Waste Not, Want Not. A 'Smart Garden' Approach to Water Conservation using Remote Sensing and Geospatial Technologies for Urban Agriculture

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Objective:

- Design a smart watering system capable of watering when necessary to promote water conservation–reducing energy costs of water management, reducing consumption of fresh water sources to promote sustainability, and reducing water diversion efforts for habitat and biodiversity preservation
- Compare water usage with and without automated smart irrigation system and create a standard curve of wilting to create a training dataset
- Investigate effect of environment, plant type, and soil type on need for irrigation using knowledge-engineered smart system
- Develop a predictive model for 'smart' irrigation in an urban agricultural setting

Approach:

- Utilize sunflowers as "indicator" plants to sense when and where water is needed and to create a training dataset based on correlation of soil moisture levels and wilting
- Connect Raspberry-Pi boards to a soil moisture sensor and camera system and utilize PlantCV and custom Python scripts to capture soil moisture level and sunflower wilting image outputs
- Integrate geospatial data into the automated system to create a system capable of determining the timing of irrigation and deliver water directly to plant roots resulting in minimal loss of water due to evaporation and run-off
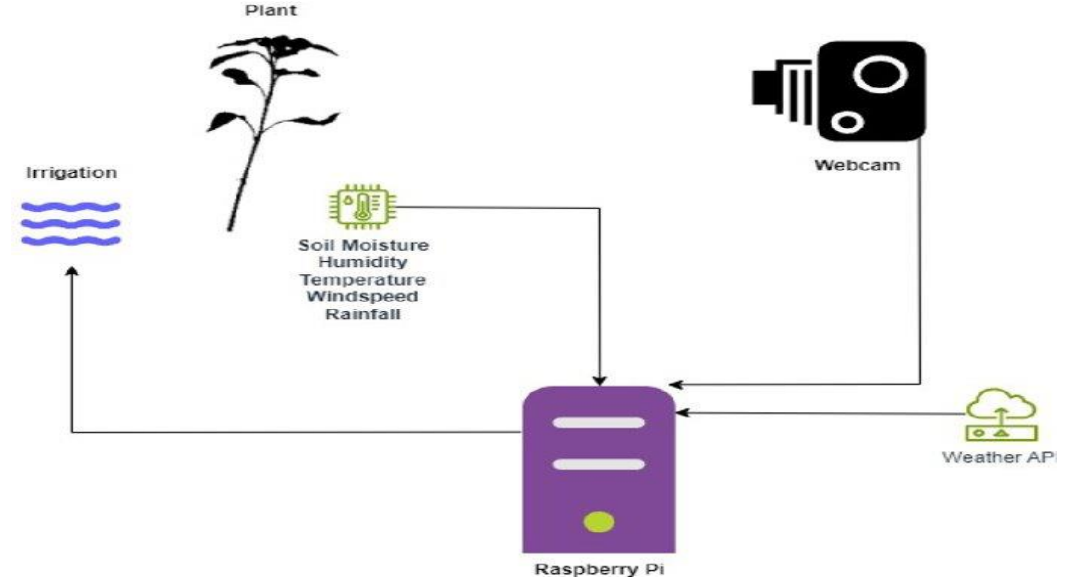
Building Blocks of Smart Watering System

Key Milestones:

• Award start	05/01/2024
• Moisture sensor options investigated and sensor selected	completed
• Python code implemented to collect moisture-sensed data	completed
• Weather data integration	in progress
• Mapping of vegetation, soil moisture and soil type in ArcGIS	in progress
• Predictive model development	in progress
• Award end & submission of final report	03/31/2025

Collaborators / Co-I's/Partners:

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