Team 13 Final Project

Agriculture Automation for Wheat

Boyi Li

1. **Description of the problem you are solving:**
    a. **Keep the wheat in the best growing condition.**

    The agriculture sector has strict requirements regarding the temperature and humidity. And current agriculture is still mostly relied on human operations. Wheat is the most important crops to human society; automation of wheat agriculture will be a big improvement to the agriculture.

    b. **Automatic Find the Local Temperature**

    The system should also be able to get the weather information for any place where the client used the system. And this system also can predict the near future weather.

2. **Description of the solution:**
    a. **Wheat Environment Control**

    This system is combined with an Arduino board and a Jetson Nano. The system is aimed at providing the best condition for farming by monitoring the environment's temperature and humidity. According to NASA, "Wheat grows best in temperatures between 21ºC/70ºF and 24ºC/75º F. For high yielding wheat, ideal weather includes humidity in the range of 50 to 60%."

    Our system monitors the temperature info by using both Openweathermap API and a DHT11 sensor. And monitor the humidity by using the DHT11 sensor. If the temperature or humidity is out of the range of suitable environmental variables, the system will turn on heater/cooler or humidifier/dryer. Which can control the environmental variables in the best range. The system is initially set to 75º F for

temperature and 55% for humidity, user also can adjust the ideal temperature and humidity manually on the Arduino board.

b. Weather Information Gathering

The system gathers the weather information by using Openweathermap API, user can input the city's name in the python program and the current temperature will be sent to the Arduino and display on the LCD screen.

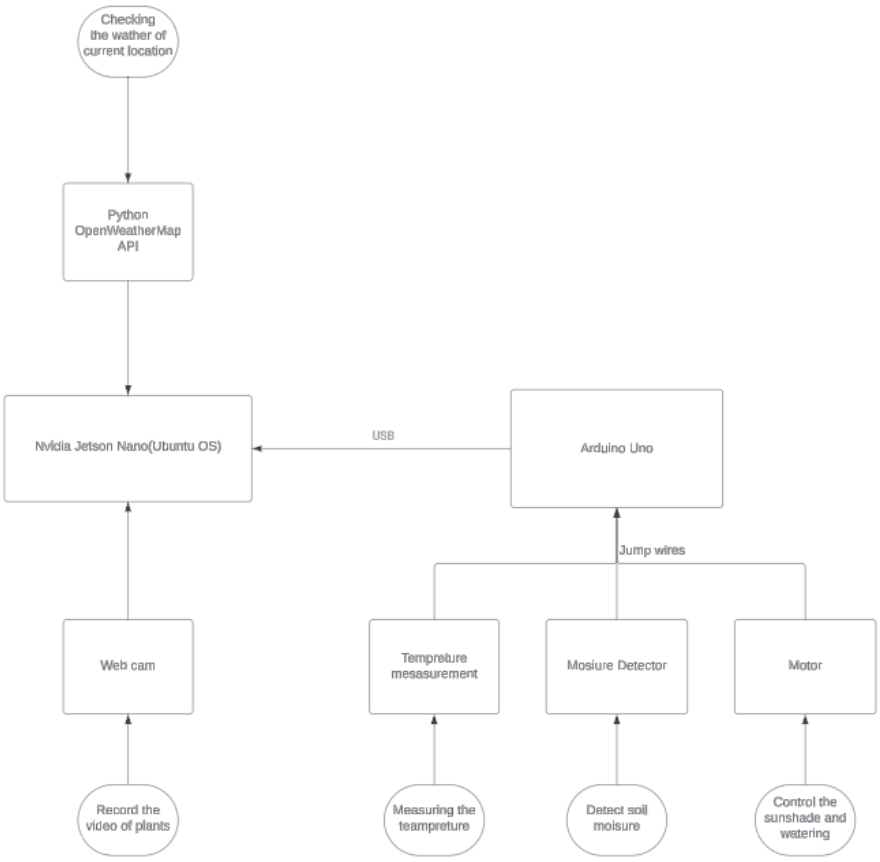
3. Recorded Demo

https://www.youtube.com/watch?v=RIFw75YaRGg

4. GitHub Link

https://www.youtube.com/watch?v=RIFw75YaRGg

5. System Block Diagram



6. **Future Improvements**

   Our system can implement a camera-based machine learning algorithm to record the relationship between the environmental variables with the growing speed of the wheat. After a certain time of training, the system can compute the optimal variable values for the wheat.

7. **Reflection**

   After this project, I learned that edge computing has a huge potential in the future automatic agriculture, edge device is powerful to connect different types of sensors. It is able to connect to the cloud to gather data or to do cloud computing. Also, connection between development boards is useful in a complex system. Different boards can process a certain type of specific data or operations and make the whole system easier to manipulate. Overall, our project achieved the goal of automation of wheat agriculture in the demo.