

Prototyping

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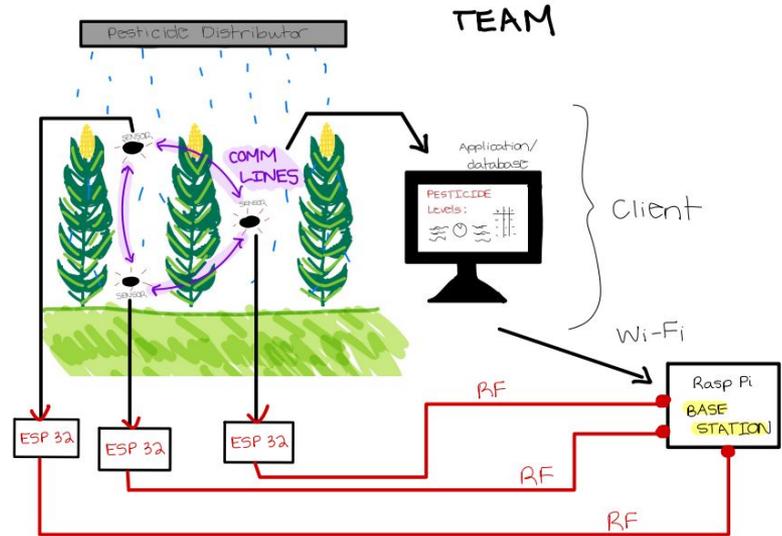
Advisor: Nathan Neihart

Client: Claussen Labs

Project Overview

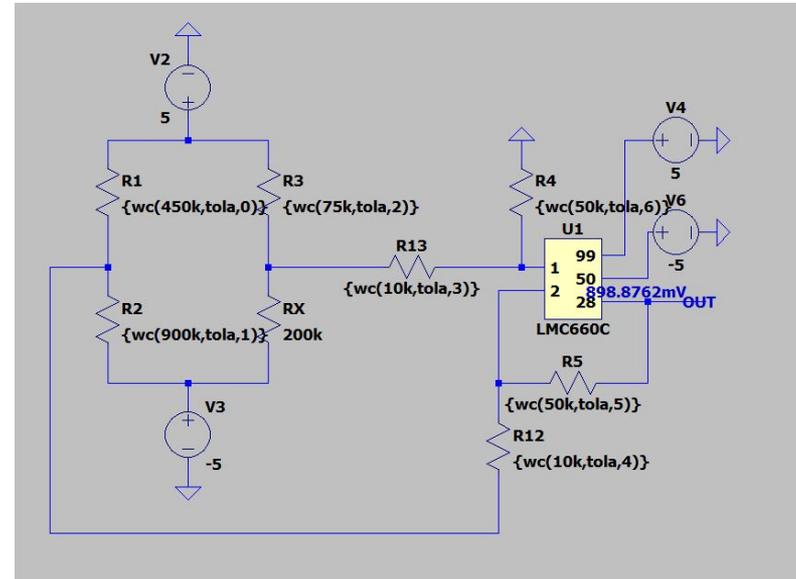
Goal: Wireless Mesh Network for Pesticide Spray Monitoring and Mapping

- Collect resistance data from IDEs (Interdigitated Electrodes) at various levels of crop canopy
- ESP32s microcontrollers will also be placed on poles at various levels of corn canopies and locations and create a mesh network
- Measurements will be sent to a centralized device and saved as .txt files to be collected by the user
 - Centralized device will be a ESP32
 - Transmitted over LR wifi
 - Text files must be user friendly

