

January 13, 2006
Berkeley Professor Honored for the Development of “Smart Dust”
A Wireless Network of Sensors that was Rapidly Commercialized

Kristofer S.J. Pister, a professor of electrical engineering and computer sciences and co-Director of the Berkeley Sensor & Actuator Center, has been awarded the second annual Alexander Schwarzkopf Prize for Technological Innovation from the I/UCRC Association, a voluntary, independent organization of past and present members of the National Science Foundation’s Industry/University Cooperative Research Center program involving 42 Centers, 110 Universities, and thousands of researchers.

The award recognized Pister’s successful pioneering achievements in developing and inspiring the commercialization of “Smart Dust”, a wireless network of miniature sensors. The network consists of a series of highly miniaturized motes, each of which contains a sensor, about the size of a grain of rice that detects and records things; a miniature transmitter/receiver that communicates with other motes; and a battery about the size of an aspirin that allows operation for longer than a year. These features allow the network to operate in an autonomous, self-discovering, and self-configuring fashion.

This work started with Pister’s vision of a network of communicating microrobots that could operate as a coordinated but self-organized network of peers. The first step was the construction of a miniature, wireless sensor network that could be constructed from commercial, off-the-shelf components. Pister showed both technical and entrepreneurial leadership in conceiving of the solution and developing the funding to take it from the research laboratory to a commercially available technology. This took him from the starting point of a \$25,000 award from an industrial member of the Berkeley Sensor & Actuator Center (BSAC) and a matching \$10,000 grant from the State of California through multimillion dollar research grants from the Department of Defense to the formation of the company *Dust Networks* that now has over \$30, 000, 000 in venture funding.

In the process, numerous technical innovations took place, including progressing from only line of sight communications via optical links to radiofrequency technology that transcends this need. Size of the individual motes was also reduced while the number that could be included in the network increased. Smart Dust became the operating platform for a coupled innovation, the development of an open source operating system “Tiny OS” by UC Berkeley computer science collaborators. Steps along the way included installation of a network throughout the hallways of the Electrical Engineering building on the Berkeley campus, public distribution of schematics for the motes and code for Tiny OS on the university website (with each release being downloaded by over 10,000 developers around the world); collaboration with the company *Crossbow* (ex-Berkeley students) to produce motes and sensors from schematics made public by Pister’s group; and formation of the company *Dust Networks* by Pister. Time Magazine reported in 2004 that the mote market could be worth \$50 billion in 10 years time.

Applications that will be changed forever are almost too numerous to enumerate. According to Dr. Tariq Samad, Corporate Fellow at Honeywell, “Professor Pister envisioned a future where pervasive ‘dust’ motes self-configure, self-adapt, and auto-network with other motes to provide sensor data for monitoring building health, ensuring industrial safety, improving industrial processes, sensing precursors to earthquakes, and safeguarding the environment”. Dr. Thomas Sereno, VP and Division Manager for SAIC’s Monitoring Systems Division, observed that “Dr. Pister and his colleagues at Dust Networks have developed a truly

transformational or disruptive technology that will enable a broad range of new capabilities in homeland security and national defense”.

Ben Warren of Nortel Networks believes that Pister’s accomplishments bode well for Industrial-University environments. Warren offers that “we at Nortel are always searching for ‘thought leaders’ of future growth industries, and this is certainly a well-earned description of Professor Pister”.

Pister has recently returned to the University from his entrepreneurial break to work on his vision of microrobots as self-deployed Smart Dust motes that “work” as well as “sense”. His initial work on Smart Dust as well as current activities was supported by the Berkeley Sensor & Actuator Center, a multi-university member of the National Science Foundation’s Industry/University Cooperative Research Center program.

The Alexander Schwarzkopf Prize is awarded annually in the name of Dr. Alexander Schwarzkopf, who established the Industry/University Cooperative Research Centers (I/UCRC) Program at the National Science Foundation (NSF) in 1979 and has managed this unique and remarkably effective program since its creation. His efforts have been recognized by many awards as noted above and have been the catalyst for adoption of the I/UCRC model by a number of states and several other countries, the highest form of recognition.

###



About the I/UCRC Program - The I/UCRC Program traces its history back to the early 1970s; it is the longest continuously operating cooperative research center program sponsored by NSF. With a modest budget of \$6 million/year, the program currently supports 45 centers involving over 80 universities, 600 member firms, 700 faculty and 850 students. NSF support is leveraged 15-to-1 by other public and private funding sources. Over the years faculty supported by the I/UCRC program have won a long list of scholarly and professional awards and honors for their research. Remarkably most of the 110 centers formed over the past 30 years are still in existence. In 1998 the Technology Transfer Society awarded the I/UCRC Program its coveted *Justin Morrill Award* for excellence in technology transfer. On the occasion of the I/UCRC program's 30th anniversary, Dr. Rita Colwell, Director of NSF, commented: "It is seldom that a federally funded program is a real pioneer and yet remains vigorous and innovative more than a generation later... The I/UCRC Program continues to be recognized as a model for collaborative research and development between universities and industry, throughout the United States and around the world"

Further information about the I/UCRC program can be obtained from the web site
<http://www.nsf.gov/eng/iucrc/>.

Contacts:

Kristofer S. J. Pister
Berkeley Sensor & Actuator Center
University of California, Berkeley
510-643-9268
pister@eecs.berkeley.edu

John Huggins
Executive Director
Berkeley Sensor & Actuator Center
University of California, Berkeley
510-643-5663
jhuggins@eecs.berkeley.edu

R. Bruce Thompson
Chair, I/UCRC Association Executive Committee
Center for Nondestructive Evaluation
Iowa State University
515-294-8152
thompsonrb@cnde.iastate.edu