Where INNOVATION happens
When Gabbi Coloyan was in high school, she wanted to generate electricity with a revolving door.

**Innovative**

SHE COULD ENVISION IT, BUT AT THE TIME, SHE Didn’T KNOW HOW TO BUILD IT. SO SHE TUCKED THE IDEA AWAY AND ENROLLED IN CARNEGIE MELLON.

Flash forward five years, and Coloyan, who was a senior in mechanical engineering, has seen her idea realized. In her capstone design course, she and three classmates created a mechanically powered hinge that opens doors for people with disabilities. “I thought if I could generate energy from a door and save it, it could be used to open the door in the future,” says Coloyan. The team created a device that contains a spring and sits atop a door. When the door is opened repeatedly, the spring compresses and stores energy. When a disabled person hits a button, the spring is released, and the door automatically opens. “This is simple, but it’s innovative,” says Coloyan.

Coloyan, who was the president of Carnegie Mellon’s chapter of the American Society of Mechanical Engineers (ASME), has lots of ideas that are coming to fruition. When she was a sophomore, she told her professors that she wanted to conduct research. Soon she found herself developing theoretical models that illustrate how heat is transferred in carbon nanotubes. These tiny cylinders made of carbon atoms possess unique electrical and thermal properties that engineers are exploring with great interest. Coloyan says her research could be used in heat shields that protect satellites from the harsh conditions of outer space or serve in energy conversion applications.

For her comprehensive work, she won a trip to the King Abdullah University of Science and Technology in Saudi Arabia, where she placed third in an international undergraduate research competition. She, along with 49 other international students, spent 10 days in Saudi Arabia presenting their projects, attending educational events and exploring the region. “It was a fantastic experience. It was a little intimidating, but I felt adequately prepared. I traveled into Jeddah and saw camels. I went snorkeling in a coral reef in the Red Sea. I got to see things that most Americans can only imagine,” says Coloyan.
“I love living abroad,” says Spencer, who recently graduated with a dual degree in chemical engineering and engineering and public policy. Although he was immersed in the oil industry since birth and he has accepted an international assignment from a leading oilfield service company, when he came to Carnegie Mellon, he wasn’t committed to any particular career path. That is until he took a course called “Energy and the Environment.” “That changed everything for me. I really found my passion for energy,” explains Spencer.

Spencer, who considers himself a “people’s person,” discovered that engineering and public policy enabled him to explore the dynamics of energy policy and economics in addition to the technical issues associated with energy production and use. “I want to tie all of this into my international experience and work overseas on energy issues,” explains Spencer. From living abroad, Spencer has observed how cultural differences affect decision making in the workplace. For example, “in the Arabic culture, conducting business, in general, is different than in the U.S. In the U.S., business is transactional, but in the Mideast, it is about the relationship you have with your business partner. It is more about establishing a relationship before you talk business,” explains Spencer. “Ideally, I want to go into management and work in the Middle East, or Southeast Asia or even Africa, areas that I have an understanding of.”

For now, however, Spencer will start his career as a field engineer and test wells by sending tools down into drill holes to determine “what’s down there.”

“It is hard to think about the future, but ideally, I want to go into a position where I can work in different cultures and use my international experience. Or maybe I’ll work with governments to help people make informed decisions about energy.”
Alex Yoshikawa believes the biotechnology industry is teeming with opportunities.

“IN BIOTECH, SO MUCH IS UNKNOWN AND THAT LEAVES ROOM FOR INNOVATION,” HE SAYS. “I WANT TO DO SOMETHING REVOLUTIONARY. I WANT TO MAKE A COMPLETELY NEW PRODUCT THAT HELPS PEOPLE.”

At Carnegie Mellon (CMU), Yoshikawa dual majored in chemical engineering and biomedical engineering so he could apply engineering concepts to biology. “Modern chemical engineers are doing things like treating cells as mini factories to engineer genetics. I think this is really cool,” says Yoshikawa. Itching to learn his way around a lab, after his sophomore year he interned on campus as a research assistant. Working on a team, he tested how particles behaved in emulsions. (An emulsion is a mixture of two or more liquids that won’t blend, much like olive oil and vinegar.) Yoshikawa’s efforts were part of a larger project to develop a drug delivery system.

Enjoying hands-on work, the next year he interviewed for a biotech startup that was founded by two CMU alumni. Landing the internship was not easy. He was tested on subjects ranging from computer science and math to engineering and organic chemistry. He got the internship and traveled to San Francisco. “They guaranteed me that I wouldn’t be an intern, instead I’d be an employee.”

“My first day on the job, I made my own computer. Startups have limited funds, and making a computer is cheaper than buying one,” explains Yoshikawa. On the second day, he and a handful of employees looked at a list of tasks written on a white board, and each person selected several jobs to complete. “I picked the hardest things,” he says.

He wrote several programming scripts, including one that automatically cleaned lab instruments each morning. “If instruments needed to be made, I got to try and make them,” says Yoshikawa. He considered his job exciting, even when he performed an occasional mundane task. “I took out the trash a few times, but I was taking it out with the CEO of the company. Everyone was working toward a common goal, and it was a great atmosphere to be in. My dream is to start my own biotech company and working at a startup taught me a lot.”
Today’s engineers operate in settings that did not exist 20 years ago. Whether they live in the United States or Australia, they must be able to lead construction projects in India or manage wind-powered energy systems in Spain. Successful engineers understand how cultural perspectives affect their work and influence technological innovation.

As the world grows more interconnected, societal well-being and economic prosperity become increasingly linked to technology and innovation. Innovation is critical to creating and retaining a competitive edge. This is true for nations, companies and individuals. Startups and long-established companies have vast opportunities in a global economy but they also face fierce competition. Many Carnegie Mellon engineering graduates have performed extraordinarily well in this dynamic environment. They used knowledge beyond their engineering expertise to turn smart, creative ideas into reality.

Great innovators understand cultural differences and local market needs. That’s why the college offers courses and opportunities to help you understand how technology fits into the larger world we live in. Project courses and undergraduate research will enable you to learn about innovation. Classes that focus on international issues or studying abroad will allow you to explore cultural diversity. You can also participate in extracurricular activities and attend social events with classmates from diverse backgrounds. Carnegie Mellon engineering students develop technical skills in a diverse, collaborative environment, which prepares them for fostering innovation anywhere in the world.
Travel

Global Education
www.cit.cmu.edu/global

The value the college places on global education manifests itself in exciting opportunities for students, such as study abroad and exchange programs; funding to travel abroad; and a Global Engineering minor.

Research

Undergraduate Research
www.cit.cmu/current_students/undergraduates/research_funding.html

Research, whether it’s part of the Honors program, a study group or an individual project, is highly valued and can enhance your career opportunities. Support is available for students who need financial resources to pursue their projects.

Courses and Project Courses

The college’s undergraduate program focuses on educating engineers so they are equipped for successful careers in today’s global economy. The curriculum encourages students to confront problems of a professional scope by working in teams to recreate a true work environment. Many engineering courses are project-based, including the “Introduction to Engineering” classes taken in the first year.