AEROSPACE ENGINEERING
COLLEGE OF ENGINEERING

RESEARCH OPPORTUNITIES FOR UNDERGRADUATE students

APPLICATION DEADLINE: February 8, 2026

PROJECT TITLE: Development of a High-Speed Optical Flame Detection & Discrimination Sensing System

Physical Requirement :
Must be able to lift 20 lbs and be a US citizen

Project's Technical Skills Requirement :
Work with hand tools and klowledge of pthon coding and data acquisition systems

Project's Available Positions : 1

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Project Description

Optical Flame Detectors are generally designed for large spaces with the expectation that there will be little to no interference from structural members (e.g., walls, structural frames, bulkheads, etc.) and personnel. However, applications involving Navy ships have experienced nuisance and false alarms due to lighting conditions and movement of equipment and personnel in the monitored space. Each inadvertent event on board a Navy vessel is costing time and resources, in fact some sources have indicated a cost of approximately $270,000.00 from a false fire indication in some the critical spaces. High false and nuisance alarm rates without an underlining system understanding causes firewatch personnel to lose confidence in fire detection system’s ability to detect fire, accurately and reliably. This in general instills indifference in the personnel towards alarms/faults, potentially resulting in the ship’s crew not quickly responding to an actual fire event. The innovative nature of the current research is to modify an existing optical flame detector our team has previously developed and to transition this technology into a non-ideal environment with traffic in both open and crowed spaces experienced on Navy vessels.

This will involve the generation/modification of the software necessary to acquire data from several different sensors with different wavelength responses. Using this data develop an algorithm based on artificial intelligence (AI) to discriminate between the light emissions generated by fire/flames and those due to other light emitting sources. Sources such as sunlight, fluorescent light, welding operations, workmen’s flashlights,

cigarette’s, etc. to name a few. Students may also participate in large scale fire testing.

This topic is open to all CEAS students. Although training will be provided, basic skills needed include experience with coding, such as python, LabVIEW, etc. and being a team player is required. Comfortable in a large-scale laboratory environment. In addition, there is a potential for the student to participate in technical publications at local and national levels. Dr. Disimile’s UC-FEST laboratory is located off campus in Fairfield, Oh, approximately 30 minutes north of UC.