



Left to right: Ed Stolper, Charles Elachi, Ares Rosakis, and Axel Cruau

## French Republic's Order of Academic Palms

Ares J. Rosakis has received the Commandeur dans l'Ordre des Palmes Académiques, which is the Commander grade of the French Republic's Order of Academic Palms. Founded by Napoleon in 1808 to honor educators and scholars, this distinction recognizes eminent personalities who have made significant contributions to the development of French culture, science, and education. Chair Rosakis was received into the order by the Consul General of France in Los Angeles, Axel Cruau, at a special ceremony hosted by Caltech Vice President and Director of the Jet Propulsion Laboratory Charles Elachi. Also present was Caltech's provost and acting president, Ed Stolper.

Visit [eas.caltech.edu/news/428](http://eas.caltech.edu/news/428) for more information.

## Decreasing the Energy Bill of California Homeowners

Renewable energy sources used in the generation of electricity, such as wind and solar power, can fluctuate rapidly, frequently, randomly, and by large amounts. It has been estimated that achieving California's goal of 33% renewable generation by 2020 will require three times the 2011 reserve generation capacity, wiping out the emission and cost benefits of renewable generation. One potential solution is to exploit flexible loads and adapt their power consumption to fluctuating supply, which is known as the "demand response." Summer Undergraduate Research Fellowship (SURF) student Esha Wang has been working with Professor of Computer Science and Electrical Engineering Steven Low to explore whether there is enough demand-response capacity in California to help stabilize the grid as well as to estimate the market value of this capacity. Specifically, she studied the flexibility of thermally controlled loads such as refrigerators, air conditioners, and pool pumps. Using the



Esha Wang

real-time energy prices from electricity market operators in California and other states, she has developed an algorithm to operate such controllable loads in a way that is not only most efficient for the users but also most helpful to the grid. Wang used the Caltech startup Chai Energy's detailed home energy data to understand the impact of her control algorithms. These types of technologies are very valuable in integrating renewable generations and transforming the grid into a sustainable energy system.

To learn more about Professor Steven Low's research, visit [smart.caltech.edu](http://smart.caltech.edu). For more about SURF, visit [surf.caltech.edu](http://surf.caltech.edu).



"Interactive Game of Life" by Alan Menezes

## The Art of Data

Visiting Professor of Art and Design in Mechanical and Civil Engineering Hillary Mushkin has been creating a variety of opportunities for Caltech students and faculty and Jet Propulsion Laboratory (JPL) researchers to explore new ways to visualize data. In her new-media art history seminar, students conceptualized, designed, and fabricated their own original new-media artwork using technologies and fabrication methods of their own choice. Students created electroencephalogram (EEG) art, automatic drawing machines, conceptual-art-inspired visualizations of mathematical concepts, interactive video projections, electronic instruments, and other novel forms. She has also organized a symposium hosted at Caltech in collaboration with JPL and Art Center College of Design in Pasadena, where computer scientists, artists, and designers gathered to discuss the "emerging science of big-data visualization." Over the summer, the Caltech/JPL/Art Center Data Visualization Summer Internship Program brought together students with computer science and design backgrounds to create interactive visualization tools to explore complex data and visually communicate their discoveries. Working in multidisciplinary teams, the students created tools for a number of faculty and researchers, including Beverley McKeon's group, to explore and demonstrate decomposition of fluid turbulence.

Visit [mushkin.caltech.edu](http://mushkin.caltech.edu) for more information.



Hillary Mushkin; Rebecca Lawler's "Exoskeleton"

## Engineers Without Borders

Four Caltech undergraduate students, one graduate student, and an alumnus have formed a new chapter of Engineers Without Borders USA (EWB). EWB is a nonprofit organization that serves underprivileged communities around the world by helping to provide basic necessities such as clean drinking water and adequate sanitation. The Caltech EWB team has begun a program to construct spring-water protection systems in the Ilam District of Nepal by partnering with the Namsaling Community Development Center, a local NGO. They are also receiving technical advice and mentorship from professional engineers in the Southern California area and the University of Colorado-Boulder EWB chapter, which has past experience with similar projects. The team members are preparing for their assessment trip to Ilam to survey the spring-water source and gather information about the community and its water usage. Then they plan to engineer a sustainable and economical technology that addresses the community's needs. A consequent implementation trip would then be undertaken to construct the water protection facility and to educate the community regarding proper usage and maintenance of the site.

For more information and to support the team, visit [ewbcit.caltech.edu](http://ewbcit.caltech.edu).



EWB members discuss water quality and cleanliness at a local spring in Ilam, Nepal. During this illustration, the young girl learns about variable water quality. She is surprised to discover that clear water does not necessarily mean clean water. In this case the water contains dissolved salts and sugars.