Wireless Mesh Network for Pesticide Spray Monitoring and Mapping

Project Planning

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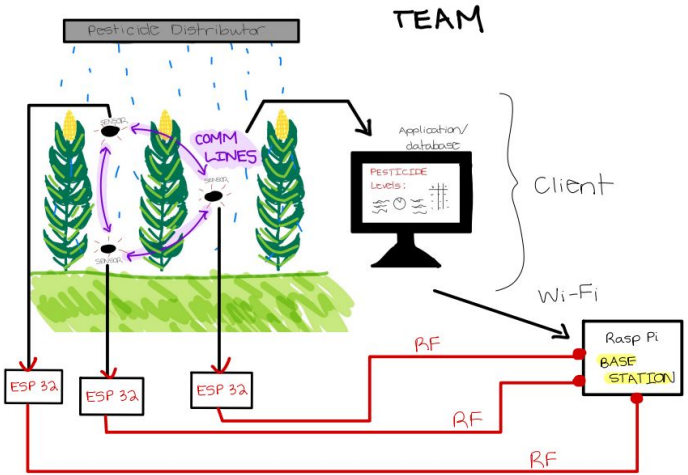
Client: Claussen Labs

Project Overview

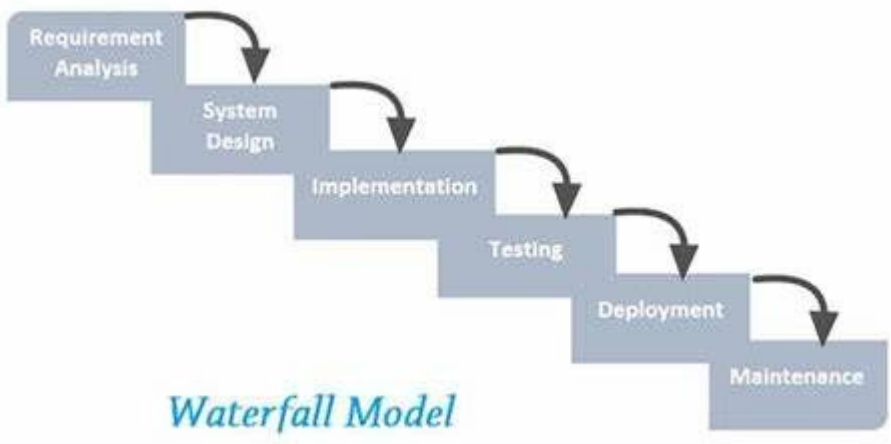
Goal: Wireless Mesh Network for Pesticide Spray Monitoring and Mapping

- Collect resistance data from IDEs (Interdigitated Electrodes) at various levels of crop canopy
- ESP32s microcontrollers will also be placed at various levels of corn canopies and locations and create a “mesh network”
- Measurements will be sent to a centralized device to be pulled by user
    - Centralized device will be a Raspberry Pi
    - Transmitted over bluetooth or wifi
    - Text files must be user friendly



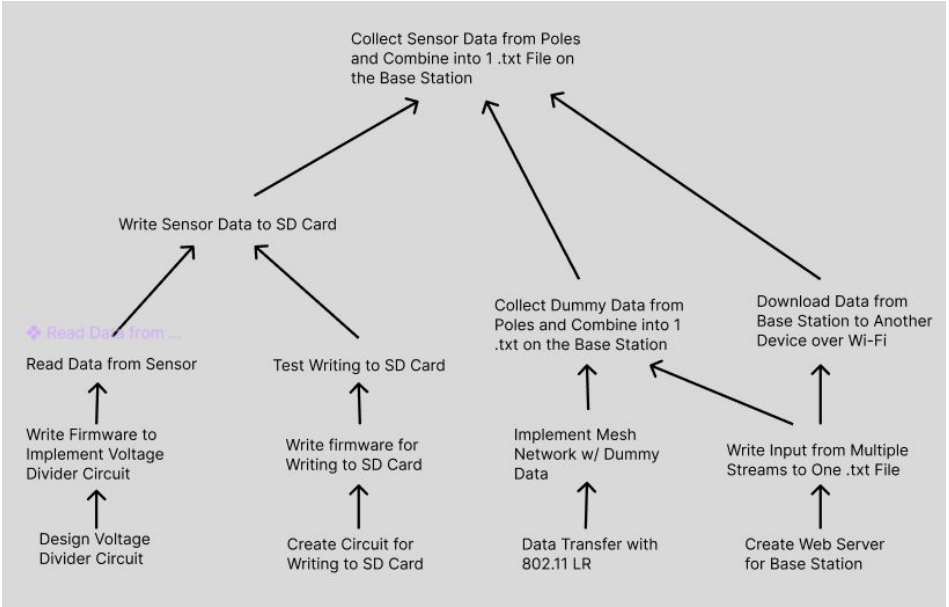
Project Management Style

- Allows for a fixed timeline with deadlines
- Limited need for client check-ins
- Low flexibility
- High planning load
- Meetings weekly with advisor
- Regular meetings between project group



