PURDUE UNIVERSITY

Smart Irrigation

webee®

matplotlib

WHIN

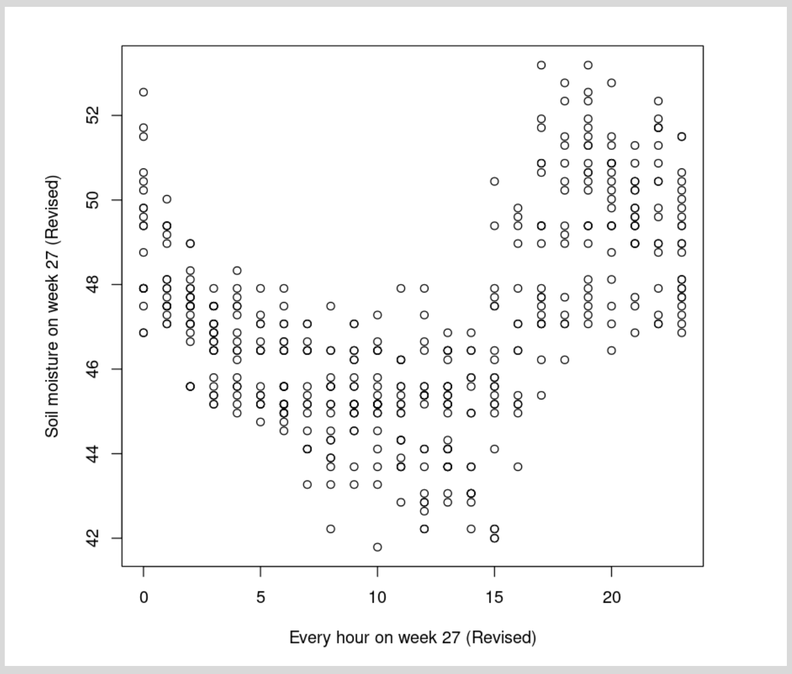
OpenMeteo

Background

- It is known that an estimated 70% of freshwater is used in irrigation.
- For Webee, the goal is to utilize sensors that provide necessary data on weather and soil patterns which will then be processed into useful visual information for farmers to save water by utilizing rain to water crops more effectively.
- Our main methods of obtaining this data are through soil sensors (from WHIN and Webee) and weather APIs (WHIN and OpenMeteo)

Methodology

- We analyzed the relationship between variables such as the change in temperature and the change in soil moisture.
- We will also model the speed at which the soil moisture decreases after being watered, either by rain or manual irrigation.



- We are using WHIN and OpenMeteo APIs to gather data and have successfully visualized correlations between temperature and soil moisture using Python and its libraries, such as Matplotlib.

Change of Scope

- Logistically unable to go through with Webee Sensors
- Successfully changed to WHIN API and weather sensors

Findings

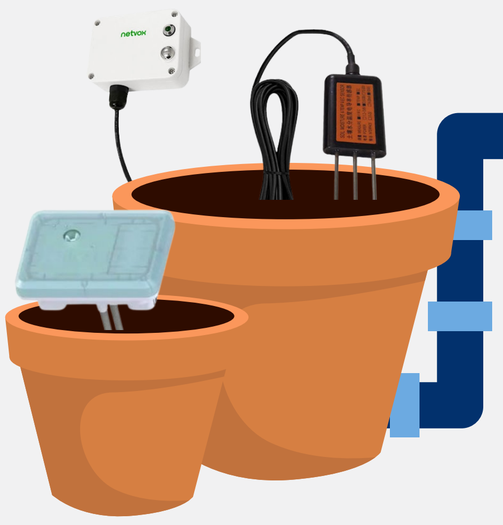
- WHIN and Open-Meteo APIs contain accurate weather data which are used to craft a moisture prediction model.
- A clustering model can assist in determining when to irrigate. depending on weather and soil moisture data

Experiment

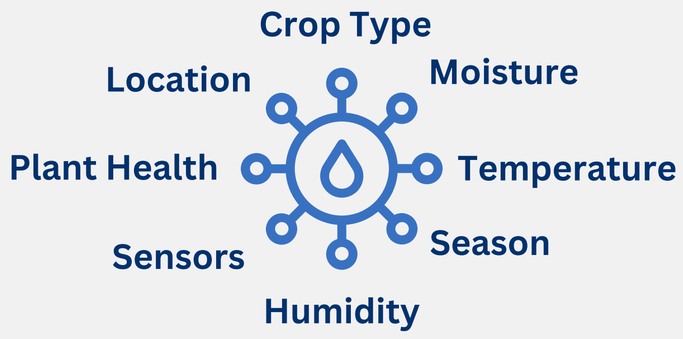
- Controls:
  - Soil type, temperature, nutrients, irrigation method, location, crop type, season
- Independent:
  - Irrigation amount and timing
- Dependent:
  - moisture drop off rates
- Set up:
  - Two groups of pots filled with potting soil
  - Group one watered in excess at dusk every day
  - Group two watered limitedly at dusk every day

Future Goals

- Account for any possible variable or variation
  - Including any location or plant
- Able to modulate irrigation according to water and money accessibility
- Make software user friendly with a concise user interface



Soil Type	Dangerously Low Soil Moisture
Fine (Clay)	Below 60
Medium (Loamy)	Below 70
Coarse (Sandy)	Below 80



Irrigate?

Yes or No