If you’re a passenger on an airplane approaching the airport on a foggy night, you might understandably worry about how the pilot will ever find the runway. Current landing technologies, while good, have gotten even better with a new landing system developed in part at Ohio University’s Avionics Engineering Center.

The local area augmentation system (LAAS) is a new ground-based augmentation to global positioning system (GPS) satellites. It uses a fixed receiver, combined with mathematical computations, to correct any errors in the positions calculated from satellite signals.

“The number-one function of the LAAS is to remove errors safely,” says Dean Bruckner, Avionics Engineering Center assistant director-technical. “It’s basically the FAA’s eyes and the ears on the GPS system, for airplanes that are using it for high-precision approach and landing.” The chance of a plane missing the runway due to faulty navigation input from LAAS? “One in a billion,” Bruckner answers.

The aircraft’s corresponding LAAS equipment uses the satellite-to-user range corrections provided from the ground-based system to guide the aircraft safely to the runway.

The first FAA-approved LAAS system—which is based on the prototype developed at Ohio University—is now active at one of the New York City area’s top three international airports: Newark, New Jersey. Still others are coming online. LAAS systems are intended
to replace the current instrument landing system (ILS), which is specific to not only every airport, but every runway end. “If you have four runways, as in a large airport, you may have up to eight ILS installations. These are expensive,” Bruckner says. “However, just one since the 1960s, when the ground-based instrument landing system was the newest technology. “We still have a role in supporting the ILS and other ground-based navigation aids as well as helping them move toward this Next Generation Air Transportation System,” said Mike DiBenedetto, senior research program engineer for the Avionics Engineering Center. DiBenedetto and his colleague Rob Thomas manage the center’s participation in the FAA’s Automatic Dependent Surveillance-Broadcast (ADS-B) program.

LAAS can serve the entire airport. It does have an economy of scale.”

These cost savings are one priority of the FAA’s Next Generation Air Transportation System, or NextGen, along with improved safety and volume capacity. NextGen is ushering in a satellite-based system of air traffic management, from the current ground-based system, so the LAAS system is the first step in an entire transformation of how the FAA manages air traffic safety.

NextGen goals also include reducing emissions while increasing air traffic volume. Another FAA adaptation of GPS helps with this, too. Currently, air traffic controllers stair-step the altitude of arriving planes into airports; using a few stages of constant altitude and speed makes it easier to control multiple planes in densely packed airspace. The Automated Dependent Surveillance-Broadcast (ADS-B) system—in which airplanes use GPS to report their location and trajectory in relation to another—will allow controllers extra leeway to permit smooth, continuous descents into airports, which in turn conserves fuel, limits emissions, and reduces noise pollution.

The Avionics Engineering Center has been partnering with the FAA since the 1960s, when the ground-based instrument landing system was the newest technology. “We still have a role in supporting the ILS and other ground-based navigation aids as well as helping them move toward this Next Generation Air Transportation System,” said Mike DiBenedetto, senior research program engineer for the Avionics Engineering Center. DiBenedetto and his colleague Rob Thomas manage the center’s participation in the FAA’s Automatic Dependent Surveillance-Broadcast (ADS-B) program.

This long-standing relationship is based on the center’s unique facility that has on hand test aircraft to evaluate prototypes developed by faculty and staff. “We have a good fundamental understanding of navigation and landing systems and, obviously, interest in new technology,” DiBenedetto says. “We’re always interested in learning more to help the FAA sustain what they have and to bring new technologies into existence.”

The LAAS program has received more than $14 million in funding from the FAA since 1997.