



## **P**RESIDENT'S PERSPECTIVE

Rising to the Challenge of the  
Emerging Robotics Industry



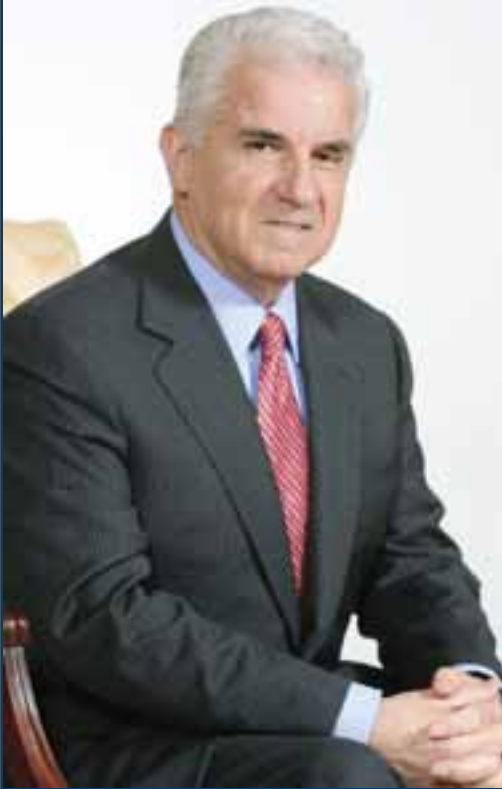
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**SUMMER  
2008**

From the desk of Dr. Angelo Armenti Jr.,  
president of California University of Pennsylvania



Anyone with life experience understands that change is inevitable. John F. Kennedy said “Change is the law of life. And those who look only to the past or present are certain to miss the future.”

Higher education is all about planning for what lies ahead. We look to the marketplace to anticipate future workforce needs and we prepare our students for a future that may not be our own.

At Cal U, this effort to prepare for still-emerging needs and industries is reflected in our growing robotics curriculum. Building on our longtime strength in what had been industrial arts education, we are developing a program that prepares students for roles that will meet the expanding needs of private industry, as well as the Department of Defense.

Twenty years ago, few could have imagined that southwestern Pennsylvania’s dying steel industry would be replaced by yet-to-be-imagined, high-tech industries that would allow this Rust Belt region to rise like a phoenix. This issue of the President’s Perspective looks at how the University is adapting a long-established program to meet new needs.

# Creative Destruction

## SOUTHWESTERN PENNSYLVANIA HAS RISEN LIKE A PHOENIX

A late-March article in the Washington Post encouraged the presidential candidates to remember that Pennsylvania is “truly a laboratory for change.” The writer, David Ignatius, mentions that he received his start as a journalist in the Keystone State in 1976. He was covering the steel industry for the Wall Street Journal in those days, when Pennsylvania’s manufacturing industries were entering a period which he describes as a “convulsive shakeout.”

Yet, Ignatius goes on to say that if ever there were a case for what economist Joseph Schumpeter described as “creative destruction,” it is what happened in Pennsylvania. While steel and other manufacturing jobs were shattered by competition from the just-emerging global economy, new industries that could not even have been imagined in the 1970s and early ’80s replaced them. These newly emerging industries created jobs year after year.

Ignatius writes that Pennsylvania became a platform for innovators in technology, finance and the health industry. By 1999, a Wall Street Journal article suggested that Pittsburgh should be renamed “Roboburgh” because the city, once very representative of the Rust Belt, was by then one of the country’s 10 hotbeds of technology.

Southwestern Pennsylvania’s riverfront property, once lined with steel mills, was being transformed. By the late 1990s, we were beginning to compete with the likes of the Silicon Valley and Boston’s Route 128 corridor, which had by then solidified their reputations as centers for extensive technology activity.

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## Creative Destruction *(continued from page 3)*

California University of Pennsylvania is playing a critical role in the region's new economy. Not only has the University served as a significant economic engine in southwestern Pennsylvania as an employer, we also are preparing technologists and technicians to work in the region's emerging industries. Moreover, the University has intensified

its outreach into western Pennsylvania by working with public middle schools and high schools on curriculum improvement projects in math, science and technology. These projects are designed to better prepare high school graduates for college and to help ensure a pipeline to make certain that workforce needs are met well into the future.



