Use Diagram Specification

The drones must be able to fulfil the following functionality:

1. Check the moisture level of the soil using Thermal Cameras
2. Check the pH level of the soil using a built-in probe
3. Apply Herbicides/Pesticides using built in sprays
4. Take high quality pictures of the plants
5. Synchronise these pictures with the Cloud Database

The soil needs to have a pH level between 6-8 before planting.

The Cloud Database in return will analyse the data and implement the Deep Learning Algorithm on it. Certain features of the pictures will need to be taken into account. For instance, we need to track when the leaves will turn greenish yellow as this is an indication for a fungus disease called Black Root Rot.

Figure 1. Wilting of oldest leaves first and yellowing of plants infected with R. solani

Figure 2. Blackening of petioles and infection at the soil level

Figure 3. Rhizoctonia root rot infected plant with yellow leaves, and showing infectio root just below the soil line

The Cloud Database will also communicate with the autonomous sprinkler. The goal is to ensure the soil remains moist but not wet.

There are certain limitations to the drone. These are factors we need to keep in mind while implementing this system in a realistic environment. The flight time for standard drones is between 15-20 minutes. Charging stations can be implemented near the farms. The drones will need to be manually charged by an individual keeping in mind their charging time. The larger a drone the more stable it is while up in the air. For the soil probe, we recommend using a larger drone. For other use cases where stability is a non-issue, we can stick with a smaller drone. There should also be a specific spot to deposit the soil samples for further testing.

Emergency Scenario prompts the drone to return to the charging station immediately. Possible scenarios include the following:

1. Runs out of battery
2. Encounters an operational failure
3. Gets hit by a bird

Reference
https://www.ndsu.edu/agriculture/ag-hub/publications/management-rhizoctonia-root-and-crown-rot-sugarbeet