Funding To Commercialize Technologies Of UCSD Engineers Tops $1.2 Million

July 14, 2004

Doug Ramsey

In its fifth round of funding since being set up in 2001, the William J. von Liebig Center for Entrepreneurism and Technology Advancement at the University of California, San Diego today awarded $300,000 to six projects. That brings total grants so far to more than $1.2 million, with the funds supporting projects led by 31 faculty members of UCSD's Jacobs School of Engineering.

The von Liebig Center fosters entrepreneurism education on the campus, but also provides funding for internal technology projects that have strong commercial potential. The latest grants will be used to commercialize technologies that could show up in the form of better cell phone cameras, wireless video instant-messaging, a way to quantify an individual's risk of suffering an aneurysm, and more powerful photovoltaic cells that could drive down the cost of solar energy. (For more on each project, see below.)

All of the applicants went through a rigorous screening mechanism, and their proposals were reviewed by an external committee of industry experts. "We have been impressed with the continuing high level of interest on the part of faculty in this mechanism to speed the transition of their technologies from the lab to the marketplace," said Joe Bear, executive director of the von Liebig Center. "All 18 applications showed great promise. Now, our staff and advisors will work with all the applicants - including those who did not receive funding - to develop commercialization strategies for their technologies, and if possible, help them secure other types of funding for their projects."

Of the six new grants, three went to faculty in the Electrical and Computer Engineering department, two went to researchers in Mechanical and Aerospace Engineering, and one award was given to a Bioengineering faculty member.

Go to http://www.vonliebig.ucsd.edu/Projects/current_projects.shtml for information on previous awardee. For more information on the von Liebig Center, visit http://www.vonliebig.ucsd.edu, call (858) 822-5960 or email vlassist@soe.ucsd.edu.

ELECTRICAL AND COMPUTER ENGINEERING

Yu-Hwa Lo, Professor *"Integrated Adaptive Optics for Cameras in Cell Phones, PDAs, Notebook Computers, and Micro Surveillance Systems"* $50,000

A growing percentage of the 535 million cell phones sold each year contain cameras, and the improvements in picture quality have mostly come from electronics through expansion of the number of pixels and image processing capability. Further improvement will require changes in the front-end optics that have become the bottleneck for performance, functionality and the cost of all miniature cameras. With support from DARPA and the U.S. Air Force, Professor Lo's group has fabricated a prototype integrated optical-front-end-on-a-chip, using microfluidic and optical MEMS technologies. This comes at a time of growing industry interest in fluidic lenses for high-performance, multi-functional, and cost-effective miniature imaging systems. Having overcome the major

technical hurdles, the focus of Lo's effort under the von Liebig Center grant will be on product development, notably hiring of a product engineer to generate samples for alpha-testing in 7 to 9 months after the program starts, and beta samples in 12-15 months.

Truong Nguyen, Professor *"Video Instant Messaging System"* $50,000

This is the von Liebig Center's third award to Professor Nguyen, and will build on work he did as part of a 2003 grant to develop a "Video Walkie-Talkie." Nguyen's group is now developing a video instant-messaging system that would work over wireless 802.11 (Wi-Fi) or cellular networks. Users with PDAs could easily videoconference with anyone on their "video buddy list" - with the video streams delivered automatically at the best level of quality available for the specific device. Nguyen sees a pressing need for video instant messaging in the homeland security arena, where emergency first responders and law enforcement would benefit from situational awareness to observe activity at other parts of a disaster scene. Video could also be "pushed" to phones to provide alerts and instructional video information such as news reports.

Edward Yu, Professor *"Nanostructure-based Enhancement of Semiconductor Optical Absorption for Photodetectors and Photovoltaic Devices"* $50,000

Professor Yu and his team have developed a novel technique to enhance the near-surface absorption of photons by semiconductors using engineered nanostructures placed on the surface of the semiconductor. The approach leads to a substantial increase in optical absorption, even in silicon-based semiconductors. Now, Yu plans to adapt this technology to thin-film photovoltaic solar cells and other semiconductor photodetectors. The commercial potential is huge: Even a moderate increase in efficiency of thin-film solar cells could have a major impact on the economic viability of solar power generation via photovoltaics, which as of 2001 was a $2 billion industry and is projected to grow to roughly $15 billion by 2020. Yu will collaborate with investigators at the U.S. National Renewable Energy Laboratory in Colorado, to test the technology in realistic solar-cell devices to gauge their efficiency.

MECHANICAL AND AEROSPACE ENGINEERING

Steven Buckley, Assistant Professor *"Ultra-fast Combustion Stability and Performance Sensor"* $50,000

Emissions requirements for stationary and mobile power sources have led to combustion-control problems, notably oscillatory behavior that diminishes performance and can damage equipment (such as turbine blades). Professor Buckley and his team have developed gas-absorption sensors that can be multiplexed in a single fiber optic, based on tunable diode lasers that are used in the telecommunications industry. Buckley's sensors can measure emissions and performance oscillations at rates needed for rapid feedback control of these devices (e.g., 500 Hz and above), and because the sending and receiving electronics can be mounted at some distance from the high temperature process, only a small optical access is needed for the fiber-optical input and exit. The von Liebig Center grant will pay for proof-of-concept and prototyping work, including integration and testing of the requisite combination of gas sensors.

Juan Lasheras, Professor *"Development of Improved Radiological Predictions of the Risk of Rupture of Abdominal Aortic Aneurysms"* $50,000

Professor Lasheras hopes to improve the current capabilities of biomedical imaging techniques to better monitor the disease progression in Abdominal Aortic Aneurysms (AAA). Quantifying the spatial and temporal distribution of mechanical stresses acting on the vessel walls, the project could lead to a quantitative assessment of the risk of rupture in AAA - and potentially provide improved guidelines for intervention. Lasheras will work with other engineers, computer scientists as well as physicians specializing in radiology and vascular medicine. The proposed method consists of using high resolution computerized tomography (CT) scans and magnetic resonance imaging (MRI) to reconstruct a three-dimensional model of the abdominal aorta, including AAA. A finite-element computer code incorporating non-linear elastic effects and all physiological and mechanical

information of the arterial wall will be developed to compute the distribution of stresses along the aneurysm's wall to provide information on the possible location of rupturing and a quantification of the risk of rupture.

BIOENGINEERING

Robert Sah, Professo r *"In Vivo Efficacy of Stratified Cartilage Tissue"* $50,000

In his second project award from the von Liebig Center to date, Professor Sah and his team will test a new way to engineer cartilage tissue for joint repair and replacement, after developing in 2001 a method of creating cartilaginous tissue constructs through fabrication of a tissue with stratification, localizing specialized cells at the tissue surface. These cells express the functional marker molecule thought to be critical for lubrication. In the past year, Sah's group has developed methods for testing the efficacy of these implants, and the von Liebig Center funding will allow them to carry out the tests in vivo in adult mini-pigs, to determine whether such stratified constructs are better than the established microfracture type of repair. Positive results could stimulate further industrial interest, and pave the way for immediate applications in animals (e.g., dogs, horses) as well as human clinical trials.

Media Contact: Doug Ramsey, (858) 822-5825

VONLIEBIG CENTER
For Entrepreneurism and Technology Advancement