Design Review 0

Agriculture Radio

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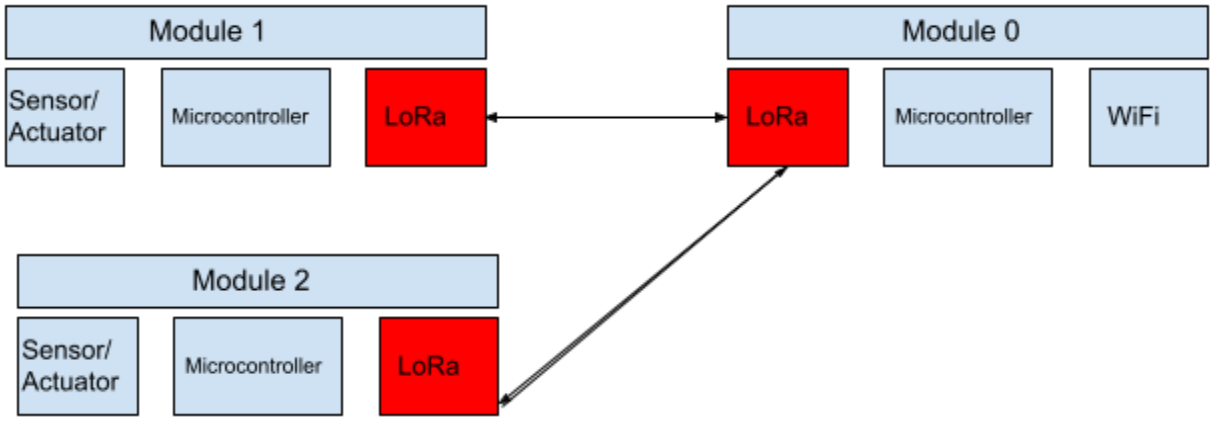
System Block Diagram



Provide a list of requirements for each subsystem.

- Base Module
  - Microcontroller
    - The microcontroller for the base module must have wifi capabilities that can be utilized to store data that is received from the remote modules
    - Will need to have LoRa capabilities.
  - Power Supply
    - The base module's power supply must be a permanent connection so as to be able to constantly be able to receive data from remote modules
  - Data Logging
    - Base module must be able to receive data by means of a LoRa transceiver, as well as transmit this data to the user's desired method of data storage
  - Control Logic
    - The base module must be able to interpret/process incoming data and send a signal to remote actuators if certain conditions are met
- Remote Modules
  - Microcontroller
    - The microcontroller on the base module need only have enough processing power to be the middleman between the sensors/actuators and the base module.
  - Power Supply
    - The power supply must be able to power the remote module (along with its ancillary features) for at least one season/year. It must also be small enough to fit into a weatherproof enclosure
  - Sensors

        - Sensors must be able to accurately detect temperature and moisture levels and efficiently communicate this data to the microcontroller
    - Actuation
        - The remote modules must be able to perform simple actuation, as controlled by the base
    - Weatherproof enclosure
        - The remote modules must be placed in a weatherproof enclosure so as to not cease operation during adverse conditions
- LoRa Interface
    - The LoRa radio interface must be able to effect long-range wireless communication of sensor data that is sufficiently detailed (number of bits). It must also accomplish this with minimal power consumption in order to not drain the remote module's battery
- Data Storage/Logging
    - Receive information from the base module over WiFi
    - Store it somewhere with a more accessible interface

Plan for Design Review 1

We need to identify which sensors, actuators, and microcontrollers that are in stock and serve the purposes we need and then order them. We also need to have a written document detailing how we plan to program the subsystems such that they interact as we desire. We should try to make the parts have similar voltage and power requirements so that they will work together easily. We should also then look into board design and also construct some sort of casing for the field devices.

After determining which parts we will use, we need to carefully peruse their data sheets and understand all power supply limitations and requirements. Ideally, they will all operate with similar voltage and power requirements that should facilitate easy board design. We also intend to have the written plan for how we will program the microcontroller(s) used.

Lastly, we will discuss with Professor about the website for details on how to access the webpage.

Action Items

- Microcontroller
    - Check power constraints and consumption for the ESP32- can it be used as a field device?
    - If so, this would allow for one module build but with distinct programming
    - Understand how we will program it- use Pickit?
        - Written guideline document on how it will be programmed
- Determine which sensors/actuators we will use
    - Likely to include moisture
- Questions for Professor:
    - Power Supply Demo Feedback
    - What sort of actuators might be best/how to overcome the challenge of power supply for actuation? Is LED good enough or do we need more?
    - ESP32 follow-up: do they have LoRa or will we need to use a radio transceiver like the COM-13909 LoRa transceiver