Student Innovation Thrives at Idaho

Avery Brock and fellow students improve satellite communications through a NASA-funded project

Avery Brock is a tinkerer.

He's been playing with circuit boards and soldering irons since he started building model trains with his dad as a child.

"Playing with electronics and building stuff — it's what I do for fun and hopefully it's going to be my career," Brock said.

The 21-year-old University of Idaho electrical engineering major from Redmond, Washington, has since upgraded his hobby, but still tinkers in his dorm room and in the university's engineering laboratories.

Access to hands-on undergraduate research clinched his decision to come to U of I. During a campus visit, Brock asked to visit the engineering labs and meet faculty. Where other schools had dismissed this request, Brock toured U of I's facilities and spoke with several professors.

"It was a really friendly experience, and it was really nice being able to say, 'OK, this is the person I'm going to interact with for the next four years,'" Brock said.

Brock threw himself into his research from the beginning, even participating as a freshman on a project to design a refueling device for fuel cell cars. During a campus presentation, SpaceX co-founder and U of I alumnus Tom Mueller wanted to know more.

"He came and stopped and talked to me for probably a solid half hour about the project. He was interested in it because SpaceX was trying to do a similar thing for generating fuel on Mars," Brock said.

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Avery Brock sits at a soldering station to work on his circuit board. The board will help provide a full internet connection between researchers and satellites for the first time.

Brock and four teammates are now working on a NASA-funded project that will improve the data exchange between small satellites and researchers on the ground. These small research satellites communicate with Earth through text messages, and the team is designing a piece of hardware that will provide a full internet connection between the satellites and researchers for the first time.

“We’re kind of going from like a very basic text messaging plan to an Internet connection,” Brock said.

Their work will drastically cut the cost of small satellite communication, lowering the barrier for researchers working in space. It’s not Brock’s first time working on satellites; during the summer after his sophomore year, he helped design two — now orbiting — satellites during an internship with NASA’s Ames Research Center.

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>
> — Avery Brock

“I’ve got friends at larger schools, and they just don’t have the direct access to resources that we do,” Brock said. “The availability of opportunities to do hands-on research is unparalleled compared to other universities.”

His team is even designing transport pods, roughly the size of 2-liter pop bottles, which can safely carry samples from the International Space Station to Earth. In time, they could even be used to transport very small rovers to Mars’ surface. Brock would like to test the tubes in the campus wind tunnel before performing low-level drop tests from buildings and high-altitude weather balloon testing.

“Senior design projects like this help students develop skills they can’t learn in the classroom,” said U of I Assistant Professor Feng Li, advisor for Brock’s team. “They improve their critical thinking and problem-solving abilities and learn to balance independence and collaboration — all skills necessary to work on a team.”

Avery Brock has been able to work on projects like his current venture to improve communication with satellites in space since his freshman year at the University of Idaho.

Brock, who will graduate in spring 2019, and his teammates will present their project at the College of Engineering Design EXPO, the longest-running student engineering innovation showcase in the Pacific Northwest. Held each April, students present projects that push the boundaries of science and technology. EXPO is part of U of I's Innovation Month, a series of events that showcase the pioneering achievements of Vandal students.

"It's an incredibly satisfying feeling to finish a yearlong project and have the opportunity to present your work to both your peers and industry to show off what you know and how far you have come since starting on the engineering path," Brock said. "EXPO is how I got my start in aerospace, and I am looking forward to showing where it has taken me."

This project was funded through the NASA Idaho Space Grant Consortium under award NNX15AI04H. The total project funding is $5,709,998 of which 50 percent is the federal share.

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Published April 2019.