National Science Foundation**, **HP** and the **Army Research Office**. Thanks to these contributors, Wager and his colleagues have raised more than \$2.6 million in research funds to pursue these projects.

Two of these projects involve transparent electronics. The goal is to make invisible electronic circuits that you can see through. So what might some of the applications of transparent electronics be?

“Flat-panel displays, lighting, solar cells, smart windows, and other military, consumer electronics, and automotive applications are likely, but at this point we really don’t know,” Wager said. “We have a lot of materials/device selection and optimization work to do before we are ready to seriously tackle most types of applications.” (Clearly these projects epitomize the word “research.”)

“Right now, transparent electrical applications include energy-efficient windows, touch screens, heated glass freezer doors, plasma and liquid-crystal displays, solar cells, anti-static coatings, automobile win-

The goal is to make
Invisible
electronic circuits.

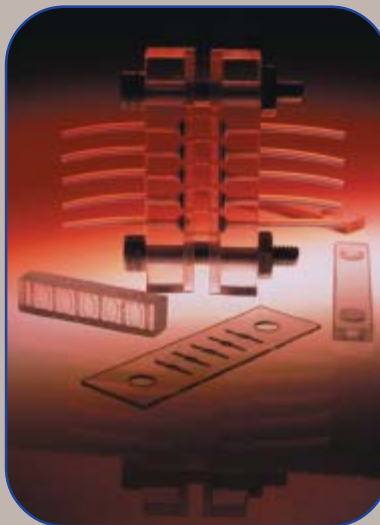
dow defrosters, clear coatings for packaging, etc,” Wager continued. “You would think that there would be many more transparent electronic applications than electrical applications.”

Thus, this space-age frontier is just too new and undefined to know for certain which products will emerge. But the prospects are exciting! ■

Specialized Cells

You might have heard of MEMS (micro-electro mechanical systems) but have you heard of MECS? MECS stands for microtechnology-based energy and chemical systems and ECE faculty **Drs. Wojtek Kolodziej** and **Tom Plant** are working on biological applications for MECS (BioMECS). This interdisciplinary effort has raised over \$3 million for research. A number of departments on campus are involved in the research efforts including Bioengineering, Chemical Engineering, Industrial and Manufacturing Engineering, Mechanical Engineering, Microbiology, Biochemistry and Biophysics.

So what exactly are the applications that BioMECS is seeking to develop? In this case they are tiny cytosensors. Cytosensors use living cells to measure and identify agents by detecting changes in the cells’ physiology. Kolodziej and Plant are developing a computerized optical system, which is integral to the cytosensors, plus researching novel ways to detect different substances. ■



Cytosensor developed by the MECS team.
Photo © Gary Tarleton

SRC FUNDS OVER \$1 MILLION IN RESEARCH

Analog/mixed-signal integrated circuits are an integral part of everything from cell phones to cable modems. Experienced researchers in analog/mixed-signal integrated circuit research can be hard to find, except of course at OSU!

The **Semiconductor Research Corporation** (SRC) is currently funding several research projects led by **Drs. Karti Mayaram** and **Terri Fiez** that total over \$1.3 million. Mayaram’s research projects focus primarily on mixed-signal integrated circuit (IC) modeling and simulation, while Fiez’s center more on analog/mixed-signal IC design. Thanks to the work of these two professors, six OSU grad students are receiving tuition and benefits for their work as research assistants on the SRC projects. ■

ECE Newsmakers

ECE FACULTY & STAFF HONORED

This past September, the College of Engineering (COE) honored two ECE personnel at their annual awards breakfast. In recognition of his “outstanding and sustained research leadership,” **Dr. Çetin Koç** received the COE Research Award. Koç is Director and Founder of ECE’s Information Security Lab which researches and develops ways to keep electronic commerce and information secure.



