



Cameron Smith

Smart Agriculture Soil Probe

U.C. Berkeley Department of Mechanical Engineering

ME 100: Electronics for the Internet of Things

Fall 2020

Application Need

According to UN data, there will be 9.5 billion humans on earth by 2050, and the expected growth in farming is 70%. Simultaneously, there is a decrease in soil quality and land available for farming. Water, pesticides and fertilizers are overused/wasted due to a lack of data. Clearly there is need for a novel revolution in agriculture to feed the world.

There are currently many offerings which seek to improve agricultural efficiency using technology, including robots, drones and satellites. Many of the current offerings are cost prohibitive and overly complex for many farmers.

Farming represents an estimated 1/3rd of global GDP and there are over 500 million farmers.

Existing Solutions are costly



Sensing

This project is built primarily to use a capacitive soil moisture probe.



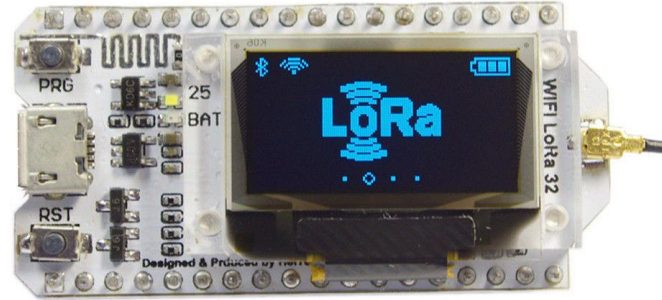
Actuation/Output

Data will be output to the internet and handheld devices and used to monitor crop health and harvesting.



868-915MHZ

Communication

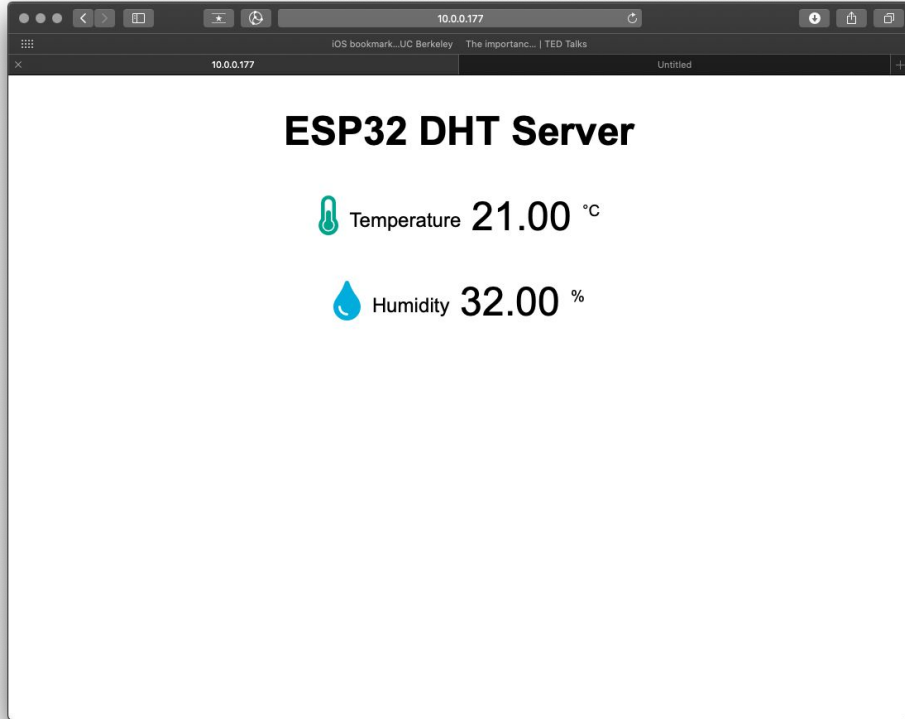


Data will be output in sub megabyte data-rates every 15 minutes via LoRa.

