

engineering

IN THE VALLEY & BEYOND

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ROBERT BAIN

The need for speed

SPARTAN RACING TEAM BUILDS FORMULA-STYLE CAR FOR COMPETITION

Q What weighs 400 pounds and can zoom from zero to 60 mph in less than 3 seconds?

A If all goes well, the Formula-style race car being built by members of Spartan Racing, the San José State University chapter of SAE International (formerly the Society of Automotive Engineers).

Engineering the future

NEW DEAN ANDREW HSU ASSUMES DAVIDSON COLLEGE POST



On the job for just a short time, Andrew Hsu, new dean of the Charles W. Davidson College of Engineering, has already identified his new school's three greatest strengths.

"First and foremost we have our faculty," Hsu says. "We have a dedicated faculty—very hard-working, very student-focused and with very good backgrounds. That's very unusual among state universities. I would say that the quality of our faculty would stack up with any major research universities."

Alumni and industry support are another major asset, Hsu says. "Again, it's not something that a lot of universities have. We have extremely supportive alums and extremely supportive industry partners."

The college's third strength is its students. "We attract very good students from not only the Bay Area, but all over the state and all over the world," he says.

Hsu, 56, took over as the seventh dean of the College of Engineering on Feb. 18, replacing former dean Belle Wei, now provost of California State University, Chico, and Ping Hsu, who served as interim dean.

He previously served as associate vice president for research and dean of the graduate school at Wright State University in Dayton, Ohio. He spent many years working in both public and private research before entering higher education, and has authored or co-authored more than 100 technical papers.

"I've been very proud to say that I've maintained an actively funded research lab since I joined academia," he said. "Unfortunately, it seems like it's winding down due to my administrative duties. The more administrative work I do, the less research I do."

Hsu earned his B.S. from the North China Institute for Hydraulic and Hydropower Engineering and two years later received his master's degree in the same subject from Tsinghua University in Beijing.

He earned a second master's and his Ph.D. from the Georgia Institute of Technology in aerospace engineering, although he describes his real expertise as computational fluid dynamics.

"Fluid dynamics is really a very broad discipline," Hsu explained. "Anything from water to oil to air to plasma to fuel combustion, to chemical engineering—they all involve fluid dynamics. For my Ph.D. I was doing helicopter aerodynamics—Georgia Tech at the time was a national center of excellence for helicopter technology."

In 1987, after a year-long post-doctoral stint at Georgia Tech, he went to work on NASA's National Aero-Space Plane project, which sought to create an aircraft capable of flying at Mach 25, enabling it to travel from Washington, D.C., to Tokyo in two hours.

Hsu worked on the project at NASA as an onsite contractor for eight years before Congress canceled it. He spent two years as a staff scientist for the Rolls-Royce jet engine division before taking his first teaching job at the University of Miami in 1997. As director of the school's Aerospace Engineering Program, he oversaw undergraduate curriculum development and student recruitment.

He had been interested in academia ever since teaching a few courses in computational fluid dynamics as a graduate student and post-doc.

"Some of the students really liked the subject and liked the way I talked about it," Hsu says. "In fact, a few of them eventually chose to go to grad school and study the subject. I just thought, 'Wow, I didn't know I had that much influence on people.' So I was really drawn to the profession of higher education."

In 1999, he moved to Indiana University-Purdue University Indianapolis, where he taught mechanical engineering, served as associate dean for research and graduate programs in the Purdue School of Engineering and became founding director of the Richard G. Lugar Center for Renewable Energy.

The move to academia was accompanied by a change in Hsu's research focus. "I got interested in green energy," he says. "I moved from conventional dirty technology to fuel cells, which also involves fluid flows and chemical reactions—the basic two ingredients are almost the same as the combustion engine."

Hsu believes hydrogen-based fuel cells will be part of the future mix of renewable energies. "If you can convert solar or wind energy into hydrogen and store it so you can use it later to generate electricity through fuel cells, then you've got yourself a completely green cycle," he says.

Research will be an important part of the mission at the College of

DEAN CONTINUED ON PAGE 4

Giving shape to an idea

HOW ROBERT AND PUNITA BIGLER REINVENTED INDUSTRIAL CONTROLLER TECHNOLOGY



When Robert and Punita Bigler decided to collaborate on their senior project in mechanical engineering at San José State University, they were intrigued by the idea of using newly developed personal computers to control industrial milling devices.

They outdid themselves, pouring countless hours into the project. But as they readied to graduate in 1987, they were chagrined to learn that their work only merited a B.

“They were absolutely right,” Robert says now. “We were ambitious. The requirement was only to produce a design, but we wanted to produce the machine.”

Adds Punita, “We became more proficient in the software side, trying to get the controls to work. We should have highlighted the mechanical engineering part of it.”

There is a silver lining: that long-ago design project morphed into a thriving business called Animatics. Two years ago, the Biglers sold the company to Moog Inc., a designer and manufacturer of precision control components and systems, for \$30 million.

The road to financial success was a bumpy one, though.

“There were terrible, terrible times, when we were just figuring out how many decades we would have to work to pay off the debt,” Robert says. “We did everything wrong. With no experience and no money we started a high-tech business in Silicon Valley with multi-billion-dollar established competitors.”

