

sensors should be imperceptible, resilient to washing, and compatible with humid environments because natural fibers like cotton and wool tend to absorb moisture. The new polymers we are developing use changes in ionic conductivity to respond to temperature variations. Such ionic conductors can be integrated in smart threads, for example, that can be embroidered into electronic textiles with new functionalities using conventional manufacturing methods.”

The Future

Because the pursuit of wearable sensors benefits from expertise in disciplines such as biology, medical engineering, electrical engineering, computer science, materials engineering, and chemistry, Caltech’s focus on interdisciplinary faculty collaboration makes the Institute well suited to be a hub for this kind of research. Though wearable sensors are still relatively new, and their future somewhat unclear, these products may become more commonplace in our lives as computing technology becomes ever smaller, faster, and cheaper, and the novel materials used to make the sensors themselves become more practical and efficient.

“In the future, I think we will have wearable devices that can simultaneously collect a broader range of information from our body,” Gao says. “With more comprehensive information, such as physical and chemical information detected with sweat sensors, we could know a lot more about our bodies and our health.” 📱

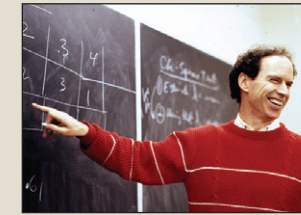
Azita Emami is the Andrew and Peggy Cherng Professor of Electrical Engineering and Medical Engineering; executive officer for electrical engineering; and director of the Center for Sensing to Intelligence, which funds her work along with the Carver Mead New Adventure Fund, Office of Naval Research, and Heritage Medical Research Institute (HMRI).

Chiara Daraio is the G. Bradford Jones Professor of Mechanical Engineering and Applied Physics, and a Heritage Medical Research Institute Investigator. She is the Caltech director of the National Science Foundation’s IUCRC Center to Stream Healthcare in Place, which funds her work.

Wei Gao is an assistant professor of medical engineering; a Heritage Medical Research Institute Investigator; and a Ronald and JoAnne Willens Scholar. His work is funded in part by the National Institutes of Health, National Science Foundation, Office of Naval Research, and HMRI.

In Memoriam

To learn more about their lives and work, visit magazine.caltech.edu/post/in-memoriam.



Gary Lorden (1941–2023)

Gary A. Lorden (BS ’62), a Caltech professor of mathematics, emeritus, passed away on October 25, 2023, at age 82. A statistics researcher, Lorden focused on ap-

plications to real-world problems and served as an expert witness in trials. He also worked as a technical advisor to the TV show *NUMB3RS*. Lorden was Caltech’s dean of students from 1984–88, vice president for student affairs from 1989–98, and acting vice president for student affairs in 2002. He was also executive officer for mathematics from 2003–06.



Betty I. Moore (1928–2023)

Betty I. Moore, co-founder of the Gordon and Betty Moore Foundation and honorary life member of the Caltech community, passed away on December 12, 2023, at age 95. Moore

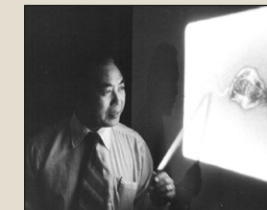
(born Whitaker) became affiliated with Caltech in 1950 after marrying Gordon E. Moore (PhD ’54) and moving to Pasadena. (Gordon passed away in 2023.) The Moores, two of the Institute’s most significant philanthropists, donated \$300 million to Caltech in 2001 alongside a contribution of \$300 million from the Gordon and Betty Moore Foundation. The resources supported health and medicine, alternative energy development, information systems, seismology, nanotechnology, and astronomy, among other areas. The Moores also provided two unrestricted gifts during Caltech’s *Break Through* campaign: \$100 million that the Institute used to match graduate fellowships and \$37 million for student scholarships.



Frank Borman (1928–2023)

Frank Borman (MS ’57), a NASA astronaut who, in 1968, commanded Apollo 8, the first crewed mission to orbit the Moon and return safely to Earth, passed away on November 7, 2023, at age 95. Borman was the first person to be named a distinguished alumnus by GALCIT. A veteran of Gemini 7 and Apollo 8, Borman was

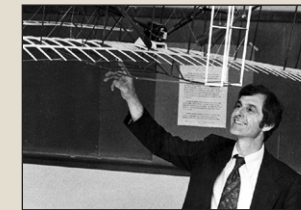
a fighter pilot and experimental test pilot in the Air Force, and he served as an assistant professor of thermodynamics and fluid mechanics at the United States Military Academy at West Point. Borman was inducted into the U.S. Astronaut Hall of Fame in 1993.



Theodore Y. Wu (1924–2023)

Theodore Y. Wu (PhD ’52), a Caltech professor of engineering science, emeritus, passed away on December 16, 2023, at age 99. Wu was hired as a research fellow at Caltech in 1952

and became an assistant professor of applied mechanics in 1955. He was made full professor in 1961 and retired in 1996. Wu’s interdisciplinary research combined aeronautics, mathematics, and fluid physics, covering topics such as the physics of jets and wakes, the energy of ocean currents and wind, ocean waves, the flight of birds and insects, how fish swim, and the locomotion of microorganisms.



Fred E. Culick (1933–2023)

Fred E. Culick, the Richard L. and Dorothy M. Hayman Professor of Mechanical Engineering and Professor of Jet

Propulsion, Emeritus, passed away on December 11, 2023, at age 90. He joined Caltech as a research fellow in jet propulsion in 1961. Two years later, he joined the faculty as an assistant professor. He was named associate professor in 1966, full professor in 1971, professor of applied physics and jet propulsion in 1978, professor of mechanical engineering and jet propulsion in 1988, and Hayman Professor in 1997. He retired in 2004. Culick’s research focused on the dynamics of combustion chambers.

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