



ADVANCED OPTICAL SYSTEMS, INC. **AOS**



REDEFINING ELECTRO-OPTICS

Located in Huntsville, Alabama, Advanced Optical Systems (AOS) is an award-winning producer of cutting edge electro-optical technologies for commercial and military applications. The scope of their technology covers a wide variety of fields, including: Biometrics; Aided Target Recognition (ATR); Cueing for ATR Systems; Space Rendezvous and Docking; Electro-Optic Sensors and Seekers; Rotocraft Auto External Load Lift; Image Stabilization; Space Imaging and Cryogenics; and Space Qualified Manufacturing.

AOS— which recently celebrated its 27th anniversary — was founded by Dr. Richard Hartman in 1988. Having retired from his post as Director of Research for the Aviation and Missile Command in Huntsville, Dr. Hartman decided to start his own company based on a few innovative small business research proposals focusing



primarily on target recognition and missile seeking technology.

Eventually, the company's research transitioned into the development of technology specializing in recognizing, identifying and finding objects spatially, and then determining how those objects exist in space relative to one another.

"So we went from building missile seekers to building rendezvous and docking technology for the International Space Station, Hubble Space Telescope and, more recently, providing similar technology for robotic helicopters," said Chris Centamore, Director of Business Development.

"In parallel to a lot of those developments, we started looking at how we could apply some of these technologies from the electro-optical world—the detection and identification world—to biometrics," he added. "That's really how we started out six or seven years ago getting into developing non-contact fingerprint technology, and that's been a big part of the focus of the company for about the past four or five years."

ON THE LEADING EDGE

AOS' focus on non-contact fingerprint technology led to the development of their AIRprint core technology. Today, a number of the company's featured products use that core technology under the Automated Non-

Contact Distance Identity (ANDI) product family name.

"The core technology is a standoff non-contact— what we refer to as zero contact— fingerprint technology that uses passive optical sensors and, to avoid being too technical, normal white lighting," Centamore explained. "You need to have a pretty specialized environment in which you can capture these fingerprints, so we've put together the illumination, the camera, the lens, the timing and the positioning of the finger so that you can capture a fingerprint from up to six meters in our lab tests."

AOS' first product using the core technology was the ANDI 200: a robotic biometric enrolment device that captures face images, fingerprints and voice samples with the ability to interact with users by giving them a series of instructions in order to collect "all the enrollment information you would normally get from interacting with a skilled human operator." But while the ANDI 200 garnered its fair share of interest on the market, the company's current AIRprint incarnation, ANDI On The Go, is generating even greater interest.

"At full walking speed— up to a meter and a half per second— you can walk past the device, wave your hand through the capture area and it captures all of your fingerprints in an instant," Centamore explained. "For applications like airport exit from a country, land border crossings, theme parks, large music festivals where they're trying to move ten thousand people in and out quickly —any area where you're trying to provide security for large volumes of people — that's what the ANDI On The Go is all about. It's really been the technology that we've been focused



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on here for the past about year and a half."

Considering the high degree of efficiency with this technology, it's unsurprising to discover that ANDI On The Go has peaked the interests of several noteworthy suitors, including the Department of Defense, Department of Homeland Security, Transportation Security Administration and Customs and Border Protection. It's also currently being used in the European Union's Smart Borders pilot program.

"Contact fingerprint technology can be fin-

icky and time-consuming, whereas we've publically demonstrated that our technology can move through 54 people a minute, which is over 3,000 people per hour," said Centamore.

Additionally, AOS' HERMES Autonomous Positioning System has also taken the industry by storm. It's an advanced rendezvous and docking technology that was originally developed as part of the Demonstration for Autonomous Rendezvous Technology (DART) mission for robotic refueling. The system was then used for the Orbital Express



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program, then as part of the Hubble Servicing Mission 4 and eventually for rendezvous and docking applications for the International Space Station.

Today, the company is applying the HERMES system to robotic helicopters, giving them the ability to pick up and deliver external sling loads autonomously. A prime example of this technology in action is the K-MAX helicopter, which has been operating in Afghanistan for a number of years now and has "moved millions and millions tons of cargo."

"You basically position a receptacle and a target within the pickup zone that's attached to a piece of cargo and mount the sensors on the helicopter," explained Centamore. "The helicopter flies in, finds the cargo using our sensor which provides navigational feedback to the helicopter so that it can connect to the piece of cargo autonomously, and then it flies off to its delivery location, which also has a target so that the helicopter can autonomously deliver it to that exact location within a meter. It could basically deliver it to the back of a pickup truck, so it's very, very exact navigation." The HERMES system has also been used for autonomous landing using



the same target/sensor interaction used for delivering external sling loads, which shows the tremendous potential for the future of the technology.

AWARD-WORTHY INNOVATIONS

Not only has AOS impressed some of the world's most powerful organizations, but it has also earned plenty of industry recognition in the process. The company's AIRprintcore technology received a 'Best of What's New Award' from Popular Science in 2014 as one of 100 winners selected among thousands of entrants. AIRprint also won Gold in the 'Innovative Services Safety/Security' category at the 2015 Edison Awards, while the



HERMES system won Silver in the 'Applied Technology/Safety' category.

According to Centamore, the team was thrilled to pick up those awards because the company was "going up against names that you would recognize."

"It's quite an honor," he said. "Usually when we tell people about what our technology does, they're pretty amazed that it's even possible. To see an organization that really operates outside of the biometrics community and outside of the specific technology areas that we're working in find this technology to be as impressive as they do, it really confirmed for us that we had something that was

very unique."

In the coming years, Centamore indicated that AOS plans to work closely with companies in the control access devices industry to have their systems integrated into their solutions. He also anticipates that the company will continue to redefine electro-optical technologies by discovering ones "that aren't even on our roadmap at this point."

"Five years from now, I think we'll have technologies that we haven't even thought of yet because we continue to innovate every day," he concluded. "And not just incrementally—we try to move the market forward in more of a paradigm-changing kind of way."

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