His own educational path involved some trial-and-error as well, he says. He started out at San José State majoring in aeronautical engineering, thinking he would be a pilot. “I found that to be excruciatingly sterile, so I moved into art, then English,” he says. “I love working with my hands. I love making things, and I knew that was where I was going to set myself apart. Engineering for me is a tool to use, but art is the calling.”

He met Punita Pandit in Electrical Engineering 105. Born in India, she was raised in the U.S., where her father, a civil engineer, worked for the Army Corps of Engineers. She at first followed in her father’s footsteps in civil engineering, before switching to mechanical engineering.

With two other students they decided to take on the computer numerical control assignment for their senior project, with Punita serving as the group coordinator. The task called for designing a system to control an end mill that cuts and shapes metal parts.

“We had to go out and find our aluminum pieces and go to surplus stores and find our parts,” Punita remembers. “We found our motor controller in a surplus store. We decided we were going to automate our machine by having it programmed.”

Adds Robert, “We tried to use the personal computer as the brain and then we sent signals to the motor, and then the motor would move the spindles and cut the part.”

Despite their lackluster grade, Robert and Punita thought their idea had commercial potential. After graduation they founded a business in his mother’s garage in Los Altos, although by the end of the summer they had moved into some commercial space.

They built a prototype of their controller and brought it to the Westconn trade show in San Francisco, matching it for demonstration purposes with a small Taiwanese-built mill drill. The desktop setup was capable of scanning the details of a quarter, then milling it in aluminum to the size of a silver dollar.

Buyers were more interested in the small Taiwanese mill than in the controller, it turned out, so the couple started importing the mills and selling them. Orders started pouring in, enabling them to move into larger quarters and hire their first employee.

To grow the business, they needed to borrow a lot of money. “That’s when we learned that God has a sense of humor,” Robert says. “We would literally finally come to the decision that we would close it down,

BIGLERS CONTINUED ON PAGE 9

The hand-built vehicle will match up against those built by teams from dozens of other colleges later this spring in SAE's annual student competition. It has become an annual rite of passage for several dozen students in the Charles W. Davidson College of Engineering.

"We have members ranging from freshmen to super-seniors," says team manager Vince Donatini, a sophomore in mechanical engineering, standing next to last year's vehicle, known as SR-4.

That model, with a carbon-fiber shell and a frame welded from 4130 chromoly steel alloy tubing, runs on a 600 cc four-cylinder motorcycle engine that generates 83 horsepower and 43 foot-pounds of torque.

With the exception of the engine and a few other key components, virtually every part of the vehicle was designed and built by hand, Donatini says. Last year, the project cost about \$70,000 in cash and in-kind donations, he says.

"For the main members of this team it's a more than full-time job," he says. "It really tests the amount of determination you have."

With such an all-consuming passion, Donatini adds, a tad ruefully, "you get out of it what you put into it. My GPA is probably lower than if I hadn't done this."

Spartan Racing also fields entries in two other SAE student competition categories, Baja SAE and Formula Electric, he says.

The Formula SAE competition is based on the assumption that a fictional company has asked a design team to develop a small race car, which is evaluated according to a variety of technical criteria, as well as a cost report based on producing 1,000 units.

Although some team members design vehicle sub-components as part of their capstone projects, "very little of this is applied to actual coursework," says senior Kevin Krakauer, a fifth-year aerospace engineering major who oversees the brake system and serves as the team's marketing manager. "It's a labor of love."

Every component and system in the car is designed with cost, reliability and ease of manufacture in mind, Krakauer says. The massive problem-solving exercise, which starts each July, does help students integrate what they're learning in their engineering courses, he says. Local businesses seem to appreciate those skills. In recent years Spar-

tan Racing members have been hired by Tesla, SpaceX and General Motors, he says.

This year's track competitions are scheduled in Michigan. Meanwhile, there will be a stiff contest to see who will get to drive the 2013 car while the judges are watching, Krakauer says.

But for Krakauer, the racing part is almost beside the point. "We're more of an engineering team that races," he says.

The race car competition allows for considerable latitude in coming up with designs that meet the technical specifications, as teams look for the right balance of weight, power, handling and braking capability.

"There's a huge variation in design," Krakauer says. "That's kind of what makes it so fascinating. "It's almost like an art exhibition for engineers." 🏁

DEAN CONTINUED FROM PAGE 2

Engineering in coming years, even as federal and state funding shrinks. "How do we compete nationally with the major-league players?" Hsu asks. "If you want to provide students with a good education, you have to have a faculty that is up to date with their technical knowledge in their disciplines."

There is, he added, "a good opportunity for the college to become a national leader in certain niche areas." In deciding which areas of expertise to develop, "it should really come from the faculty," he says.

Meanwhile, he said, the college expects to enroll a growing number of engineering students in coming years.

"In the past our target for admitting new students was roughly 800 a year," he says. "For the fall of 2013 we have upped it to 1,500 new students. How to manage that growth and make sure that we don't compromise the quality of the education that we offer to our students is the first priority, and one of our greatest challenges."

