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Monitoring water quality in hydroponics

WHAT ARE WE UPTO ?

Monitor with Precision:
Arduino-driven water quality for mustard plants.

We're developing an automated water quality monitoring system for mustard plants in hydroponic setups, utilizing Arduino technology to continuously measure pH and TDS. This innovative solution will enhance plant growth, improve yields, and reduce manual monitoring efforts through remote capabilities.

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PROBLEMS WE SOLVE

Problems We Solve:

- Dependence on manual water quality monitoring for hydroponics.
- Inconsistent pH and TDS levels affecting plant health.
- Time-consuming and error-prone measurement processes.
- Lack of real-time data for effective nutrient management.

Our Solution (USP):

- Our automated water quality monitoring system utilizes Arduino technology to:
- Continuously measure pH and TDS for optimal plant growth.
- Automate disposal of substandard water, ensuring quality control.
- Enable remote monitoring for efficient nutrient management.
- Enhance productivity and reduce labor efforts for farmers.
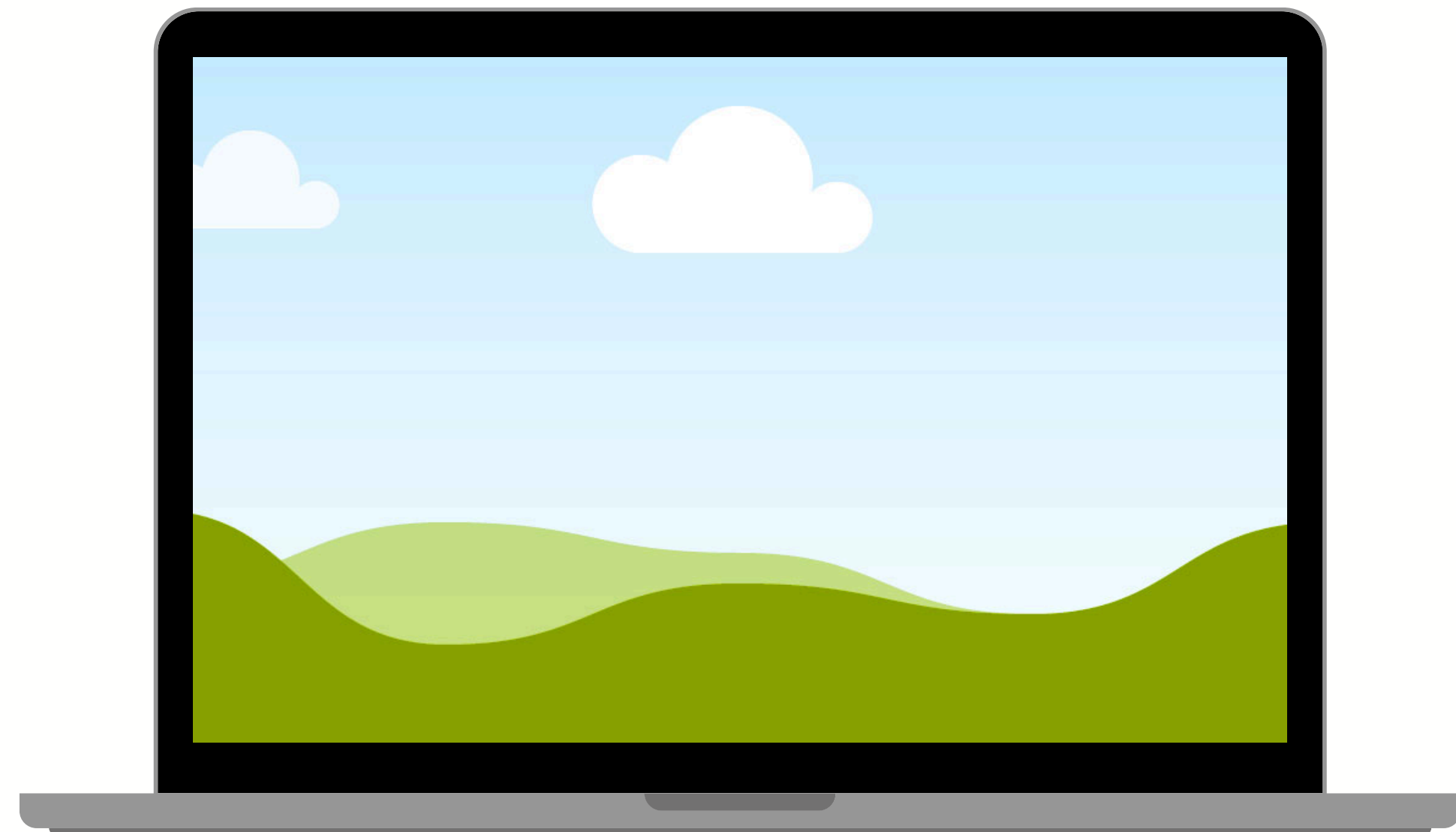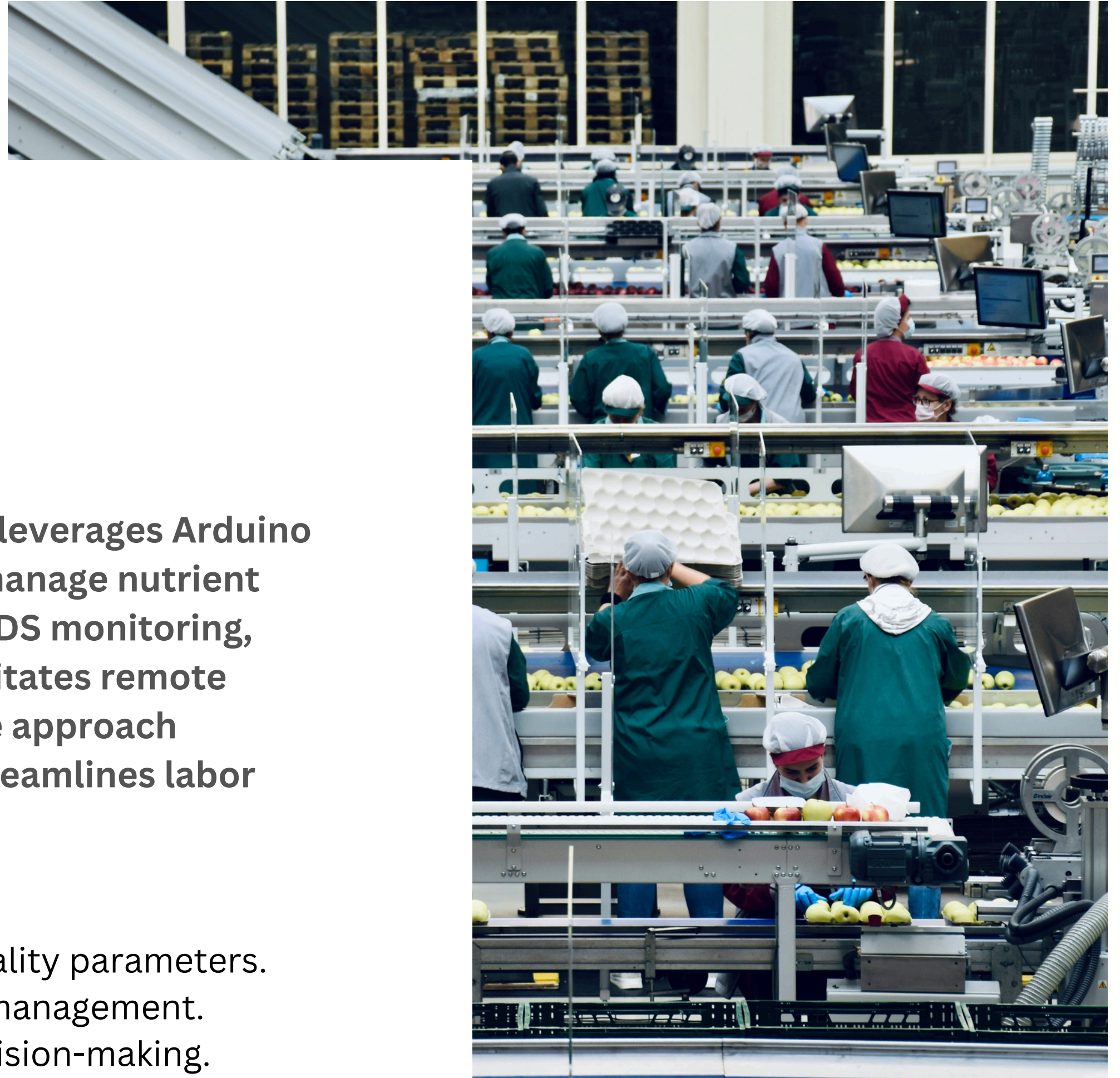
OUR SOLUTION

Our automated water quality monitoring system leverages Arduino technology to empower hydroponic farmers to manage nutrient levels effectively. It ensures consistent pH and TDS monitoring, automates substandard water disposal, and facilitates remote access for real-time adjustments. This innovative approach enhances plant growth, maximizes yields, and streamlines labor efforts.

USP -
- Continuous real-time measurement of water quality parameters.
- Automated alerts for optimal nutrient solution management.
- Remote monitoring capabilities for efficient decision-making.
- Improved plant health and increased productivity for farmers.

