Waterflow management in irrigation

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Project description

Efficient water management is crucial for crop irrigation. In rural areas due to limited infrastructure often face challenges in managing water resources. Many rural areas are prone to water leakage, pipe bursts and other issues.Our duty is to find a solution which can provide real time water flow monitoring , leak detection and efficeint distribution

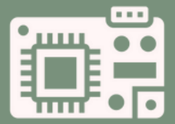
Proposed Solution

- Implementation of IoT technology to address water management issues in agriculture.
- Integration of water flow sensors and moisture sensors for efficient monitoring.
- Water flow sensors measure the rate of water flow in irrigation systems.
- Moisture sensors detect soil moisture levels in real-time.
- Data transmitted to a dedicated mobile application for users' convenience.
- App presents water flow and soil moisture levels in a user-friendly interface.
- Visual indicators denote whether crops require watering based on soil moisture levels.

- Regional variations in water flow readings are analyzed for anomaly detection.
- Decreases in water flow trigger alerts, signaling potential water leaks.
- Prompt notifications to users facilitate immediate repair actions, preventing water wastage.
- Real-time soil moisture content information empowers users to tailor watering schedules to crop requirements.
- Optimal water usage contributes to improved crop health and yield.
- Regular updates and notifications keep users informed about their irrigation systems' status.
- Insights into water usage patterns and crop watering needs enhance user engagement and decision-making.
- App allows customization of settings based on specific crop types and regional water availability.
- Scalable infrastructure accommodates varying farm sizes and irrigation setups.
- Integration with weather forecasting data to anticipate water requirements more accurately.
- Incorporation of machine learning algorithms for predictive analysis of crop water needs.
- Expansion of sensor capabilities to monitor additional environmental factors impacting crop growth.
- Our IoT solution revolutionizes agricultural water management by providing real-time insights and actionable information to users.
- Through leak detection, water conservation, and crop-specific watering optimization, we aim to enhance agricultural sustainability and productivity.

Components used

MICROCONTROLLER



- The microcontroller we used in this project is ESP8266. This microcontroller operates at 3.3v and clock speed of 160 Mhz.
- It has 8 digital pins and Only one analog pin .It is mainly preferred because it consist inbuilt wifi module unless arduino need to be conneced to external wifi module.
- It uses a TCP/IP protocol for communication. Overall cost and operations done by this microcontroller made this

MOISTURE SENSOR

- The moisture sensor used here is analog sensor which provide more accurate readings than digital ones.
- The value of moisture content in soil will differ according to the crop harvested, the moisture sensor value if there is no moisture content is 1024 .
- The moisture content for most of the crop must not go down value of 500 . The sensor is connected to A0 pin of esp8266.

Components used

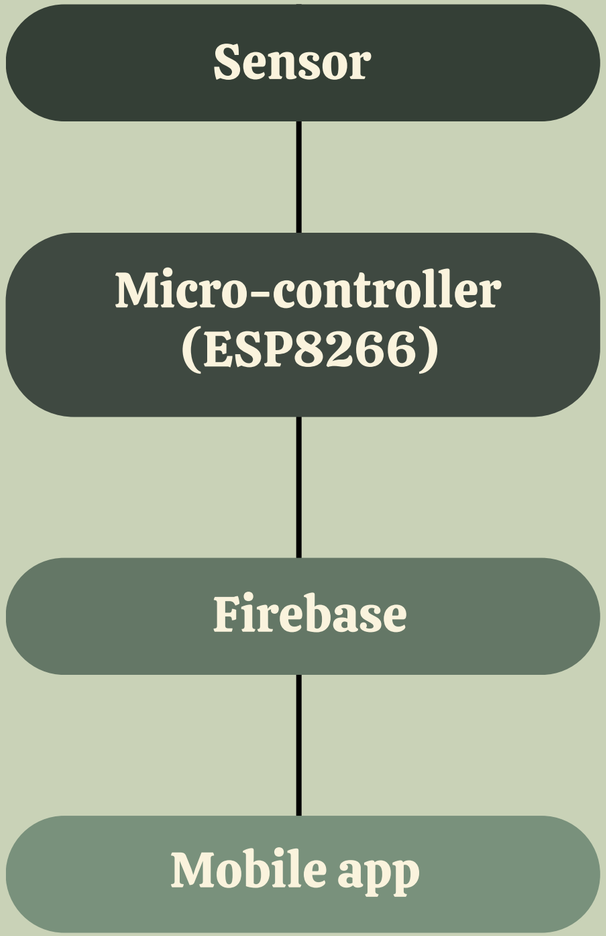
WATERFLOW SENSOR

- The water flow sensor used here is yf-s201,a digital sensor used to provided accurate readings.
- The sensor will produce electrical pulses based on the water flow using hall effect principle.
- The limit of the sensor is upto 30L/min.Based on the set constant value we detect there is a leak somewhere in the path.

FIREBASE

- Firebase is a product of Google that helps developers to build, manage, and grow their apps easily.
- It provides various services and features for app development, such as backend infrastructure, authentication, hosting and more.
- Here we use real time database for storing our values like a key value pair.Firebase supports iOS, Android, Web, Unity, and C++ platforms

Flowchart



Flowchart explanation

Utilization of ESP8266 Microcontroller:

- The data collection process begins with the utilization of the ESP8266 microcontroller.
- This powerful and versatile microcontroller is programmed to interface with various sensors, such as moisture and water flow sensors, to gather pertinent data related to agricultural or environmental conditions.

Integration with Local Wi-Fi and Internet Access:

- Once the data is collected from the sensors, the ESP8266 microcontroller is programmed to connect to a local Wi-Fi network.
- Subsequently, it establishes an internet connection, enabling seamless transmission of the collected data to external servers for storage and further processing.

Storage in Google Firebase:

- The data collected by the microcontroller is securely stored in Google Firebase, a cloud-based storage service.
- Firebase provides a reliable and scalable platform for storing and managing real-time data, ensuring accessibility and durability.
- To facilitate this process, relevant libraries are integrated and programmed within the Arduino Integrated Development Environment (IDE), enabling seamless interaction between the microcontroller and Firebase.

Data Retrieval and Visualization via Mobile App:

- The stored data in Google Firebase is accessed using specific authentication keys by a dedicated mobile application.
- This app serves as an interface for users to retrieve and visualize the collected sensor data in a user-friendly format.
- Through the app, users can monitor and analyze crucial environmental metrics, such as moisture levels and water flow rates, enabling informed decision-making for optimal resource management and agricultural practices.

Thank you