

NAVY SBIR TRANSITION PROGRAM

SPOTLIGHT

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Secmation's AutonomyLock Automates Cybersecurity Compliance for UxS Development

By Amie Alscheff

Secmation's AutonomyLock is a new engineering development tool helping the Navy and other users rapidly develop, prototype and field uncrewed systems (UxS) that meet DoD cybersecurity requirements. AutonomyLock enables developers to design the next generation of UxS with cybersecurity "baked in," according to Secmation CEO Hal Aldridge.

AutonomyLock provides an automated framework for the application of security controls and the generation of security compliance documentation. The technology automatically identifies and applies security controls consistent with certification standards such as the Defense Innovation Unit's (DIU) BlueUAS, the Association for Uncrewed Vehicle Systems International's (AUVSI) GreenUAS, and AUVSI's Trusted Cyber Framework. This allows the UxS developer to focus on control system design instead of implementing security controls.

AutonomyLock is based on Secmation's Secure Modular Aerial Unmanned System (SecMUAS), an Office of Naval Research (ONR)-funded SBIR project that began in 2019. The goal of ONR's SBIR topic was to enable faster development of Navy uncrewed aerial platforms, specifically Group 1 and Group 2 small UAS. UAS have become an essential part of U.S. military operations, providing combat support and



AutonomyLock provides a user-configurable set of interfaces, including Dual Ethernet, CAN, RS-232, USB, I2C, UART, GPIO and PWM. Secmation also offers options to integrate custom hardware.

intelligence gathering. With greater awareness of security issues found in some foreign-made systems and components, the DoD and some other government organizations have banned the use of certain commercial off the shelf (COTS) products. Due to the lack of readily-available secure systems, DoD agencies have relied on short-term security waivers to carry out active operations, an imperfect, short-term solution. In order to continue rapidly customizing UxS to meet evolving operational needs, ONR needed a convenient way to ensure that the components they select meet DoD cybersecurity standards. "Since they wanted to focus on flying cool stuff, they wanted the cybersecurity stuff to happen in the background," says Aldridge.

According to Brian Holm-Hansen, Ph.D., Flight Dynamics and Control program officer at ONR, "We see the technology as a key enabler to overcome UAS cyber security issues that burden air platform R&D. In fact, we are working towards a paradigm shift away from certifying complete

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UAS, e.g., the “Blue UAS” list curated by DIU, towards certifying the avionics backbone and development environment. These include the integrated hardware with all of the cyber-vulnerable components and the software development environment for programming the system. This technology will increase the pace of innovation by allowing one certified backbone to take the form of many different research vehicles. For example, the same CPU, I/O hardware, low-level driver software, cameras, data links, etc., can support everything from fixed-wing to rotary-wing experiments.”

Secmation worked collaboratively with the Navy's warfare centers to develop SecMUAS, says Holm-Hansen. “Dr. Katia Estabridis, director of

the Autonomy Research Arena in Naval Air Warfare Center-Weapons Division, and her team were instrumental in aligning the software development environment with a streamlined workflow to support R&D. Mr. Eric Silberg, lead for UAS Experimentation at Naval Surface Warfare Center-Carderock Division, was instrumental in aligning the technology with technical requirements for the Navy's flight clearance process.”

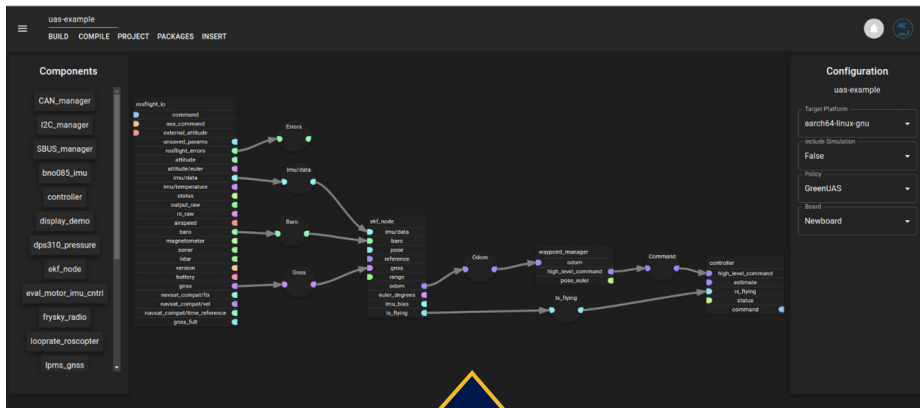
“The warfare centers were very helpful on feedback,” says Aldridge. “They were the early adopter for us. They gave us feedback about

what they liked, didn't like, what features we were missing, and so forth, and we rolled in what we could within the scope of the project.

“China Lake had early deliveries of our system software that were part of the SBIR program itself, and they've also got the current version of AutonomyLock. They're using the AutonomyLock product, both the hardware and software pieces, in their development.”

AutonomyLock takes the benefits of SecMUAS to a broader market beyond the DoD, including

other federal, state, and local agencies, as well as commercial industry. The product supports development of UxS in all domains, including air, sea and ground



Secmation's AutonomyLock IDE provides an intuitive drag and drop interface to rapidly design secure autonomous systems.

platforms. “We don't care if we're turning propellers or wheels when it comes down to it, since we're focused on the cybersecurity part of this. We saw this as a tool that could have a broader market appeal that would allow folks to get to market quicker, without having to hire in-house cybersecurity talent. It was very beneficial being able to leverage the investment that ONR made in its development.”

Designed for ease of use, AutonomyLock's integrated design environment (IDE) allows the developer to import control systems designed in industry-standard tools such as

MATLAB, Simulink, and ROS (Robot Operating System). AutonomyLock also provides a direct interface to simulation toolsets, such as Gazebo, which allows the developer to test a secure control system in a simulation environment. Additionally, AutonomyLock's secure hardware provides a ready-to-use secure computing environment for rapidly deploying autonomy to UxS. While the current release of AutonomyLock targets UxS development, Aldridge says the core product could be

adapted in the future for other industry sectors, such as industrial control systems or self-driving cars. "The tool would be the same, but we would integrate other libraries that might be more preferable to the industry."

For other small businesses trying to enter the defense market, Aldridge advises patience. "It takes time to get moving in the defense industry. Most of my career prior to founding Secmation in 2016 was in government and defense, in both the technical and the management side. I had helped small businesses before who were trying to wrangle support, so I was familiar with the process, but I had not done it myself until I switched over to the small business side. The SBIR program is such a good business model, if you can make it work: to be able to have funding, and then own the

IP rights, or the SBIR data rights. You don't get things like that by going after venture capital."

While developing SecMUAS, Secmation participated in the Navy SBIR Transition Program (Navy STP). "It helped us with some of our initial literature, going through the quad chart and other processes. The ability to have a small table at a very highly attended event like Sea-Air-Space in D.C. got us some initial connectivity that we probably would not have

had." A year after this experience, Secmation launched AutonomyLock officially at the 2023 AUVSI Xponential conference. "Navy STP got us some initial thoughts on messaging. We were able to build on that to have a full booth to support the launch."

Based in North Carolina, Secmation specializes in advanced cybersecurity technologies for defense and industrial applications. For more information about the company, see www.secmation.com.



Secmation's AutonomyLock includes an integrated development environment (IDE) and secure hardware to deploy the autonomy software package to target UxS.



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