Hsu is particularly concerned that San José State students have the preparation they need to compete with graduates from elite universities as they search for jobs in Silicon Valley. "Our college serves as a gateway to the high tech industry for many first-generation college students," he says. "We have to make sure we're successful."

Hsu and his wife have four daughters, two in college and two in elementary school. In his spare time, he says, he is an "avid" tennis player. "That's how I keep myself healthy. I'm an opera fan, and of course I read a lot of different types of books—history, biography and novels."

Looking ahead, Hsu says that while the college's emphasis will remain on undergraduate education, "because of the nature of business in Silicon Valley, there's a lot of need for graduate degrees." For that reason, he expects the graduate program to grow.

He never loses sight, meanwhile, of his early experience in helping students navigate their academic careers. "Impacting and changing lives is something that's really meaningful to me," he says. 🏁



ROBERT BAIN



By the time Sean Draper graduates from the Charles W. Davidson College of Engineering this spring with his B.S. in mechanical engineering, he will have had his tuition paid for and gained experience from working with a faculty mentor.

Along the way, he also has met and bonded with a few of his fellow Engineering Leadership Pathways Scholars.

“I look at other people’s work and think, ‘That’s amazing,’” he says. “You get that affirmation that you are doing OK, and it’s from people whose opinions you trust, because they hold themselves to the same high standards you hold yourself to.”

Draper, who transferred to San José State University in the fall of 2011 from the College of the Sequoias, is one of 27 students in the Engineering Leadership Pathways Scholarship program, which is intended to foster leadership skills in engineering students.

Funded from 2010 to 2015 with a \$600,000 National Science Foundation S-STEM grant, the program provides undergraduate engineering students with one-on-one faculty mentoring and \$5,000 annual stipends—enough to cover their tuition.

“S-STEM awards are very coveted,” says Prof. Thalia Anagnos, who co-led the NSF grant with Associate Dean Emily Allen. “To win something like this is a big feather in our cap.”

Scholarships were given to 10 academically talented students in the first year. The program, designed for upper division students, grows each year to a maximum of 35 scholarships.

Participating students are expected to develop their leadership skills in parallel with their academic development with the aim of setting long-term personal and professional goals.

The definition of leadership is “loose,” Anagnos says. “How can you be a leader as an engineer? What kind of skills can you develop in the engineering community?”

Scholarship recipients are sometimes asked to speak publicly about their participation in the program, Anagnos says. “To hear how articulate they are and how they can express what they’ve learned and put it into service and advance their careers is rewarding to me,” she says.

Several recipients have applied to graduate school, Anagnos says. “I was able to connect them with people I knew at the programs they were applying to.”

Close student-faculty interaction is a centerpiece of the program, Anagnos says. Seven engineering faculty members serve as mentors to the students, providing them with academic and professional support.

Draper and several other students have been paired with Jacob Tsao, a professor of industrial and systems

engineering. “He takes us out to lunch every now and then, and our student group discusses things,” Draper says.

“It has been very fruitful and nice—for lack of a better word—to really get a chance to have one of those small-group moments with a professor who’s still a professional in the field.”

The program aims to create social as well as academic ties among the scholars, but because students are so busy, work-related activities like visits to construction sites and leadership breakfasts have been the most successful events.

Jared Tuberty, executive director of the Engineering Student Success programs, says the scholarship program has built self confidence among its participants. “This has given us an experimental lab to pilot some things with students,” he says. “We’ve gotten good feedback from this group.”

Draper, who completed his lower-division and basic engineering coursework in community college, says the scholarship has had a “massive” impact.

“The best financial decision I’ve ever made in my life was going to community college first, and a tie with that is coming here to San José State,” he says. “This scholarship has been a huge blessing in my academic career.”

Draper hopes an internship he has held this semester could turn into a full-time job when he graduates in May. Meanwhile, he has entered the applied design competition sponsored by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). The task calls for designing a refrigeration device that can operate on completely renewable energy sources in below-freezing temperatures and run for up to five days without external power.

“It presents a lot of interesting engineering challenges that people are trying to solve with a lot of uninteresting solutions,” Draper says.

He is also interested in alternative energy generation. “My interests are all over the place,” he says. “But I really like making things better.”

Ongoing education

GRADUATE PROGRAMS AND THE DAVIDSON COLLEGE EXPERIENCE

The primary mission of the Charles W. Davidson College of Engineering has always been undergraduate education, but for many students the college also plays a prominent role in their pursuit of a graduate degree.

For some, the college serves as the launch pad for their master's or doctoral work, while others already have substantial educational backgrounds when they arrive on campus.

No one knows this better than Ali Zargar, a professor in the Aviation and Technology department, who first came to San José State University in the 1960s from his native Iran to earn twin bachelor's degrees.

After returning to Iran, he got a job with B.F. Goodrich and worked there for several years before returning to San José State, where he graduated with his master's degree in industrial engineering in 1968. Then came a stint at Stanford University, where he earned his Ph.D. in the same subject in 1973.

Zargar then taught at a university in Tehran, but after the Iranian revolution, he decided to bring his family back to the United States. He worked at National Semiconductor and as a consultant before joining the College of Engineering faculty in 1990.

"Working in industry helped me to see what our students go through when they get out of here," Zargar says. "There's a big, big gap between a classroom and industry."

