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Autonomous On-Board Control of Satellites for Space Superiority

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SBIR

COMPANY NAME:

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TECHNICAL PROJECT OFFICE:

AFRL Space Vehicles Directorate

SPONSORING ORGANIZATION:

Space and Missile Systems Center

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Technology developed by a small business in Maryland may allow satellites to act autonomously. This would offer better protection for spacecraft that are expensive and support critical national interests. (Air Force photo illustration)

AIR FORCE LOOKS TO PREVAIL IN SPACE WITH NEW AUTONOMY TECHNOLOGY

A small business in Maryland is helping the Air Force overcome barriers in satellite technology to gain the advantage in space.

With support from the Air Force Small Business Innovation Research/Small Business Technology Transfer Program, Orbit Logic Inc. developed software that shows promise to enable a satellite to consistently make its own decisions when ground contact is not possible. This added layer of protection – known as autonomy – is critical as an increasing number of satellites are tied to our national interests and can cost hundreds of millions of dollars each to launch into orbit.

Orbit Logic's technology is currently being validated at an Air Force Research Laboratory operations center, where it combines situational awareness feeds from a variety of active mission data sources to formulate satellite responses. Elements of the software architecture are also being integrated into an AFRL program for emerging urgent needs.

The Air Force SBIR/STTR Program invested \$2.4 million in the technology. So far, the company has leveraged an additional \$2.4 million in Phase III contracts, which represents funding from outside the SBIR/STTR program, and has grown by four employees because of the work.

BEHIND THE TECHNOLOGY

In the face of increased congestion and competition in space, missions will require satellites with significant capabilities including event detection and onboard decision making. Spacecraft that can spot and address threats and other issues autonomously – without the delays incurred by passing data to and from ground-based resources – will be better positioned to mitigate situations that could impact the mission or even the spacecraft itself.

During the Air Force SBIR/STTR project, Orbit Logic worked to design highly configurable autonomy planning software with plug-and-play capabilities that could solve complex space mission planning problems, reduce planning timelines and allow satellites to be more responsive to warfighter needs. The software developed by the company can be widely applied across a variety of missions.

To achieve mission flexibility, Orbit Logic built upon its modular software planning and scheduling architecture. That allows multiple numerical approaches to be independently applied to different aspects of decisions so highly-complex problems can be broken down into manageable pieces. Plans from each module are de-conflicted by a central module to ensure that system resources are not strained.

The software enables the satellite to continuously be on the lookout for potential problems, such as a collision with another spacecraft or debris, then performs assessments of the options to determine the best response to execute.

SBIR SUPPORT WAS CRITICAL

The Air Force SBIR/STTR Program provided Orbit Logic with the opportunity to work in an AFRL-sponsored team activity using relevant operational use cases. The resulting software could push the envelope of space situational awareness and be applicable to a variety of upcoming missions.

In addition to significant opportunities with the Air Force, this project also opened the door for possible commercial sales. The company is currently in discussions with several commercial customers to apply the technology to their satellite missions.

“Our development of an off-the-shelf onboard planning solution for satellites is clearly a need that many customers in a variety of domains are currently seeking for their missions,” said Doug George, vice president of Orbit Logic.



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