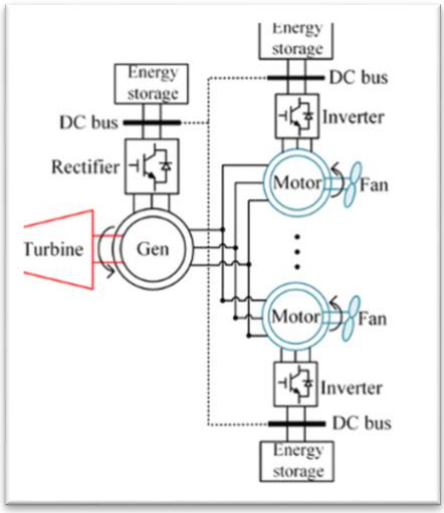
Round 3 Projects Overview

303 Brushless Doubly-Fed Machine

Project Team: The Ohio State University (Lead), University of Dayton Research Institute, Safran USA

https://www.ohiofrn.org/projects/brushless-doubly-fed-machine-and-drive-systems-aviation-application



The objective of this project was to design, develop and demonstrate a brushless doubly fed machine (BDFM) based hybrid electrical drive system with independent speed variable frequency operation capability. The machine proposed could be scalable to 100 kW for an unmanned aerial vehicle (UAV) application or 300 kW for a personal air vehicle (PAV) application. The proposed technology offers a safer system under fault conditions than permanent magnet synchronous machines, which was proved in testing of this project. The proposed technology may help NASA achieve several high priority goals in turbo electric propulsion technology. The system may be able to plug directly into existing UAVs/PAVs.

Although the BDFM-based system can achieve independent speed-variable frequency operation, its low power factor issue makes the total size of the BDFM and power converter system about the same as the traditional system that uses a constant speed drive (CSD) and a wound rotor synchronous generator (WRSG). The efficiency of the BDFM-based system is slightly better than the traditional CSD+WRSG system. OSU Technology Commercialization Office (TCO) filed an IP on this technology and posted on its website to allow companies to review the technology and determine interest.

309 UAS Detect and Avoid Sensor Fusion of Stealthy Radars and Vision

Project Team: GhostWave Technologies (Lead), The Ohio State University CDME, Converge Technologies, Lockheed Martin Advance Technologies Lab

https://www.ohiofrn.org/projects/optical-radar-sensor-fusion-uav-onboard-detect-and-avoid

The team designed and built a 24GHz RF Noise Radar and performed sensor fusion with commercially available cameras. The demonstration showed sensor fusion of the optical and radar, utilizing avoidance algorithms, the sensor fusion data was used to send messages to the autopilot for avoidance maneuvers. Due to the use of RF Noise Radar, this solution also provides low probability of jamming or interference.

This Detect and Avoid System (DAAS) is superior to existing gold standard systems in every category.

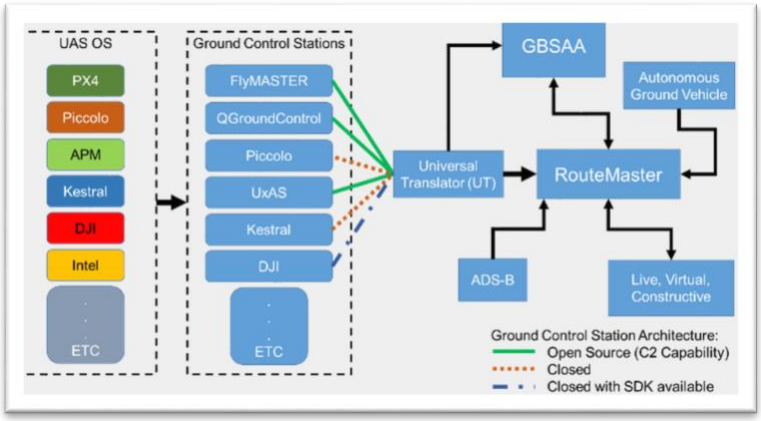
- Sensor Fusion system mitigates vulnerabilities of individual components.
- Addresses known problem of radar interference in radar saturated environments.
- Closed Loop System directly feeds our DAAS obstacle track data to the autopilot of the UAV.

The end user is a commercial UAS commander who wants to fly BVLOS, which is going to become the norm for UAS systems. Initial early commercial adopters will likely be the delivery services (Amazon and the like), first responders, law enforcement, and a growing number of other industries. The DAAS will be required as a system component of any UAV entering into service for BVLOS. The UAS manufacturing companies will be the channel partners as they integrate this DAAS into their platforms to support end user BVLOS requirements.

314 Regional Unmanned Traffic Management System (RUTMS)

Project Team: University of Cincinnati (Lead), Sinclair Community College, Demeter UAVs, SIMLAT

https://www.ohiofrn.org/projects/regional-unmanned-traffic-management-system-rutms



RUTMS is a collision avoidance and traffic management digital infrastructure that allows staffed and unstaffed systems to operate effectively in confined spaces such as an emergency response scenario or the modern urban environment, with heterogeneous communication and control protocols. It directly ties into the Springfield Ground Based Detect and Avoid (GBDAA - SkyVision) and Piccolo Autopilot.

The RUTMS system integrates with existing assets such as the GBDAA SkyVision at the National Advanced Air Mobility (AAM) Center of Excellence in Springfield, Ohio, to increase operational capabilities and capacities at both the Springfield Beckley airport and across the region. This project allowed for further development of Ohio's assets and made beyond visual line of sight (BVLOS) operations a possibility with small UAS.

315 Autonomous/Remote Cirrus SR22 Aerial Surveillance Platform and Personal Air Vehicle "Air Uber" System

Project Team: Persistent Surveillance Systems (Lead), Ohio University, Wright State University, MacAir Aviation, Autonodyne, MacNauchtan Development, Aviation Fundamentals, Bosma Technical Services

https://www.ohiofrn.org/projects/automated-cirrus-sr22-surveillance-or-personnel-transport

The Autonomous SR22 effort was a broad reaching team effort to develop a new capability to enhance airborne surveillance operations and to provide a pathway to a remotely operated semi-autonomous Cirrus SR22 for personal transportation use similar to an Air Uber use in the future.

This effort successfully developed a wide range of technologies and systems that allows the aircraft and avionics to remotely control and operate the aircraft. This was done through modification to existing certified avionics systems. This was demonstrated in October 2019 to GE Aerospace and Honda Jet who had expressed strong interest in our systems. Persistent Surveillance Systems (PSS) also worked on capabilities such as the fuel leveling systems, the auto leaning and throttle/ mixture control and a range of other useful applications for the existing fleet of aircraft.

The team pivoted and integrated many of the systems onto other prior approved aircraft such as the PSS Cessna 207 and other commercial planes. The team conducted five demonstrations and operational evaluations of various systems to commercial companies, Joint Task Force South, Baltimore City Police, and supported the combined CUE 2021 exercise.