NASA interns start work on future CubeSat mission

September 17 2013, by Claire Saravia

This summer, a group of interns at NASA's Goddard Space Flight Center in Greenbelt, Md., hoped to make their impact on the center last more than their 10-week term.

Under the Applied Engineering and Technology Directorate, also known as AETD, a team of eight college and three high school students started designing a CubeSat satellite that could one day be launched into space. A CubeSat is a type of miniaturized satellite for space research.

The interns represented the first of a string of several groups that would come in and continue working on the satellite, beginning with design and ending by delivering an actual satellite for flight. Their internships ended on Aug. 9, 2013.

During their time at Goddard, the interns had to conceptualize the mission and provide a preliminary design of the satellite hardware. With Goddard engineers as mentors, the interns followed NASA guidelines and worked hard to develop all of the satellite components—or subsystems—from scratch.

The students' skills came from a range of disciplines. Each intern was assigned to work on different satellite subsystems, including optics, thermal, electrical power, systems engineering and satellite communications.

"We threw them into the frying pan," said AETD project manager and

lead co-mentor Pat Kilroy. "They had 10 weeks to do what could take NASA a year or so depending on the scope of the project."

The project is part of NASA's CubeSat Launch Initiative, which gives educational institutions an opportunity to fly small satellites—fully-functional, stackable CubeSat units that are 4 inches long and weigh about 3 pounds—to engage students in real life science, technology, engineering and mathematics projects.

This summer's group was responsible for laying the groundwork for the satellite, designing the mission from scratch and presenting their results in a preliminary design review in front of NASA engineers. The interns demonstrated how different mechanical and electrical components of the satellite would work using prototype models.

In addition, the students also featured their results at the intern poster session, a center-wide event held the first week of August. The session allowed interns to showcase their work. The intern team left behind a detailed final report to guide the group that follows them.

Kilroy said the goal was for the interns to make this initial phase comprehensive enough so that the next group of interns could use the design as a foundation for developing the flight hardware.

"They were challenged with the most difficult portion, the front end of a mission," Kilroy said. "It's their baby to pick up and run with it."

In addition to designing the spacecraft bus (infrastructure that houses the instruments) the satellite would be based on, the interns were tasked with designing the instrument the satellite would feature—a tiny hyperspectral imager that uses light waves to determine the chlorophyll content of Earth's plants.

Intern Tiara Johnson, an electrical engineering graduate student at Johns Hopkins University, Baltimore, Md., said the challenge was to do all of the work in 10 weeks.

"I think our biggest challenge was the time constraint," Johnson said. "We didn't have that much time, and we had a lot of work to do."

Intern Jeff Sherwood, an electrical engineering student at Central Michigan University, Mount Pleasant, Mich., felt that designing a project for future interns to further develop was a good opportunity to experience how work is actually done at NASA.

"It's nice to get the real-world experience of working on a project with a team of other interns and engineers," Sherwood said. "It's something you can't learn in a classroom."

Provided by NASA