The FAA Joint University Program

The Federal Aviation Administration (FAA) Joint University Program (JUP) for Air Transportation Technology was formed in 1971. The program was implemented with research grants to three universities - the Massachusetts Institute of Technology (MIT), Ohio University, and Princeton University. These three universities were chosen based on their world-class reputations for research excellence in aviation.

The JUP is primarily a student-driven program. Faculty and staff researchers act as advisors and mentors to the undergraduate and graduate students who are conducting the research and development. Students and principal investigators are able to engage in research focused on emerging challenges in aviation in a collaborative environment with FAA personnel.

The JUP meets once every quarter where research from the three universities is briefed and reviewed by the group. Program reviews are held at the FAA William J. Hughes Technical Center and at each of the three universities. At this time, recent research results are presented, and future research plans are discussed with suggestions from the FAA and faculty from the 3 universities.

Ohio University’s FAA JUP Activities

For nearly 50 years, Ohio University has been supporting the FAA JUP for the research and development (R&D) of Integrated Avionics Technology. This R&E focuses on communications, navigation, and surveillance (CNS) system technologies.

Ground-Based Communications, Navigation and Surveillance – Although the NAS under NextGen will become increasingly reliant upon satellite-based positioning and timing systems, ground-based navigation and surveillance systems are, and will continue to be, necessary. The need for a backup for satellite-based systems necessitates research into ground-based systems, including distance measuring equipment (DME) transponders and Alternate Positioning, Navigation and Timing (APNT) systems. Current research in this area concentrates on ground based avian specific radars to detect low radar cross section (RCS) targets (e.g., birds) and report these potential hazards using aviation data links to reduce the risk of bird strikes.

Platform-Based Communications, Navigation and Surveillance – Avionics on-board aircraft operate and interface with ground and space-based segments to a provide wide variety of measurements and information to the platform as well as to ground infrastructure to allow the platform to safely and efficiently operate within the NAS. Various CNS systems are being researched by Ohio University to help increase the safety and efficiency of aircraft operations. For example, one approach under investigation to provide timely warning of obstacle avoidance (e.g., bird activity) in and about the aircraft is to track obstacles (e.g., birds) using a ground-based radar system for detection, and then relay this information to the airborne users via aviation Automatic Dependent Surveillance-Broadcast (ADS-B) data links.

Satellite-Based Communications, Navigation and Surveillance – Satellite-based CNS systems are an integral part of NextGen. Research in this area has high intrinsic value and is directly relevant to the FAA’s mission. The positioning systems (GPS and more broadly, GNSS), provide support for both en-route navigation and landing guidance. In addition, ADS-B relies upon GPS for positioning information. Ohio University is actively researching these areas to increase aviation safety for the FAA.
Airport Infrastructure – There are many ground-based systems used at an airport to provide airport operations; these systems include various ground-based CNS and supporting infrastructure systems. Ohio University is actively researching these areas in support of the FAA related to surface monitoring/inspection, FOD detection and removal, wildlife management using various sensors such as Lidar, multispectral optical, video, thermal and/or short range radar systems using various semi-autonomous platforms. Research focus is on sensor integration using Lidar, high-sensitivity optical cameras, and Infrared/thermal imaging technologies.