Real-time aircraft recognition imaging sensors

Sunlight Photonics

Company background

Sunlight Photonics is a developer of solar-powered unmanned aircraft and airborne communications systems. The company was formed in 2007 by a team of former Bell Labs and Lockheed Martin scientists and engineers. Our primary focus is the development of Sunfleets – clusters of solar UAVs with robust airframe designs, lightweight PV power, formation flight control software, and distributed communication payloads. Sunlink-X UAV is specifically designed for high-altitude long-endurance missions and will be an enabling platform for Sunfleet Networks designed for broadband wireless and internet services.

Scope of work

This work will be directed towards a special optical imaging sensor used in an aircraft's situational awareness subsystem. The sensor is based on a video camera and an on-board image processor. The processor for the purposes of this work may be based on a Raspberry Pi computer. The students will develop a software package, using Python or C++, to process a real-time video feed from the camera and output results of its image analysis to a user interface. The software may be based on a neural network, which can be trained to recognize different aircraft on an imaging screen and output its identification and position on the screen. In addition, the screen position may be further correlated with a specific position in the observed airspace. This work may be done using still stock images and sampled video feeds from actual flight tests.

The students will be involved in every phase of the project from design through implementation, during which the students could interact with and get support from Sunlight's employees. As a final product, the sensor could become an import element in the situational awareness subsystems on board of all future aircraft, manned and unmanned. More specifically, FAA is expected to mandate using such systems onboard all unmanned aircraft entering NAS.

Sergey Frolov, VP of Sunlight Technologies, will be managing this project. Dr. Frolov has extensive hardware, software development and project management experience and can help mentor the student team throughout this 6-week course.

Desired Skill Set for Students:

We understand that all the students in the group might not have the desired technical skills. As long as they have the ability to problem solve and the willingness to learn then our engineers can help teach some of these hard-technical skills.

- Python/ML expertise
- Raspberry Pi/Linux experience
- Neural network/imaging analytics

Preferred Team Size: 3-5 Students

Given the scope of this project a group of 5 students is preferred but 3 students could also excel given they are willing to problem solve and learn.

Internships at the End of the Course:

We are happy to consider offering internships at the end of the course.

Location Where Work Should Be Performed:

SUNLIGHT PHOTONICS INC. 5435 Airport Blvd. Suite 102, Boulder Colorado. Off-site locations are also available, including Golden.