Most graduate students at San José State are working people—which is why graduate classes are scheduled in the evening—he says. "Students need coaching even after they graduate from here, and I have been rather successful in helping them," he says.

"By answering their questions, I know problems are there that we did or did not cover in class."

Jodi Iwata, who recently completed her Ph.D. in materials science and engineering at the University of California, Berkeley, came to San José State in 2002 from the University of Washington, where she had earned her baccalaureate in business. She worked at Intel while majoring in materials engineering and finished her second B.S. in 2006.

"It was a small department and I felt like I got a lot of one-on-one attention," Iwata says of her experience in the Davidson College. "It was a much more personal experience than what I was used to."

For Shobana Subramanian, the path to San José State started at Delhi University in her native India, where she earned her bachelor's

degree in English. Later, at Ohio State University, she completed a Ph.D. in English and comparative studies, with work focusing on fieldwork in rural India.

She later worked for an Oregon-based non-profit developing online tools for the archives of J. Krishnamurti, the Indian-born spiritual teacher. At the time, she says, "It was all wiki, wiki, wiki everywhere. Social media was in its early stages. My role was to go look for the most interesting technology out there. What can we learn that's useful to us?"

Her interest in information technology eventually brought her to San José State, where she is pursuing her master's degree in human factors and ergonomics in the department of Industrial and Systems Engineering. Some of her time has been spent at the NASA Ames Research Center, where she studied runway safety procedures for pilots and air traffic controllers.

She appreciates the Davidson College's career-oriented focus. "It's a practical orientation that puts people in jobs," she says. "Here, it's 'Finish soon, get out there and use it.' I don't think I would have liked to go to

"WHAT IS UNIQUE ABOUT SAN JOSÉ STATE IS THAT THEY TEACH YOU PRACTICAL EXPERIENCE THAT MANY PEOPLE DON'T HAVE"

one more research-heavy school. I think this was the right fit for me."

Subramanian's colleague Mary Fraser also brings a formidable academic pedigree to the master's

degree program in human factors, in her case a Ph.D. in cognitive science and education from the University of Southern California.

Fraser earned her undergraduate degree in psychology and art and a master's in psychology at Sonoma State University. She worked in academia while getting her second and third master's degrees in education and gender studies from USC before moving on to her Ph.D.

While teaching at DeAnza College, she thought about her love of art, technology and cognitive science. "I discovered I wanted to take those three loves and combine them," Fraser says.

In the human factors program she is studying how visual representations affect the assimilation of knowledge, asking such questions as, "Is it better to test along the way, or test and then present the information?"

"I really like the students in my program," Fraser says. "I really, really like the professors. There's a 'we're all in this together' attitude. There's a lot of project work, which is great, because in the real world that's what you're going to be doing, and you all have to get along."

Saman Choubak also has her eye on the practical applications of her research into graphene in her Ph.D. program at the University of Montreal.

"We're trying to mass-produce graphene films," says Choubak, who earned her master's degree in chemical engineering from San José State

in 2008. “I’m doing fundamental science in engineering in order to understand how we can grow this material with no defects at a higher quality.”

Someday, she adds, graphene’s light weight and structural strength will make it a mainstay of aerospace and electronics technology.

Choubak, who grew up in Iran and earned her undergraduate degree there, picked the Davidson College for graduate school because of its proximity to Silicon Valley.

“I was really happy and really lucky, because once I enrolled in the program, from the emails they sent to students I could find an internship in a startup company right away,” she says. After graduation, the company hired her as a full-time project development engineer.

“At San José State they taught us as engineers that we need to make deadlines, be ready and fight for everything and get what we want,” Choubak says.

Hongrui Liu also appreciated the applied orientation of the Davidson College curriculum when she completed her master’s degree in industrial and systems engineering there in 2004.

Later, in her Ph.D. program at the University of Washington, she discovered that “San José State provided me with a good foundation that covered the main areas in industrial and systems engineering.”

Christian Espinoza likewise has found his SJSU bachelor’s degree in materials engineering gave him a strong foundation for his Ph.D. work at the University of Illinois at Urbana-Champaign.

As an undergraduate, he worked with coconut fibers to develop a composite material. “That was my senior design project,” he says. “We did it because in Third World countries fibers from the husks become waste. That was the motivation behind this project—to take something considered waste and make it into a more environmentally friendly material.” He’s currently working on a U.S. Army contract involving hazardous waste mitigation.

“What is unique about San José State is that they teach you practical experience that many people don’t have,” Espinoza says. “That will help you to get experience outside the university in Silicon Valley. If you want to go to industry, I think it’s one of the best universities.”

When Nathan Anderson graduated high school, he skipped college and went to work selling computers at an Office Depot store. “One day I started thinking, ‘What is it I am trying to explain to people? How does a computer chip actually work?’”

He decided to apply to the Davidson College thanks to a family member who had graduated from there. “I heard from him that the program had a lot of industry connections and people who went through there could get jobs in Silicon Valley,” says Anderson, who now works as an applications engineer for KLA-Tencor in Milpitas.