## CAL U-CARNEGIE MELLON ROBOTICS PARTNERSHIP CONTINUES

A partnership between Cal U and Carnegie Mellon University is evidence of the University's important role in meeting workforce needs in both the public and the private sectors. Through the support of U.S. Rep. John Murtha, Cal U and Carnegie Mellon have received nearly \$1.8 million to date and have an additional \$950,000 pending from the U.S. Department of Defense (D.O.D.). The D.O.D.'s goal in providing the funding is to have one-third of the military's ground force vehicles "robotics automated" or unmanned by 2015. This is expected to dramatically reduce the loss of human life during times of war. Cal U is a partner with the Carnegie Mellon National Robotics Center on this project. Carnegie Mellon's role is to design robotics systems and provide expertise to



aid Cal U in the development of a stem-related (Science, Technology, Engineering and Mathematics) robotics curriculum and training facility.

Cal U will prepare technicians who will be producing, installing and maintaining those systems. The Cal U component of the work directed by Dr. Michael Donohoe, is known as the Robotics Engineering Technology Curriculum Project.

All indicators point to the fact that the future of the Department of Defense depends upon robotics research and application. Cal U is well positioned to address the U.S. future in robotics by implementing an integrated curriculum that will train those who will meet workforce demands.

## CAL U TO PLAY A ROLE IN U.S. STEM'S INITIATIVE

With its historic mission in teacher education and its longtime strength in industrial arts, which has evolved into applied engineering technology, Cal U is uniquely positioned to assist in enhancing the science and math curricula in our secondary schools. In fact, the University offers one of the largest technology education programs in the country.

In March 2006, the President's Council of Advisors on Science and Technology (PCAST), in a briefing titled "Keeping America Competitive," addressed the need to sustain scientific



advancement and innovation. PCAST recommended that the U.S. government establish a world-class educational system to equip students with a strong foundation in science, technology, pre-engineering and math.

The PCAST report suggests that improving education in these areas is a way of ensuring that the United States will maintain its economic standing and defense.

Cal U is addressing this issue by working with local schools to enhance their science, technology and math programs. Not only does this ensure a pipeline to programs like the University's robotics program, it also will make certain that all students, regardless of the career paths they pursue, will have a strong foundation in these areas, so critical to our economy.



# Other Markets

## ROBOTICS IN THE PRIVATE SECTOR



At Cal U, we are developing a robotics curriculum based on input received not only from the Department of Defense, but also from the private sector. We met with companies and asked them about their needs — both current and anticipated. We wanted to know what skills they are looking for in their employees. This input, as well as that supplied by the D.O.D., provided the foundation for development of the University's robotics curriculum, which is still under way. Two courses are in place and a third will be pilot-tested in the fall of 2008-09.

Our robotics curriculum is being created not only for those going into the technology field, but also for those in other academic majors who prefer a hands-on approach to learning science and math.

Along with the eventual development and testing of four agile robotics-related classes, we will be developing a STEM-related, associate degree program in Robotics Engineering Technology and the University will be sharing in the cost of a \$500,000 robotics training facility in our Eberly Science and Technology

Center. Work on the space has already begun and is expected to be completed by the fall of 2009. We are also involved in ongoing parallel 2+2+2 pipeline grants sponsored by the Pennsylvania Department of Community and Economic Development, as well as a National Science Foundation-funded Advanced Technology Education grant as part of our outreach efforts. The objective of these outreach efforts is to link our robotics curriculum with secondary-level programs in order to develop a strong career pathway and enrollment stream from high school to college. This will enable us to ultimately address workforce needs.

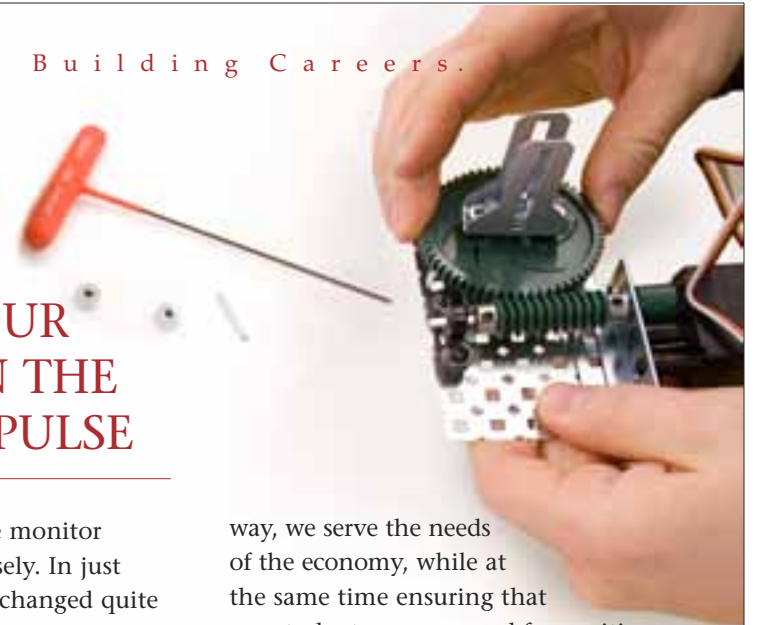
Cal U is in on the ground floor of robotics education. The Technology Collaborative, based in Pittsburgh, reports that robotics is still being defined. According to The Technology Collaborative, robotics is being used in many industries including healthcare, materials handling and mining, but it is not necessarily being labeled as such. The branding of the industry is under way as Cal U moves forward in preparing professionals for this expanding market.