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Hardware Components:

- Arduino microcontroller
- pH sensor
- TDS sensor
- Ultra sonic sensor
- Relay module
- Water pump
- GSM module
- bread board and jumper wires
- power supply

Software Components:

- Arduino IDE
- libraries for sensors
- data storage

Setup Components:

Arduino Microcontroller: Central control unit.

pH and TDS Sensors: Monitor water quality.

Ultrasonic Sensor (optional): Checks water level.

Data Acquisition:

Sensors collect real-time data on pH and TDS levels.

Data Processing:

Arduino processes sensor data to identify if values fall outside optimal ranges.

4.Decision Making:

Alerts triggered if pH/TDS levels are abnormal.

Activates water pump to discard poor quality solution if necessary
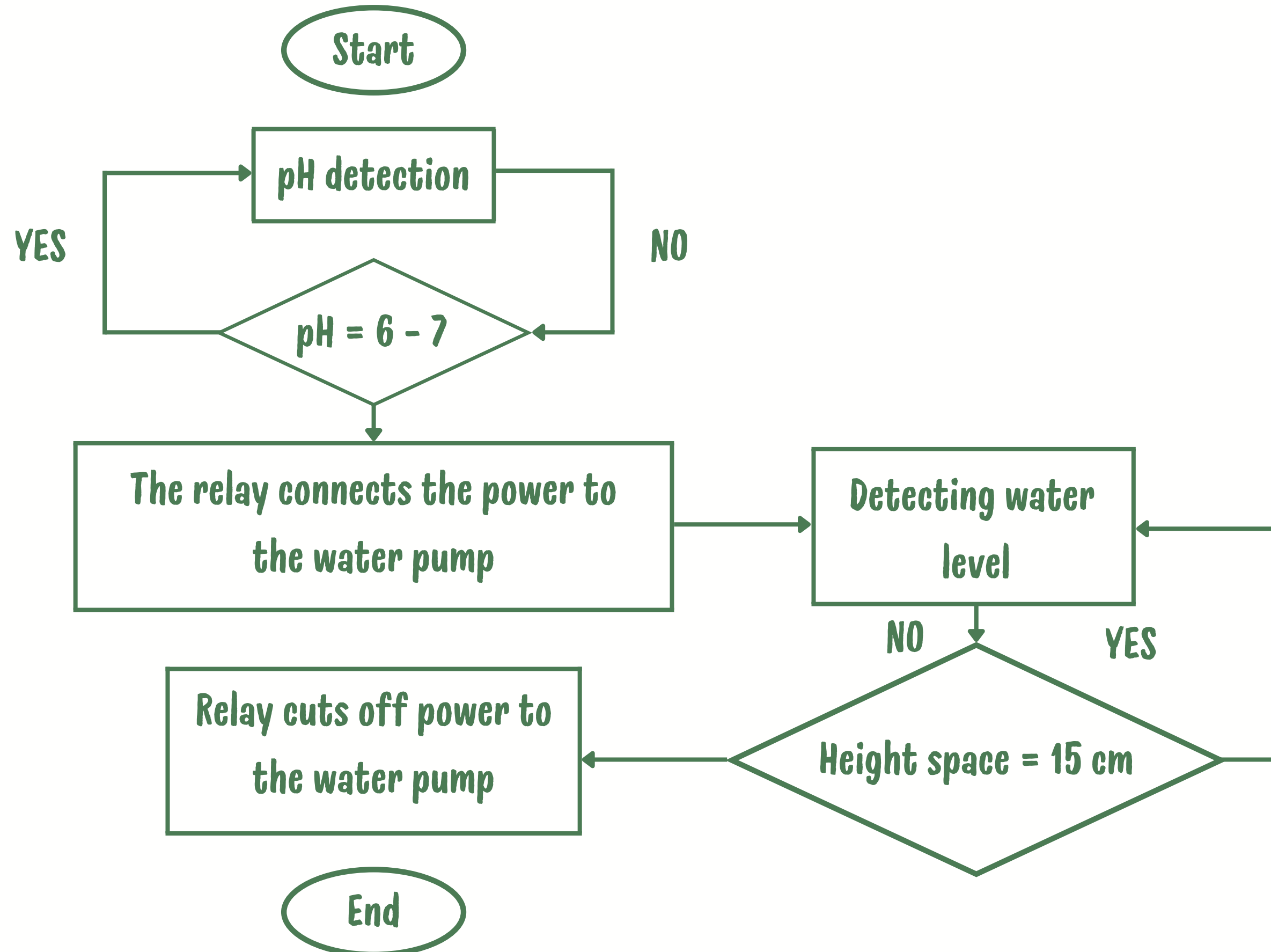
5. User Notification:

GSM module sends SMS alerts to farmers about water quality issues.

6 . Remote Monitoring (Optional):

Data can be viewed online if a Wi-Fi module is used

Continuous Feedback:

The system operates in real-time, ensuring optimal conditions for mustard plant growth.