After earning his B.S. in materials engineering, Anderson elected to pursue a Ph.D. in materials science and engineering from Purdue University, focusing on reducing the defects in amorphous silicon dioxide. “It’s probably the most fundamental material in the world,” he says, pointing to its ubiquitous use in windows, computer chips and fiber-optic cables.

Abdulahim Shamayleh chose to do his master’s work in industrial and systems engineering at San José State based on a relative’s recom-



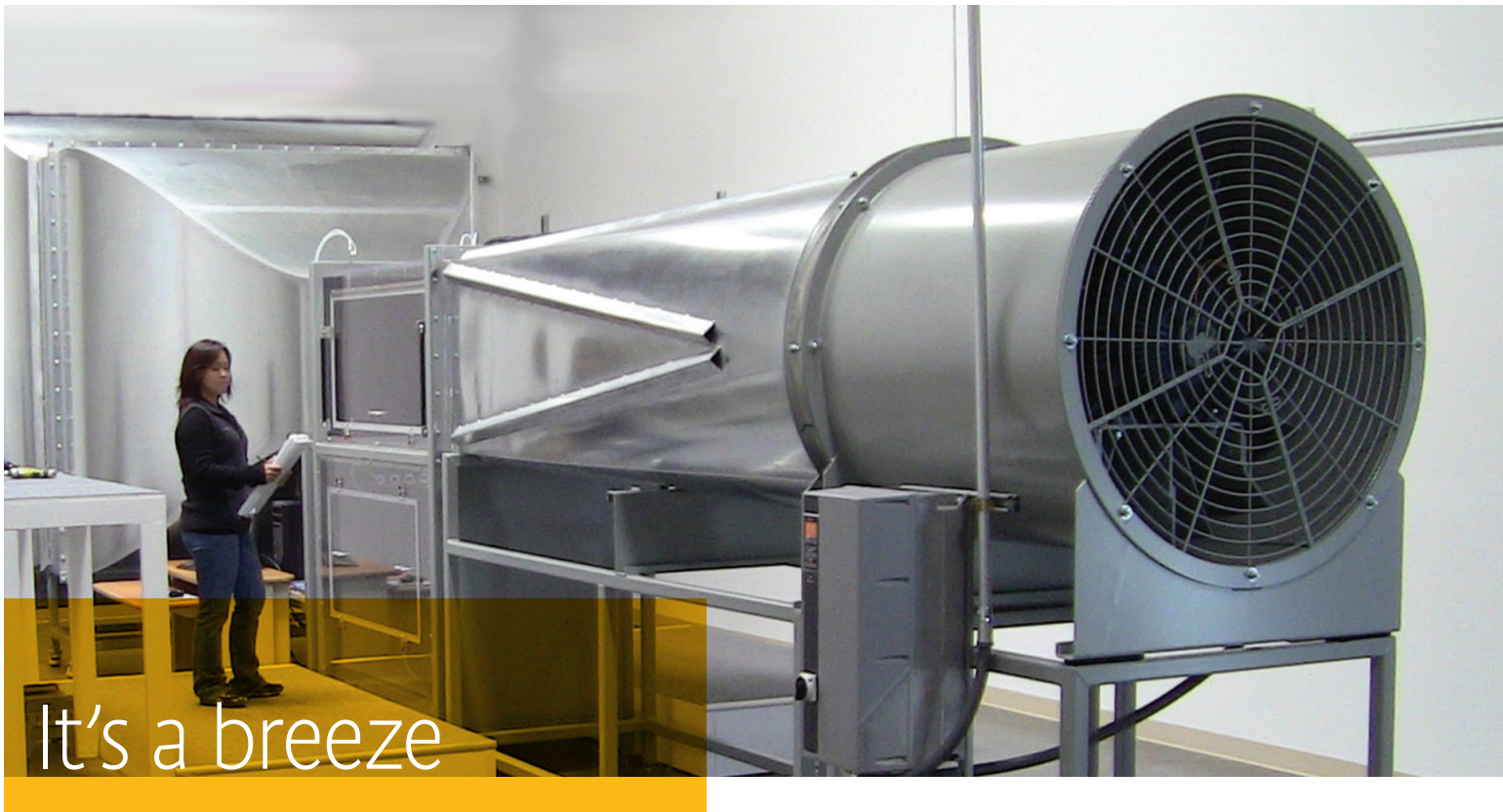
Dr. Louis Freund, professor and director of the graduate program in Human Factors/Ergonomics in the Industrial and Systems Engineering Department, is one of 50 current or former members of the Society for Health Systems being recognized for their contributions to society and industry. The award was presented at the society’s 25th anniversary dinner in New Orleans on March 2. He also serves as co-chair of the second international conference on the Human Side of Service Engineering, to be held in Krakow, Poland, in June 2014.

mendation and the school’s reputation. “It seemed like a very lucrative opportunity to be at a school nestled in the Silicon Valley,” he says. “I felt that being surrounded by all those big companies would present good training opportunities and an opportunity to attend lectures and seminars by professionals from these companies.”

The Davidson College faculty was also part of the attraction, Shamayleh says. “It was great to learn from them not only during lectures, but also to observe and learn from them how to be a true professional in a university environment and to learn from their varied teaching styles.”