## KEEPING OUR FINGER ON THE MARKET'S PULSE

Here at Cal U we monitor the market closely. In just 20 years it has changed quite dramatically. With our longtime strengths in areas like industrial arts/technology education serving as a foundation, our curriculum is shifting to meet changing marketplace demands. We will continue to reach out to industry to ensure we are meeting its evolving needs. In this

way, we serve the needs of the economy, while at the same time ensuring that our students are prepared for positions that will meet their personal financial and professional development needs.

As our robotics program grows, I will be providing updates on that expansion, which will be directed with an eye to the future, while meeting the needs of the present.



## JUST THE FACTS...

### Service robots for personal and private use:

about 2.44 million units for domestic use and about 1.1 million units for entertainment and leisure sold by end of 2005.

— FROM WORLD ROBOTICS 2007 REPORT



We think that the “service robotics” sector is the biggest regional (and international) growth opportunity in the future, as well as the area that is currently represented by the bulk of the southwestern Pennsylvania robotics company cluster.

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VICE PRESIDENT, EDUCATION AND TRAINING AT  
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## “It’s been fascinating...”

As a senior at Greensburg-Salem High School, Kati Wise had planned to study pharmacy at the University of Pittsburgh or Saint Vincent College, but a teacher encouraged her to pursue an interest in technology at California University. “He said Cal U has the best technology education program. That’s what inspired me to come here.” Wise, now a sophomore who plans eventually to teach technology to younger students, has especially enjoyed her class in agile robotics this spring.

“This is my first experience with robotics, and it has been fascinating,” she says. “It has broadened my horizons and made me more aware of opportunities and possibilities related to robotics that will be available in the near future.”

Wise says she is particularly interested in autonomous robots. They are used primarily for military applications but will soon be widely available to the public. “It’s such a fast-growing field. It’s exciting to learn about the huge role robotics will play in helping people with everyday tasks in the near future,” she says.

Wise has high praise for her applied engineering technology teachers, Anthony F. Rodi, faculty coordinator of robotics engineering, and Mike Arnheim, assistant professor of applied engineering and technology. “I feel very lucky to have the teachers I have.”

She says she particularly appreciates the collaborative relationship between Cal U and Carnegie Mellon University. “Our teachers are working closely with Carnegie Mellon and that’s very beneficial to us. They are able to share the latest technological research and development with us and help us better understand the robotics field.”



Wise hopes to teach elementary school in the future. “I think you can make a big impact in the lives of children and help them get excited about technology and robotics at a younger age,” she says.

College and high school students alike enjoy Cal U’s extensive technology education outreach through camps and leadership in such activities as the annual Southwestern Pennsylvania “BattleBots IQ” competition at Century III Mall, she says. “It’s so much fun to participate in these events.”

Wise, one of the few females in her classes, has also enjoyed helping with technology awareness camps aimed at encouraging more high school students, particularly girls, to pursue technology. “There’s a lot of great outreach going on here,” she says. “I hope more girls will be inspired to give robotics and technology a try.”

Today, smart systems are in cars, kitchens, microwaves, stores — everywhere. And, according to Robin Shoop, director of the Robotics Academy at Carnegie Mellon University, “discoveries on one system lead to innovations on another.”

“It is imperative that Americans are leading the world in the development of robotics and intelligent systems,” says Shoop, who earned a bachelor’s degree in industrial arts education at Cal U in 1978. “Our region is a world leader. If we are going to grow companies, then we need more people prepared to work in them.”

Shoop says his Cal U education provided a strong foundation for his work with the Robotics Academy, the

says Shoop, who spent nearly three decades teaching in the Pittsburgh Public School system and now develops tools for teachers to implement robotics curriculum into today’s classrooms.

“I had an exceptional experience at Cal U. I really enjoyed the size of the University and the individualized instruction. The quality of the faculty was outstanding. I would recommend the education that I received to anyone.”

From 2004 to 2006, Shoop was project lead on the development of Cal U’s Robotics Engineering Technology (RET) program.

