Back | Home

NEWS
THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine
NATIONAL ACADEMY OF SCIENCES • NATIONAL ACADEMY OF ENGINEERING • INSTITUTE OF MEDICINE • NATIONAL RESEARCH COUNCIL

Date: Jan. 2, 2008
Contact: Randy Atkins, Senior Media Relations Officer
National Academy of Engineering
202-334-1508; e-mail <atkins@nae.edu>

CREATOR OF KALMAN FILTER AND FOUNDERS OF RENOWNED EDUCATION PROGRAM WIN HIGHEST ENGINEERING HONORS OF 2008

WASHINGTON -- The engineering profession's highest honors awarded in 2008, presented by the National Academy of Engineering (NAE), recognize a revolutionary contribution to the field of decision and control engineering whose applications have become ubiquitous, and an achievement in engineering education that builds leaders through experience and service.

RUDOLF KALMAN will receive the prestigious Charles Stark Draper Prize -- a $500,000 annual award that honors engineers whose accomplishments have significantly benefited society -- "for the development and dissemination of the optimal digital technique (known as the Kalman Filter) that is pervasively used to control a vast array of consumer, health, commercial, and defense products."

LAWRENCE E. CARLSON and JACQUELYN F. SULLIVAN will share the Bernard M. Gordon Prize -- a $500,000 award issued each year that recognizes innovation in engineering and technology education -- "for the Integrated Teaching and Learning Program that infuses hands-on learning throughout K-16 engineering education to motivate and prepare tomorrow's engineering leaders."

The prizes will be presented at a gala dinner event in Washington, D.C., on Feb. 19.

THE CHARLES STARK DRAPER PRIZE

RUDOLF KALMAN invented the Kalman filter, a mathematical technique that removes "noise" from series of data. From incomplete information, it can optimally estimate and control the state of a changing, complex system over time. The Kalman filter revolutionized the field of control theory and has become pervasive in engineering systems.

Kalman conceptualized his theory in the late 1950s while at the Research Institute for Advanced Studies in Baltimore (then part of the Glenn L. Martin Co., which became Lockheed-Martin Corp.). It was published in the breakthrough paper "A new approach to linear filtering and prediction problems" (Transactions of the ASME-JOURNAL OF BASIC ENGINEERING, 82D:35–45, 1960). Kalman soon published two other influential papers, one on the state space theory of linear systems, and another on concepts of controllability and observability. When Kalman presented these new approaches in seminars, audience members were thrilled by his elegant solution to their stubborn obstacles.

Kalman's ideas enabled a broad range of technologies to achieve unprecedented accuracy and to be used in previously unimagined ways. Recognition of the Kalman filter's utility began in the early 1960s with aerospace and military applications such as guidance, navigation, and control systems. It was quickly applied to systems and devices in nearly all engineering fields and continues to find new uses today. Applications include target tracking by radar, global positioning systems, hydrological modeling, atmospheric observations, time-series analyses in econometrics, and automated drug delivery.

Kalman continued studying many fundamental ideas in control and systems theories throughout his career, and he has received many awards and honors for a lifetime of achievements, including the first Kyoto Prize in Advanced Technology (1985) from the Inamori Foundation, the IEEE Medal of Honor (1974), and the American Mathematical Society's Steele Prize (1987). He is a member of the National Academy of Engineering, the National Academy of Sciences, and the American Academy of Arts and Sciences. Kalman is now Professor Emeritus of the Swiss Federal Institute of Technology in Zurich.

THE BERNARD M. GORDON PRIZE

The Integrated Teaching and Learning (ITL) Program of the University of Colorado at Boulder uses interdisciplinary, hands-on learning in an innovative environment to develop future engineering leaders. JACQUELYN F. SULLIVAN and LAWRENCE E. CARLSON founded the program in 1992, and since then -- through creativity and personal initiative -- have expanded and strengthened its K-16 reach.

The ITL Program is exceptional because of both its setting and curriculum. The technology-rich ITL Laboratory promotes engineering's human connections through open, interactive, interdisciplinary design and experimental spaces. The transparent design of the building itself helps students and visitors appreciate the inner workings of a complex building.

The laboratory is essential to the ITL Program's undergraduate curriculum because engineering students from all departments, beginning with their first year, can take design courses where small teams develop products to solve real problems. Leadership naturally emerges as teams call upon each member's strengths to create and manage an engineering project from start to finish; all of the teams showcase their creations in the semiannual Design Expo. The first year design course has contributed to significantly higher retention for all students across the engineering college.

A second element of the program's curriculum is the extensive development and implementation of K-12 engineering education. About 1,700 students in grades 3-12 experience the excitement of hands-on engineering in weekly classes -- helping them realize that engineering is about making a difference in the world -- while cementing the commitment to the engineering profession among the graduate fellows who do the in-class teaching. The ITL team has also led the creation of the TEACHENGINEERING digital library, a collection of hundreds of standards-based hands-on engineering lessons and activities, available free to K-12 educators around the world. In addition, the ITL Program conducts weeklong summer design workshops for hundreds of K-12 students. Most of the program's K-12 activities specifically target girls, underrepresented minorities, low-income youth, and first-generation college-bound teens.

Carlson and Sullivan have worked tirelessly to extend the success of the program. They have woven the ITL Program into the various departments of the College of Engineering and Applied Science. They have also hosted visits from many interested engineering schools across the U.S. and around the world. Sullivan and Carlson have shared the results of the program's research and self-assessments in numerous presentations and papers, as well, showing themselves to be leaders in the engineering education community.

Jacquelyn F. Sullivan and Lawrence E. Carlson were the founding co-directors of the ITL Program. Carlson is currently a professor of mechanical engineering, and Sullivan continues as co-director of the program and director of K-12 engineering education.

The Draper Prize was established in 1988 at the request of the Charles Stark Draper Laboratory Inc., Cambridge, Mass., to honor the memory of "Doc" Draper, the "father of inertial navigation," and to increase public understanding of the contributions of engineering and technology. The prize is awarded annually.

The Gordon Prize was established in 2001 as a biennial prize to acknowledge new modalities and experiments in education that develop effective engineering leaders. Recognizing the potential to spur a revolution in engineering education, NAE announced in 2003 that the prize would be awarded annually.

The National Academy of Engineering is an independent, nonprofit institution. Its members consist of the

nation's premier engineers, who are elected by their peers for seminal contributions to engineering. The academy provides leadership and guidance to government on the application of engineering resources to social, economic, and security problems. Established in 1964, NAE operates under the congressional charter granted to the National Academy of Sciences in 1863.

For additional information about any of the prizes, contact Deborah Young, NAE awards administrator, at 202-334-1266 or <dyoung@nae.edu>, or Randy Atkins, NAE senior media relations officer, at 202-334-1508 or <atkins@nae.edu>. Visit the NAE awards site at HTTP://WWW.NAE.EDU/AWARDS for additional information.

# # #

[This news release is available on the World Wide Web at HTTP://NATIONAL-ACADEMIES.ORG]