He went on to earn his Ph.D. in industrial, systems and operations engineering in 2010 from Arizona State University. Since then, he has taught as an assistant professor in the department of systems engineering at King Fahd University of Petroleum and Minerals in Dahrhan, Saudi Arabia.

“The time I spent at SJSU helped me a lot,” he says. “I would recommend studying at SJSU, and in fact I have already done that with many people I knew pursuing their graduate study.” 🌟



It's a breeze

ALUMNA BUILDS SUCCESSFUL WIND TUNNEL BUSINESS

These days, Rachael V. Ishaya has good reason to believe she has the wind at her back. Her Fairfield-based Bryza Wind Lab, Inc. (she's the founder, president and sole employee) is the only wind tunnel business in the Western Hemisphere that is suitable for calibrating wind-speed sensors.

But there are challenges: thanks to computer simulation, fewer designs are being physically tested in wind tunnels, says Ishaya, a 1996 graduate of the College of Engineering. "There's not a whole lot of wind tunnel experts out there anymore," she says. "It's kind of like a dying art."

There are some conditions that computers cannot simulate, however, and that has Ishaya thinking about designing a new wind tunnel that can accurately model air flow over buildings—in particular computer data centers.

"With a data center, cooling is an issue," she says, explaining that air flow patterns affect how buildings disperse heat and interact with weather conditions. "That's an area I'll probably explore in the future."

Ishaya has charted her own path ever since she graduated from Oak

Grove High School. After attending San José State University for a year, she joined the Marine Corps. She wanted to learn about the applied aspects of engineering, but was also looking for a challenge.

"I was disciplined in the classroom," Ishaya says, "but I wanted to get physically fit." She learned to weld and became a specialist in helicopter structural maintenance. She served from 1988 to 1992, spending six months in Saudi Arabia as part of Operation Desert Shield/Desert Storm. "It was really tough to keep the sand off things," she recalls.

Back in civilian life, Ishaya took a job as an aircraft welder at a San José-area company that was a supplier to Boeing. Meanwhile, she was attending a community college to get her general education requirements out of the way.

Thanks to her ample hands-on experience, by the time she enrolled in the College of Engineering in 1994, "I was a little bit ahead of the game," she says.

An experimental aerodynamics laboratory course provided her first exposure to a wind tunnel. "It was quite easy for me to understand how things work when I already knew how actual flight works with an aircraft," she says. "I was quite happy that I was able to use what I picked up from the Marines and apply it to this."

After graduating in 1996, she took an internship as a laboratory technician at the NASA Ames Research Center. “We were trying to model surface winds on Mars,” she says.

The Ames wind tunnel was inside a 100,000-square-foot chamber where pressure could be reduced to as low as 5 millibars, less than 1 percent of the surface pressure on Earth. The data collected during those experiments was used in subsequent Mars lander projects.

Ishaya next headed to the University of California, Davis, to work on her master’s thesis in a lab that was using a boundary layer wind tunnel to simulate air flow over large cities, like San Francisco and Los Angeles.

Ishaya consulted on the construction of a new wind tunnel at UC Davis before becoming lead engineer for Otech Engineering Inc., a Davis-based wind tunnel business that was based there. Much of the company’s work entailed calibrating anemometers—wind sensors mounted on weather towers.

When the company’s owner retired, “I decided to start my own laboratory that offered the same services,” Ishaya says.

Her wind tunnel, powered by a 50-horsepower precision-controlled fan motor capable of generating test speeds of up to 100 miles an hour, opened on Dec. 7, 2011. “So far there’s a lot of interest from sensor manufacturers,” Ishaya says. “There’s also some interest in low-speed wing design.”



After the first year, business is picking up, especially now that Congress has passed wind-energy production tax credits that will spur her clients to make further investments. She meanwhile hopes to relocate to offer her services to other industries.

In casting about for wind-related names for her business, Ishaya thought about “brisa,” a monsoon wind pattern in her native Philippines, but went with ‘bryza,’ a Polish word describing a gentle sea breeze.

She chose that spelling (pronounced “breeza”), she says, because “I wanted to have that sound of a tornado over the Philippines.” 🌀

and the fax machine would light up and an order would come in.”

Then they had a realization. “The reason our controller wouldn’t sell is we never asked the market what it wanted,” Robert says. “We developed a product with the input of companies like Applied Materials and Novellus—companies in the Valley that were looking for motion control.”

The SmartMotor was a compact, integrated, programmable servo motor system that gave manufacturers tremendous flexibility because it could provide control on four axes of motion—and it was a tenth of the size of competing devices. As Punita puts it, “We combined the controller and the amplifier inside of a cigar box made of aluminum.”

It took the industry by storm when it was introduced in 1995. *Design News* included it in its list of best products. Sales grew as word of the new device spread among local semiconductor companies, and two years later, Animatics was ranked No. 212 on *Inc. Magazine’s* list of fastest growing private companies.

“It was exciting,” Punita recalls. “We got the attention of our big billion-dollar competitors.”

With the company growing 90 percent per year, the Biglers realized they were reaching the limits of their business acumen. “I drew the short straw and had to go back and get my MBA,” Punita says. “I learned about finance, economics and inventory control.” Meanwhile she also found time to give birth to two of their three children.