Block Diagram

Framework

The Problem

- The time for replacing nutrient water still uses the manual method
- Inaccuracy in the pH of the nutrient water when replacing the nutrient water

Needs Analysis

- Automation of nutrient water disposal system
- Knowing the nutritional water level.

Implementation

- Object: Mustard Plant ; Nutrient: Water
- Sampling Technique Detection of pH of nutrient water

Planning

- Analysis
- C & C++ Construction
- Black Box & White Box Testing

Results

- Automatically change the pH of nutrient water based on the results of nutrient water pH detection according to the fertility parameters of mustard greens.
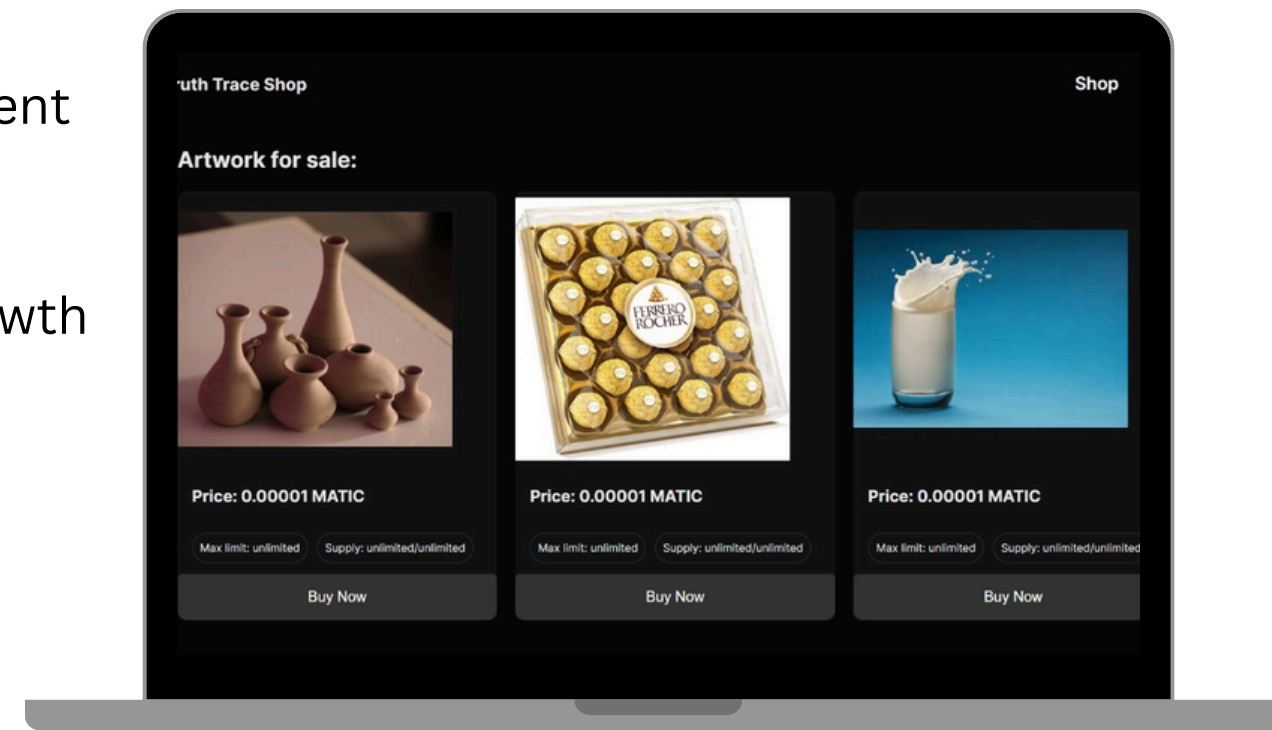
Features

Focus on Mustard Plants

- Mustard is a popular crop for hydroponic systems due to its adaptability.
- Ideal pH range of 5.5 to 6.5 ensures maximum nutrient uptake and better yields.

Overview of Hydroponics

- Soil-less cultivation of plants for efficient water usage and faster growth.
- Space-saving method that boosts productivity and accelerates plant growth cycles.

Need for Monitoring Systems

- Manual monitoring is labor-intensive and prone to errors in maintaining water quality.
- Automated systems maintain optimal growing conditions consistently for better efficiency.

Importance of Water Quality

- Critical to maintaining optimal nutrient absorption in hydroponic systems.
- Regular monitoring of pH and TDS levels ensures healthy plant growth

Conclusion

The model operates as a feedback system, constantly monitoring the water quality of the hydroponic setup. By leveraging sensor data, the Arduino microcontroller makes real-time decisions to maintain optimal conditions for mustard plant growth, enhances operational efficiency, and simplifies nutrient management for the farmers.

Thank You