Task Decomposition

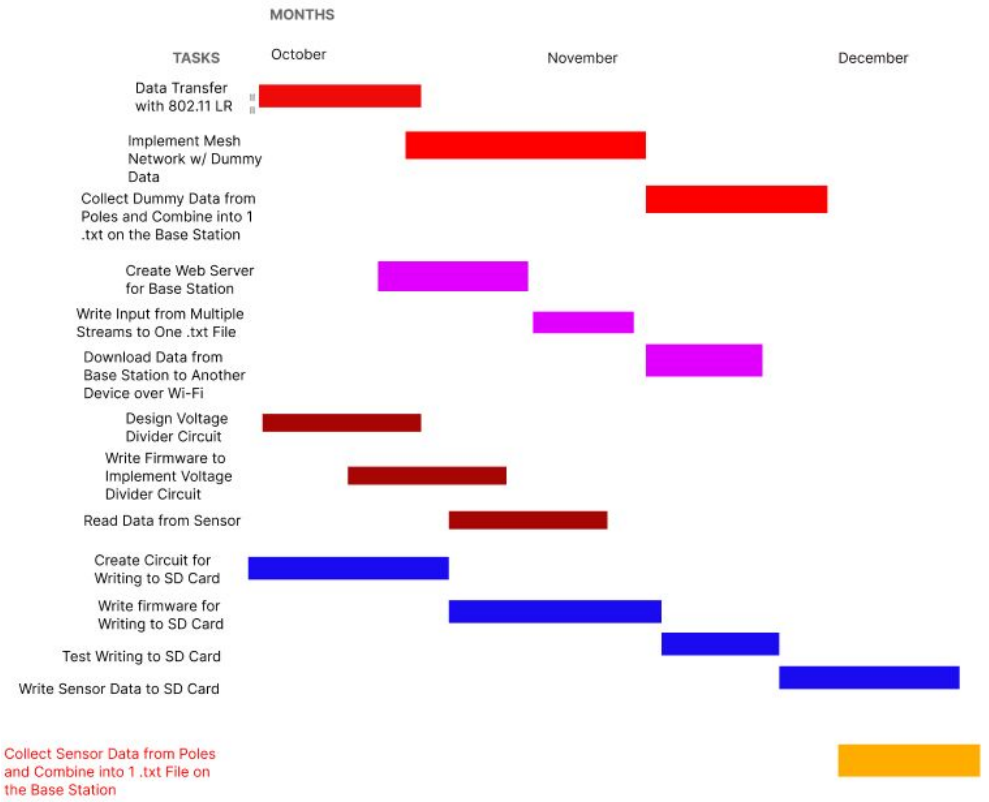
- Currently broken into two teams
  - Software & Hardware
- Allows for teams and individuals to break off and work on tasks assigned to them or that team that week



Key milestones

4 essential components must be completed:

1. Create working network between nodes and central node
2. Feed mimicked voltage levels into microcontroller to find resistance
3. Package resistance measurements in predictable frame
4. Draw data from central node to a text file



Key Risks

Although not certain, there are a few risks with our implementation:

1. Poor communication between microcontrollers as a result of interference
    a. Farming equipment or corn stalks could interfere with wireless communication
    b. We are addressing this by exploring different protocols such as the long range wi-fi built into the ESP32
2. Errors in data transmission
    a. We need to determine how the microcontrollers will handle errors or drops in data received from another node
    b. Can be mitigated via a clear frame for packaging, error messages, and timeouts
3. Unknowns with IDE sensors
    a. We are currently troubleshooting with an artificial circuit rather than pesticides
    b. Once we move to using IDEs, we may have issues that we can not foresee at this moment
    c. Simply giving ourselves enough time to troubleshoot is essential

Conclusion

1. Waterfall primarily since it aligns with:
    a. Fixed deadlines associated with our task decomposition
    b. Weekly meetings with advisors
    c. Frequent communication with team members
2. Tasks decomposed through a branched style
    a. First determine whether it is a hardware or software concern
    b. Then assign to specific individual(s)
    c. Made up of essential milestones
3. Some risk involved with our project and strategy
    a. Unknowns involving communication, interference, errors, and sensors
    b. Waterfall is relatively inflexible and may need altering