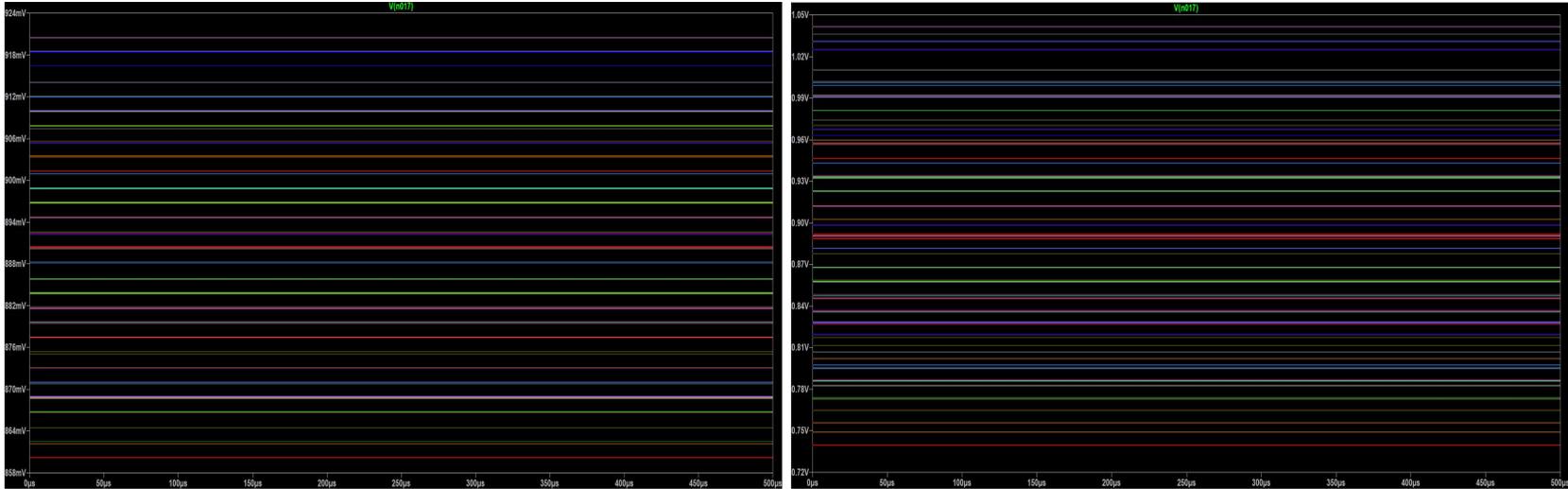


Hardware

- Wheatstone bridge
 - Provides a more precise resistance measurement compared to a simple voltage divider
 - More linear output compare to voltage divider
 - Helps to reject common-mode noise and power supply functions
 - More sensitivity for the small changes voltage

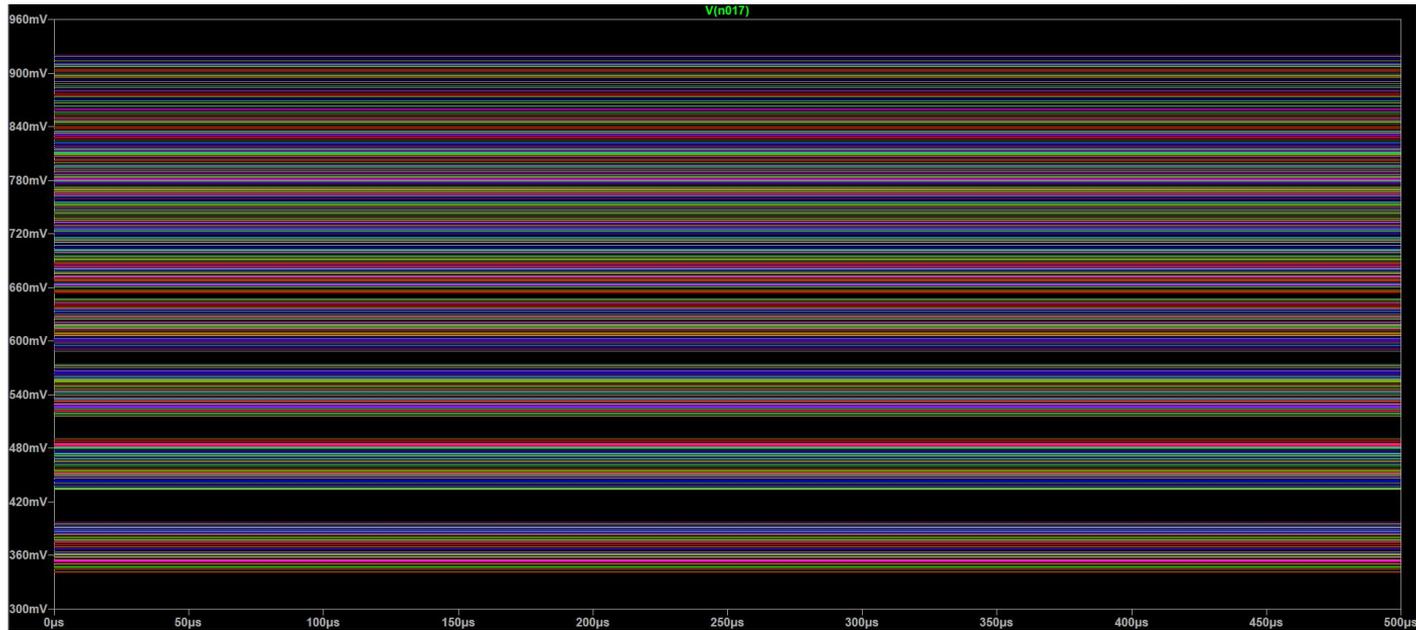


Worst Case Analysis



- Simulated the output with all the resistor with a 1% and 5% error
- Within the range between 0.1V and 1.1V with the resistance of 200k(max)

Worst Case with Resistance Sweep



- Resistance sweep from 120Kohms to 200kOhms with the resistance error of 1%
- Every values are within the range that our client specified

Prototype Takeaways

- Prototype has allowed us to adjust accuracies and determine best track for precise data measurements
- It provides evidence that we are within client's requirements
 - Ex. the resistance sweep ranges are what the client expects even with worst case scenario
 - We can mathematically defend the precision and linearity of our data measurements
- Our prototype provides tangible evidence of progress made
 - Particularly on the hardware side
 - Will launch us into successfully finalizing our PCB design
 - Aided in identifying design flaws



Questions or Comments?