They developed a top-notch line of distributors and emphasized customer service as a way of attracting new business. Being located close to the Silicon Valley semiconductor companies who were their customers helped make that possible.

Having started out calling their business Animated Systems, the Biglers took a friend’s advice to go with something more dynamic, and the Animatics brand was born, complete with a snazzy logo. “It was way more playful than the industry was used to,” Robert says. “I think the packaging of the company is one of the reasons we’re successful.”

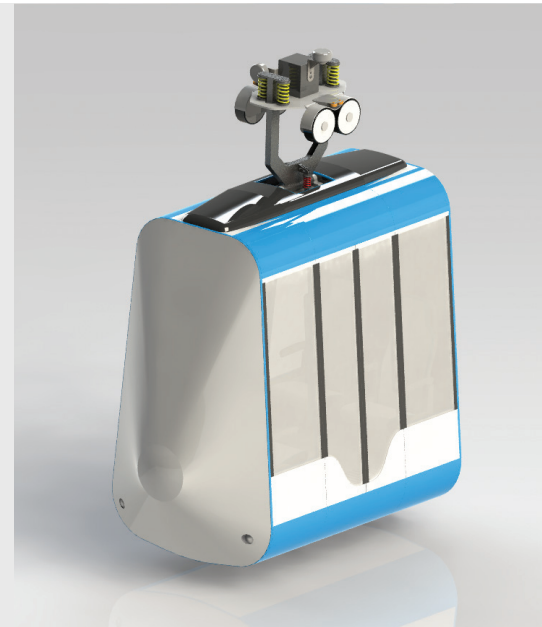
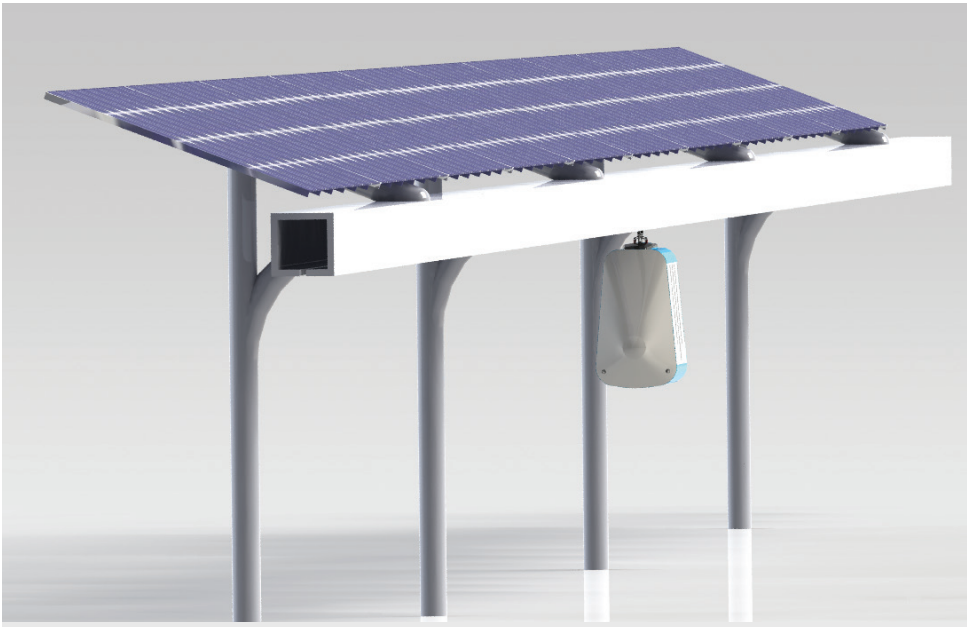
By 2008 Animatics had bought out three other companies and opened facilities in Rochester, N.Y., England, Germany and Japan.

Their success drew imitators, which gave rise to a patent infringement lawsuit (they eventually won). “We learned a lot about the legal system,” Punita says. “We’re practically lawyers now.”

The Biglers sold Animatics to Moog in 2011. Punita stepped down from her role as vice president for operations last May, while Robert relinquished his CEO title in December, but they’re already on to their next adventure. “We’re workaholics,” Robert says. “We want to do something in the electrical vehicle space.”

They attribute their success more to persistence than to good luck. “After our second or third downturn, we became pros at this,” Punita says. “We learned survival skills and found more opportunity during downturns.”

Adds Robert, “We look at crises now as opportunities. Every crisis is an interesting puzzle. Every crisis is just marbled with opportunities.” 🌀



Highway exit

[CAN BUFF FURMAN'S STUDENTS TRANSFORM URBAN TRANSPORTATION?](#)

In Burford “Buff” Furman’s cluttered lab, a group of students huddle at a worktable, mapping out the details of a 21st century solar-powered automated transit network for Silicon Valley.

The idea, says Furman, a professor of mechanical and aerospace engineering in the Charles W. Davidson School of Engineering, is to create a system of autonomous personal transport vehicles—podcars—operating on a network of elevated guideways, with the door-to-door convenience of a taxi.

“Let’s automate it, so now there’s no driver, and put it on a dedicated guideway, but not at surface level,” he says. “If there’s a network of these guideways, now there’s a way for me to get from point A to point B out of the congestion, out of the traffic. Why do I need a car?”

