Title: Evaluating sensors for irrigation management

Where – in person lab/field

Abstract:

Oregon produces more than 220 ag commodities of which many require irrigation for viable production. Facing a changing climate exacerbated with drought conditions, producers in Oregon are pressured to optimize irrigation management practices and conserve water. This project consists of testing different sensors – publicly available as well as newly developed – to improve irrigation management decision making. Testing may include soil-, plant-, and weather-based sensors across important agricultural commodities in Oregon. Data collection, analysis, and a sensor comparison will be performed to determine the sensors’ advantages and disadvantages for growers to integrate and implement in their operations.

Project Description

In the face of a changing climate, increasing agricultural demand for freshwater must include improvements in irrigation management solutions in order to optimize water resources. Inadequate irrigation management decisions may result in under or over-water applications, which consequently can result in crop water stress, or increase nutrient leaching, and therefore affect crop growth and yield. This project consists of an evaluation of multiple sensors (i.e., soil-, plant-, and weather-based sensors) to be performed across important agricultural crops in Oregon. Sensors may include dendrometers, soil moisture sensors (e.g., tensiometers, volumetric water content), and/or remote sensing evapotranspiration (ET) estimates (e.g., OpenET) for determining consumptive water use across specialty crops such as hazelnuts and blueberries. In a research site located either at –the OSU Lewis Brown Farm, or the North Willamette Research and Extension Center (NWREC), the student will be involved in different ongoing research projects involving sensors and collaborate with other undergraduate or graduate students. For instance – the student will collaborate with Zamora Re’s Lab students to collect, process, and analyze data from dendrometers along with other soil moisture sensors. The student will be involved in sensor data collection, analysis, and evaluation of the efficiency of the sensors for irrigation management decisions. It might include field deploying and testing different sensors.

Description of work environment (ex. primarily campus lab, field work near campus, etc.)

Hybrid (remote/lab/field)

The project may include field work in the OSU Lewis Brown Farm and/or in the North Willamette Research and Extension Center (Aurora, OR).

 Description of Student Responsibilities - a specific description of what the student's day-to-day research/work responsibilities will be

The student will be responsible for field data collection, analysis, and efficiency evaluation of the sensors for irrigation management decisions. To test the dendrometers and soil moisture sensors, the student will work collaboratively with main advisor, and with graduate and undergraduate students from the OPEnS Lab who are developing and improving the dendrometer prototype. The student will collect field data from sensors on a regular basis, organize, and analyze data with multiple datasets to determine the efficiency of the sensors for irrigation management.

Acquired skills: The student will learn about sensors used in the industry, as well as newly low-cost sensors developed by students, for irrigation management. Skills to be acquired include: proper sensor installation, research field data collection, and analysis, and analytical and computational procedures. The student will also gain interdisciplinary research experience since the project includes aspects of soil science, plant physiology, and technological/mechanical aspect of the sensors. The student will learn the basics of performing a simple literature review to frame the results from their project in the context of the larger research data. Science communication skills and the ability to inform complex data to stakeholders will also be acquired.

Preferred skills: experience working with data collection and data analysis. Experience in data processing using Excel or programming languages such as Python, R, Matlab working with sensors in agriculture/irrigation, and an interest in irrigation field work. This project might require the student to be in the field under different weather conditions.

Learning outcomes

The student will learn about how to process data collected from sensors used in the industry, as well as newly low-cost sensors developed by students, for irrigation management, water savings, and the avenues for potential stakeholder adoption on larger scales.

The student will learn the basics of performing a simple literature review to frame the results from their project in the context of the larger research data. Science communication skills and the ability to inform complex data to stakeholders will also be acquired.

Timeframe

1/15/2024 - 6/7/2024

Hours per week

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