Executive Summary

SoilSense ECE.25

Original Design Problem

The original design problem of this project was to create a soil probe that not only took accurate and usable data but also was able to operate at a state of low power consumption while still being able to communicate data over a relatively large distance all while keeping the cost relatively low. The most challenging aspect as well as the most limiting was the power limit. All components had to be selected with this aspect in mind and tradeoffs had to be made in terms of part selection and cost.

Team Approach

The team worked together to research the most cost effective and power efficient components that could be used in the project. The microcontroller and the sensors were prioritized for these features to leave as much power as possible for the data transmission. Most components included in the project have sleep modes with micro-amp current draw. The team also decided that data transmission only needs to happen periodically (once a day) and in short bursts to minimize the power consumption as much as possible. Components were tested individually and then assembled as the designs were finalized and PCB's arrived. Integration between the transceiver and LoRa wireless communication gateway was essential and required the most work code-wise to create packets that could be useful for the receiver and the user. The timeline for the project is shown in Figure 1 below.

Key Lessons Learned

Key lessons learned from this project is the importance of effective communication, time management, and insight to the design process of starting with an idea, prototyping, revising, and finalizing designs. Most problems in this project came from integrations of blocks with each other. Individually all blocks worked phenomenally well however the difficulties of integrating blocks effectively was a challenge that we had to learn to overcome together.

Project Timeline

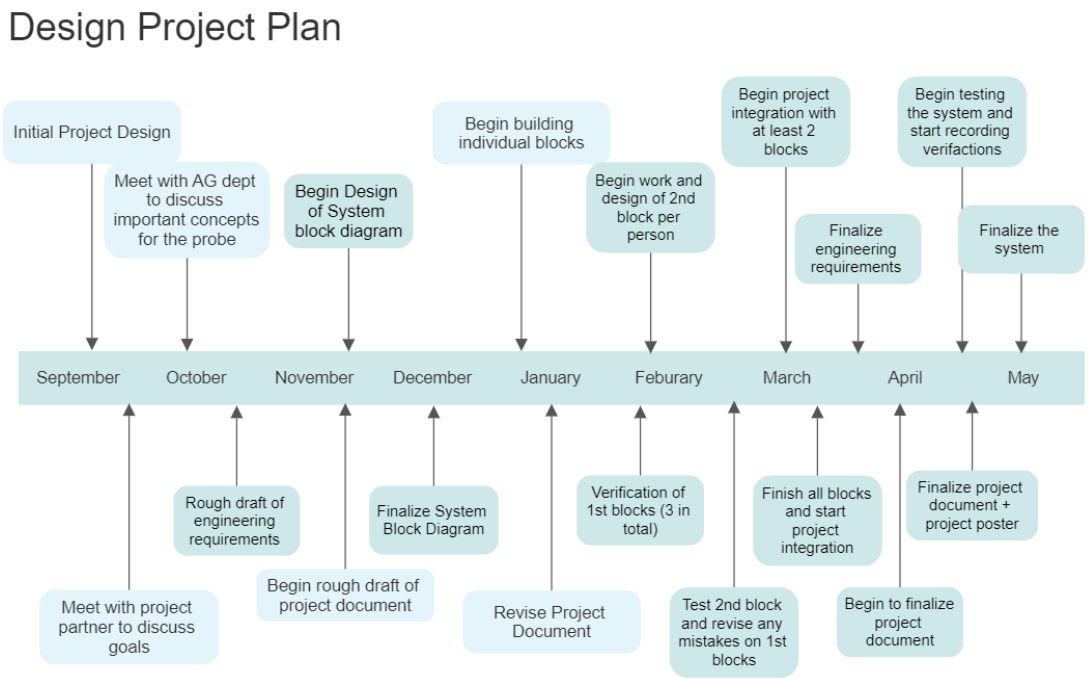

Fig1 Project Timeline