Students in Furman’s Engineering 195 class have been working on their senior project since last August as part of a plan to enter the Solar Skyways Challenge 2012-2013, a contest organized by the International Institute of Sustainable Technology. The winning team will get a \$10,000 prize and a trip to Washington, D.C., to present next fall at the Podcar City 7 Conference.

Furman has also submitted a proposal to the EPA’s P3 (People, Prosperity and the Planet) Student Design Competition for Sustainability to secure funding for his students’ research.

He hopes his team will have completed a one-twelfth-scale model of a podcar and guideway built by the end of the semester. “The team started out the semester not knowing anything about automated transit networks and have made tremendous progress” he says.

People have been dreaming about personal rapid transit systems since the 1950s, Furman says. One project, which uses rubber-tired vehicles on a concrete track, was designed and installed in Morgantown, W. Va., in the 1970s. A small system is in place at London’s Heathrow Airport, he says, and another one is operating in Masdar City in the United Arab Emirates.

Given the Bay Area’s population density, automated personal transit is an idea whose time has come, says Furman, who points out that it costs \$100 million to build a mile of freeway, but just \$5 million to \$10 million for an automated guideway system. “We can’t keep widening Highway 101,” he points out. “It’s done.”

For Silicon Valley, a system could employ vehicles as small as a Smart car, Furman says. “There is some interest in dual-mode operation,” he adds, where an owner could drive their vehicle to an access point, then join the network and switch over to automated navigation mode.

“With new computer and wireless capabilities, people could use a mobile app to engage with the system,” he says. “There’s a lot of system development that needs to be done.”

Furman says his interdisciplinary team, which includes urban planning and business majors, has also been in talks with the cities of San

New faces

FACULTY AND STAFF @ CWD



José, Mountain View, Sunnyvale, Santa Cruz and Milpitas about implementing an automated transit network.

“There are a lot of questions that still need to be answered regarding automated transit networks,” he says. “How do we integrate transit in development? Can we think it through better?”

Meanwhile, the city of San José and Santa Clara Valley Transportation Authority commissioned a study looking at the feasibility of installing a system that would link the San José Mineta International Airport, BART and VTA light rail systems he says.

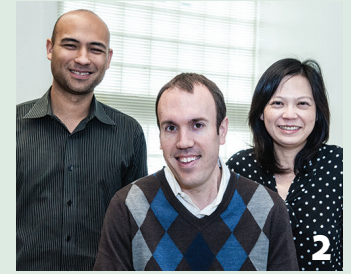
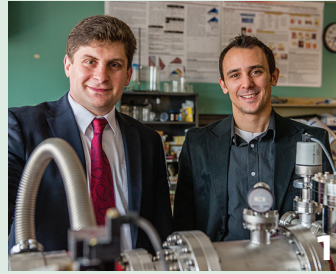
Energy sustainability is a major goal of this research, he says. “We think we can do this using renewable energy,” Furman says. “We can design it with solar panels along the guideways to collect solar energy.”

A number of Silicon Valley companies are working on electric vehicles, Furman notes. But even if a successful electric car is developed, “They’re still going to be sitting in traffic on Highway 101,” he says. Personal vehicles spend an average of 22 hours a day parked, he points out. “Why do we do that? It’s kind of dumb. Things have to change significantly, and we think this automated transit network has the potential as a game-changer.”

Furman acknowledges that “quite a delicate dance” would be necessary to make this vision a reality. “What’s hard is you’ve got to convince a lot of stakeholders,” he says. “It’s an expensive price tag, and it’s going to be there for a while, so it needs to be done right. A lot of people have to buy into it and want it and say ‘yes.’”

Furman is convinced that there will be greater support for alternative transportation technology as people become more concerned about the environmental degradation associated with carbon-based energy systems.

“What are the implications of the addiction to oil?” he asks. “Do we want more fracking, more global warming? Can we afford that?” 🌱



1—Faculty (L-R)

Vitaly Spitsa (Electrical Engineering)

Ben Hawkins (Biomedical, Chemical and Materials Engineering)

2—Dean’s Office (L-R)

Paul Schindler (Off-campus programs)

Lee Andersen (Engineering Computing Systems)

Eileen Chen (Off-campus programs instructional designer)

3—Engineering Student Success Center (L-R)

Blanca Sanchez (MESA Engineering Program)

Nellie Ellis (New academic advisor)

4—Staff (L-R)

Agnes Borja (Civil and Environmental Engineering administrative staff)

Teresa Mercure (Computer Engineering administrative staff)

Roger Jue (Mechanical and Aerospace Engineering technician)



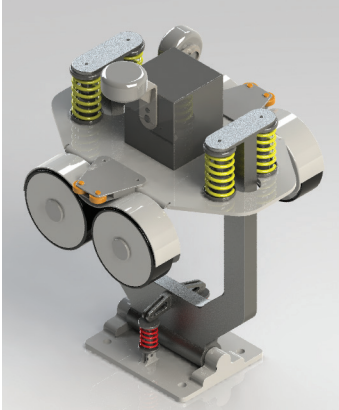
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**Buff Furman's students design
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