

## LESA Center URP Opportunity

Title: *Microcontroller Coding - Spectral Optical Monitoring System for Horticulture*

Location: Low CII 7015

Duration: Spring 2022 Semester

LESA is seeking an undergraduate researcher to work with the LESA engineering team to develop spectral optical monitoring system for integration with LESA's greenhouse lighting system.

### Background

LESA participates in advanced research of horticultural lighting and control systems for applications in indoor growth chambers and greenhouses. Current research activities include enhancing the lighting control system with sensing capabilities that will ultimately enable feedback control.

### Project Description

The goal of this URP project is to fully develop an optical sensor system based on a selected  $\mu$ spectrometer to provide spectral data to the greenhouse lighting control system. The optical sensor system will record and monitor specific wavelengths that are available from the LESA spectrally tunable greenhouse lights. The sensor system includes:

- $\mu$ spectrometer for capturing photon flux measurement between 400 nm and 700 nm
- A controller that interfaces directly to the spectrometer (such as ESP32 or raspberry pi)
- Wireless connectivity to a control computer (part of an existing larger system controller)
- Output data formatted for display in a light control GUI (developed separately)

### Project Output / Semester Milestones:

The expected output of the project at the end of the semester includes:

- Development of control system on microcontroller for reliable spectrometer operation and communication, including generation of all code for the interface controller and wireless communication
- Lab based testing to confirm reliable operation of spectrometer and data communication

### Applicant Requirements

- Preferred junior or senior student majoring in ECSE/CSE, CSE, or CS
- Demonstrable experience with microcontrollers - i.e., Raspberry Pi, ESP32 (examples beyond coursework preferred)
- Experience with Python
- Familiarity with Bluetooth communication protocols
- Familiarity with IoT messaging protocols such as MQTT
- Good documentation and communication skills
- Reliable availability (minimum 6-8 hours/week; maximum 12 hours/week allowed) in-person

Interested students, send your resume & cover letter to LESA no later than **Monday, January 17, 2022**.

Send to: Michelle Simkulet [simkum@rpi.edu](mailto:simkum@rpi.edu)