“Technology companies need employees that are STEM competent. Due to spin-offs starting at the University of Pittsburgh and Carnegie Mellon,

our region is a world leader in robotics-related companies,” he says. “If we are going to grow these companies, we need more

## “It is imperative...”

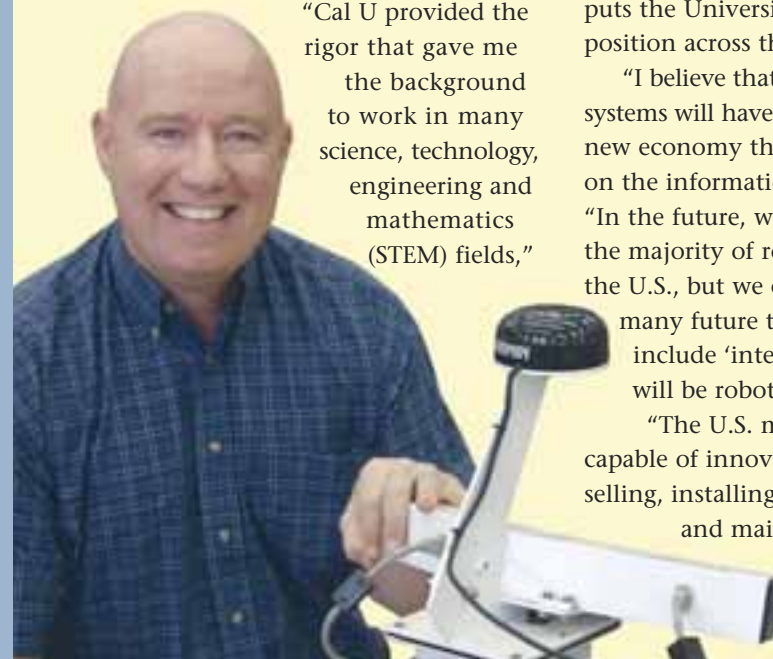
world’s largest educational outreach program aimed at exciting young students about science and technology through robotics.

“Cal U provided the rigor that gave me the background to work in many science, technology, engineering and mathematics (STEM) fields,”

engineering technology professionals that know about robotics and intelligent systems. Cal U’s program is designed to grow that pipeline, and the RET program puts the University in a leadership position across the state.

“I believe that robotics and intelligent systems will have the same impact on the new economy that the computer had on the information age,” says Shoop. “In the future, we cannot guarantee that the majority of robots will be built in the U.S., but we can guarantee that many future technologies will include ‘intelligent systems’ that will be robotic in nature.

“The U.S. must have a workforce capable of innovating, designing, selling, installing, troubleshooting and maintaining robotics intelligent systems.”



## Faculty Profile.

My favorite motto is 'I believe in the student who believes in himself.' I really abide by that," says Jeff Sumey, assistant professor of applied engineering and technology at Cal U and the faculty lead for curriculum development in the new Robotics Engineering Technology (RET) program.

"I think it's an extremely exciting time to be an educator in this field," says Sumey. "The outlook for the future of agile or mobile robotics is

robotics industry."

Sumey is a key player in Cal U's joint effort with Carnegie Mellon University to develop an integrated robotics curriculum. The broad goal is to grow a technologically literate workforce in support of robotics and intelligent systems, a \$500 billion-a-year emerging industry.

To launch its new RET program, Cal U collaborated with Carnegie Mellon's Robotics Academy to help develop an initial core set of courses

science will support a new associate degree program. The goal is to extend that into a four-year baccalaureate program within the next several years, according to Sumey.

Cal U is well positioned to lead the way in robotics engineering technology, says Sumey. "For the past few decades, the University has been a great leader and advocate in the engineering technology fields," says Sumey. "We have a long-standing background and experience in creating solid, interesting and even fun engineering technology programs. We combine the minds-on approach with the hands-on approach, a sort of hybrid between engineering and technology.

Sumey says that students and teachers alike are attracted by the multi-disciplinary nature of robotics, a field that spans such diverse disciplines as electronics and mechanical engineering to computer science. "Our students like to do hands-on work and be involved with the nuts-and-bolts of projects, as well as the behind-the-scenes engineering aspects. It's the blending of skills involved in multiple disciplines that is so exciting to me about this field." While the computer scientists at Carnegie Mellon are engaged in inventing tomorrow's technologies, "we're concerned with educating students to apply today's technologies," says Sumey. "That's what our graduates, robotic technologists, will do."

By the year 2010, agile or mobile robotics growth is slated to be a \$25 billion dollar industry, according to Sumey. "By 2025 it is projected to be a \$66.4 billion dollar industry. To some extent, the jobs they will work in have yet to be defined. We're really looking toward the future."



“It’s an extremely exciting time...”

extremely bright. We need students who will be able to help solve the future problems of filling all the job opportunities that will be created in the next few years in this 'new style'

in the basic underlying fundamentals and principles of agile robotics. These core courses, together with Cal U's existing courses in industrial technology, engineering technology and computer

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