

*Left to right -- Ken Davidian, Kyle Thurmond and Nick Demidovich present Thurmond's payload prototype at the 18th Annual FAA Commercial Space Transportation Conference in Washington, D.C.*



## FAA-Sponsored Student R&D Pays Off for Experimental Payloads

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Kyle Thurmond might have one of the most innovative, high-tech contraptions the space community has ever seen. It looks like it was taken straight from a sci-fi movie...but it's real.

A graduate student in the University of Central Florida's mechanical engineering program, Thurmond is leading the development of a gas sensor, similar to an in-home smoke detector that could be used in spacecraft. The new device senses carbon monoxide and carbon dioxide from fires or materials overheating more accurately than NASA's current smoke detectors.

"What we can do with this is we can better characterize the smoke and determine what exactly is burning or what is heating up that may turn into an explosion," said Thurmond, as he presented his prototype at the 18th Annual FAA Commercial Space Transportation Conference in Washington, D.C.

The prototype is just less than 20 pounds and is about the size of a home stereo receiver. Thurmond is working with his professors and classmates to reduce its size to that of a pack of gum weighing just ounces so that many devices can be used throughout one spacecraft.

The payload utilizes light-emitting diode technology to enhance reliability and reduce power output in comparison with the current devices in use. LED light gets transmitted through the gas that is measured by a light detector located on the other end of the unit. The light detector works like a solar panel used for generating electricity from sunlight, except it is tuned to the wavelength produced by the LEDs.

"By knowing how much of the light was absorbed by the gas, we can determine the concentration of the target gas," Thurmond explained.

Thurmond and his team intend to further improve the system by giving it the ability to sense several other poisonous and combustible gases. A successful implementation of this device could mean a major safety enhancement for future commercial space activities overseen by the FAA. Thurmond's research and development is a contribution to the FAA's Center of Excellence for Commercial Space Transportation (COE CST).

"Sensor development is super important in terms of ensuring the safety and the safe operations of space vehicles," said Ken Davidian, the director of research for the FAA's Office of Commercial Space Transportation and program manager of the COE CST. "Small projects like this can have a huge impact on overall safety."

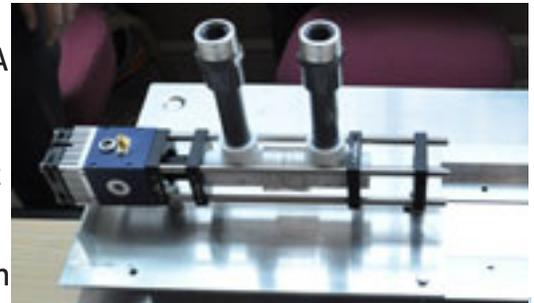
Nick Demidovich, who works closely with Davidian, is an FAA aerospace engineer and the program manager for payloads and technology that support commercial space transportation. Demidovich is excited about testing the device when it is ready.

"We're going to put this on a high-altitude balloon first, then on a suborbital rocket, then hopefully on an orbital vehicle as an experimental payload to prove the concept," Demidovich said. "First we have to get this payload down in size, weight and power. Ideally, you would have several of these sensors on a manned suborbital vehicle once the sensor has evolved to operational status."

The testing will incorporate controlled combustion to see how the sensor responds in various scenarios. The FAA hopes that utilizing multiple sensors throughout a spacecraft will make for better diagnostics of issues that arise. These devices may even be applicable for ground operations such as launches if, for example, there was a propellant leak.

With safety as the FAA's top priority, this could end up being one of the most important inventions for space transportation.

"It can not only affect the safety of one vehicle, but it's generic enough that it can help the entire industry establish and maintain a safe record," Davidian said. "And that is ultimately the mission of the FAA."



*Thurmond's prototype for a new gas sensor for spacecraft. D.C.*

*Thurmond (left) explains characteristics of the gas sensor.*

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