For ten weeks during the summer, 12 undergraduate students from across the country are getting the chance of a lifetime on the UH campus, becoming engineering researchers in the Cullen College’s Research Experience for Undergraduates (REU).

The UH engineers leading the program, Haleh Ardebili, Bill D. Cook Associate Professor of mechanical engineering, and Jacinta C. Conrad, Ernest J. and Barbara M. Henley Associate Professor of chemical and biomolecular engineering, share a motivation for leading students into the future. The National Science Foundation designated the University of Houston as an REU site and awarded Ardebili and Conrad $360,000 for three years to reach students early in their college careers.

Nationwide there is a critical objective to increase the number of students pursuing careers in the STEM
fields, said Ardebili. She thinks the REU program will inspire students to continue in the science, technology, engineering and mathematics (STEM) fields.

There's a large body of research that shows we lose students at all stages in the pipeline, said Conrad. Typically for students you need role models and research experience early.

The REU students are getting plenty of both in the program, each working under a UH engineering professor and graduate student mentor as they conduct their daily research.

**Sustainability is key**

The theme of the UH REU sight is Materials for Sustainability in Energy and Manufacturing. Other universities in the United States designated as REU sites have other themes.

Making sure future generations have sufficient resources is one of the most critical topics in our society, said Ardebili. Sustainable energy means renewables; sustainable manufacturing means using nanotechnology and science to improve the large-scale processes that create them.

A common theme in both of those topics is that we require materials that can be sustainably derived, said Conrad. And there are research needs in every step.

Jennifer Bernard, a senior chemistry major from Hastings College in Nebraska is one of Conrad’s student researchers in the REU program and is co-advised by Jeremy Palmer, assistant professor of chemical engineering. She is deeply immersed in computer simulations of materials made of glass.

We’re trying to figure out why glass does what it does because glasses are not normal solids or liquids, they’re in between, said Bernard. When we find out then we can make better and stronger glass.

Conrad said the success of the program will be measured quantitatively.

We’re focused on two outcomes: Does our program change the goal of our student participants to enter careers in science and engineering? We’re also asking our graduate student mentors how they feel about mentoring younger students and whether mentoring affects their career plans, said Conrad.

Those questions get easy answers from Bernard and her student mentor, Cullen College chemical engineering Ph.D. candidate Ryan Roberts, who says Bernard is doing well and, in fact, mentoring her benefits him, too.

What I like about the REU program is being able to communicate overall research objectives and methods to someone who would be considered a layman going in and getting them to competency when they leave the program, said Roberts.

As for Bernard, yes, the program has made an impact.

It’s made me really want to go to grad school and do more research, she said.

**A similar story**

Kimi Bourland, an REU chemical engineering senior from the University of Colorado Boulder, sings a familiar refrain.

The program just solidified that I want to continue to do materials for sustainability and that I can definitely go to grad school, she said.
She works under Ardebili performing experiments at the interface of electrolytes and electrodes in flexible lithium-ion batteries to improve their performance. As Ardebili is well known in this field, Bourland is plenty impressed with her teacher.

“She’s fantastic; I love her!” exclaimed Bourland. “She’s one of my new role models in terms of women in STEM as a whole; just to meet her is so cool. Especially in engineering, you just don’t meet a lot of women who run labs and let you work in their labs.?”

If excitement and passion is the yardstick, REU is paying off. But there’s little wonder if it was conceived of passion.

“I’m in science partly because I had a transformative research experience when I was in high school,” says Conrad, recalling a summer research camp at MIT that lit her fire. “REU is a long pathway in paying it forward.”