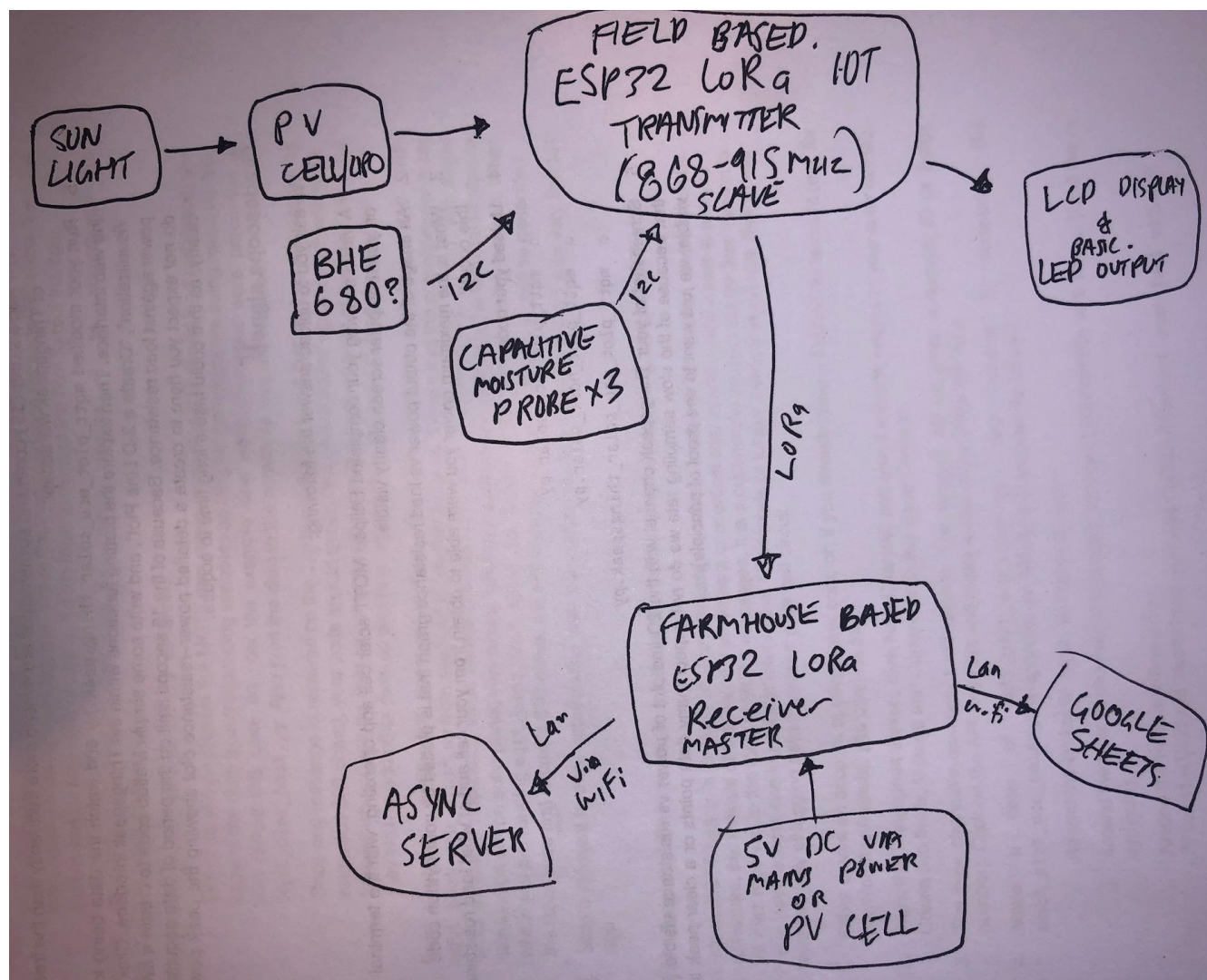
Power consumption will be offset by a solar cell.

For larger farms unused TV whitespace could be used.

Data presentation work - Async Server



Block Diagram:



Challenges

- 1. Using LoRa over field distance**
- 2. Designing a capacitive moisture sensor that is cheap and can be soil inserted and removed multiple times.**