Dr. Çetin Koç



Manfred Dittrich

Development Engineer **Manfred Dittrich** was also recognized with the Outstanding Classified Employee Award for his “outstanding job performance and scientific achievement.” Dittrich runs the Engineering Shop and does everything from helping design rugged bases for the TekBots™ to developing mechanical systems.

Needless to say, we are honored to have both Koç and Dittrich on the ECE team! ■

POWER ELECTRONICS UPDATE

Drs. Alan Wallace and **Annette von Jouanne** have truly been “busy beavers.” As chairs of the June 2001 “IEEE Power Electronics Specialists Conference” they organized a technical program for about 600 digests. In addition to their ECE teaching loads and research projects, they also taught an industry short course on “Adjustable Speed Drives and Utility Application Issues.”

To find out more about their latest projects, short courses, etc., visit the OSU Motor Systems Research Facility web page: www.ece.orst.edu/~msrf/. ■

ENCYCLOPEDIA RELIES ON ECE

When *The World Book Encyclopedia* wanted to update its section on remote control, it consulted **Dr. Molly Shor**. Shor edited and wrote explanations of how remote controlled devices work, their applications and their history. ■

INFORMATION SECURITY LAB LEADER IN DEMAND

As Director of OSU’s Information Security Lab, **Dr. Çetin Koç**’s talents are in demand by many professionals. Koç is currently serving as Guest Editor for an *IEEE Transactions on Computers* special issue on “Cryptographic Hardware and Embedded Systems.” He’s also the founder and program chair for the Workshop on Cryptographic Hardware and Embedded Systems (CHES) which will be holding its fourth workshop in August.

When he’s not teaching or helping his professional society, you can find him working on ISL research projects or consulting. For more details on his latest cryptographic research efforts, go to security.ece.orst.edu. ■



Dr. Karti Mayaram

MAYARAM NAMED EDITOR OF IEEE JOURNAL

We are pleased to announce that **Dr. Karti Mayaram** has been named the Editor-in-Chief of *IEEE Transactions on Computer-Aided Design (IEEE TCAD)* for a two-year term starting January 1, 2002. Over the past six years, Mayaram has volunteered as an associate editor for the journal in “Modeling, Simulation and Estimation.” More information about this journal can be found at tcad.ece.orst.edu.

Our congratulations to Mayaram on this worthy achievement. ■

New Faces

INTRODUCING...

This past August, **Dr. Huaping Liu** joined the ECE faculty. An active part of the communications faculty, he is teaching digital communications system design and pursuing research in wireless communications, signal processing and digital communications system design.

Liu holds an MS from Nanjing University of Posts and Telecommunications in China and a Ph.D.



Dr. Huaping Liu

from New Jersey Institute of Technology. He previously worked for Bell Laboratories and Lucent Technologies.

Our newest faculty member is Computer Engineering faculty **Wen-Tsong Shiue**. He previously worked at Motorola, Silicon Metrics Corporation and was formerly an adjunct professor at Tamkang University in Taiwan. The author of numerous



Dr. Wen-Tsong Shiue

papers, Shiue has a master's degree from Western Michigan University and a Ph.D. from Arizona State University.

Shiue's research interests include VLSI for portable computing and wireless communications, VLSI/CAD algorithms, low-power design, memory design for low-power, retargetable compilation, VLSI architectures and algorithms for signal processing and image processing, VLSI physical design, accurate power estimation techniques and parallel processing.

Visiting us from Changwon National University in Korea is **Dr. Taein Kwon**. He earned his MS and Ph.D. in Mathematics from Dankook University. Kwon is working with Dr. Çetin Koç on a project in elliptic cryptography. Formerly the Chair of the Department of Applied Mathematics at Changwon National University, Kwon plans to return as a professor once his project is completed.

This November, **Gale Sumida** also joined our staff as a Research and Development Coordinator and is already hard at work helping our department with research initiatives and other related projects. Sumida comes to ECE from OSU's College of Engineering Advancement Office.

Please join us in welcoming these folks! ■

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