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Smart Irrigation System Using IoT

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ABSTRACT: Smart irrigation systems are a new technology that uses sensors and weather data to optimize watering schedules for crops. Saving water and energy and improving crop yields can be achieved through these systems. A number of sensors are used for monitoring soil moisture, weather conditions, Rain Detector and plant growth by irrigation systems. Agriculture is critical to India's food production development. Agriculture in our country is dependent on monsoons, which do not provide enough water. So, irrigation is used in agriculture. The Internet of Things (IoT) is a watershed moment in technological evolution. IoT is crucial in many industries, including agriculture, where it has the potential to feed billions of people in the future. The goal of this study is to address this difficulty; the entire system is microcontroller-based and can be controlled from a remote place via wireless transmission, so there is no need to worry about irrigation time based on crop or soil conditions. Sensor is used to take sensor readings of the soil, like temperature, humidity and moisture.

Smart irrigation systems are a new technology that uses sensors and weather data to optimize watering schedules for crops. Saving water and energy and improving crop yields can be achieved through these systems. A number of sensors are used for monitoring soil moisture, weather conditions, Rain Detector and plant growth by irrigation systems.

KEYWORDS: IOT, Sensors, Data Visualization.

I. INTRODUCTION

Agriculture is the main source of food production in our country. In India, agriculture contributes 18% of the country's Gross Domestic Product (GDP) which employs more than half of the total population. The Indian government has stressed and highlighted the need of innovations to be in above mentioned criteria in agriculture, thus seeks an indication of technology exposure and innovative implementation practices to enhance the productivity Irrigation involves the man-made application of water to the soil using various systems such as tubes, pumps, and sprays. This method is typically utilized when natural water sources and rainfall are insufficient to meet the water requirements of plants, especially in regions with irregular rainfall patterns or expected dry spells and droughts.

The soil moisture sensor measures the volumetric water content in the soil, comparing the measured soil moisture level with a fixed threshold value. Additionally, humidity sensors help measure the surrounding air temperature and relative humidity, which is the ratio of actual moisture in the air to the highest amount of moisture that can be held at that air temperature. In agriculture, irrigation is essential, and classic methods such as channel irrigation, sprinkler irrigation, and drip irrigation are used based on the crops' needs. Researchers have shown that implementing an automated irrigation system relying on soil moisture as a parameter minimizes water usage.

We come up with a new technology that is the combination of machine learning technique and semantics for some input parameters such as climate type, crop type, and soil type with the sensors' output: temperature, humidity, and soil moisture.

II. RELATED WORK

This is the IOT project, we can make a simple smart irrigation system using IOT and Arduino, also We Can use in green house and reduce unwanted water on the farm. We are using Various Sensors Which will collect the data and further it will be uploaded to cloud Blynk for data Visualization Where we can Monitoring soil humidity & temperature.

III. METHODOLOGY

This project will undergo through some phases:

Phase 1: Literature Survey

An algorithm developed and implemented with threshold values. The threshold values are applied in the temperature and soil moisture by using micro controller-based gateway to monitor water quantity. The system can be powered and have communication link on cellular interface that allows data monitoring and irrigation scheduling through a web page.

Phase 2: Concept Generation

In the irrigation system instead of normal irrigation type we use drip irrigation method where the water can be directed to the root in sufficient amount so that water as well crop management can be improved. Using IoT the drip irrigation method is automated with the help of sensors and pipe tubes. Various sensors such as temperature, soil moisture sensors are used in field monitoring and the ground water level can be monitored lively using the float switch where the fall in water level can be notified to the farmer through SMS.

Phase 3: Design of System

This system is a combination of hardware and software components. The hardware part consists of different sensors like soil moisture sensor, photocell sensor, etc whereas the software part consists of an android based application connected to the Arduino board and other hardware components using Internet of Things (IoT). The android-based application consists of signals and a database in which readings are displayed from sensors are inserted using the hardware.

Phase 4: Structural Analysis

The improvement in irrigation system using wireless network is a solution to achieve water conservation as well as improvement in irrigation process. This research tries to automate the process of irrigation on the farmland by monitoring the soil water level of the soil relative to the plant being cultivated and the adaptively sprinkling water to simulate the effect of rainfall.

Phase 5: Fabrication

The farmer can monitor the field and water level either through the web page which updates field information lively or through SMS in mobile phone. Thus, through the Web interfaced processor and relay switches the water management is controlled and information is delivered to the use.

Phase 6: Experimental Investigation (Actual Field Trial)

The smart irrigation system will be tested for agriculture operations. The sensors used to log the data into their attached memory and later on we were able to use it. This excrement is also used to Water Conservation Technologies, Sensor Innovations.

Proposed System

The Tensiometers will be used to measure the Soil moisture sensor that measure this tension between soil particles and water molecular and send it to the Arduino. The Arduino runs a code that obtains the temperature and humidity from the DHT11 sensor. The Arduino then controls Water supply based on the temperature, Humidity of Soil. Based on the data captured in the cloud server

In this project following component required for smart irrigation system

- ESP 8266 wi-fi module
- Arduino UNO Module
- Relay Module
- Mobile
- LCD Display

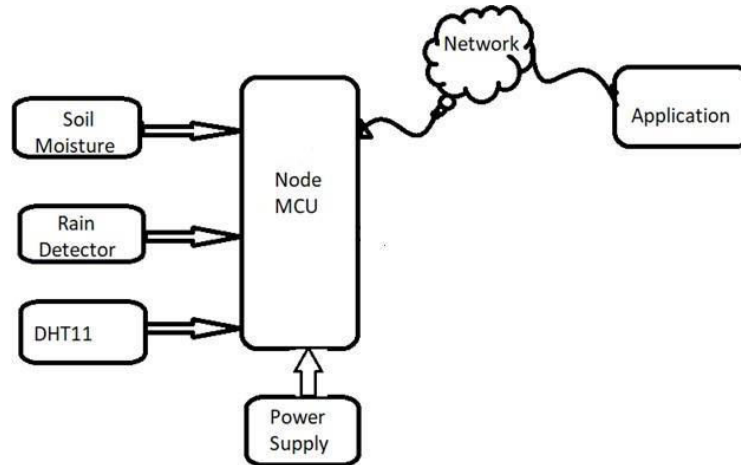


Fig.1 Block Diagram of Proposed System

ESP8266

If the ESP8266 is connected with Wi-Fi, then we could control the relay module with Blynk App. We could control, monitor the current status of the relays from anywhere in the world from the Blynk App.

Wi-Fi Module

Wi-Fi stands for Wireless Fidelity. We are using Wi-Fi which acts as heart for IoT. Through Wi-Fi the consumer can set changes in threshold value, he can ON and OFF the electric use. Time to time the readings of units and cost are displayed on Blynk cloud. Consumer can access the Arduino board with help of Wi-Fi.

Switching Device

In our system we are using SSR as switching device even though we can use RELAY because SSR is highly advantageous. We are using switching device to switch the Water Pump. For ON and OFF purpose of irrigate system. we are using switching block. SSR stands for SOLID STATE RELAY.

Features of Relay:

- Both are used as AC switching device, but if switching speed is high than SSR is suitable, if switching speed is slow than RELAY is used.
- Relay life decreases as number of usage time increases, but in SSR there is no change.
- For driving relay, current or power required is more comparatively to SSR.
- For switching SSR requires 15amp, whereas RELAY needs (30amp,50amp,90amp) as per requirement.

Arduino

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

IV. EXPERIMENTAL RESULTS

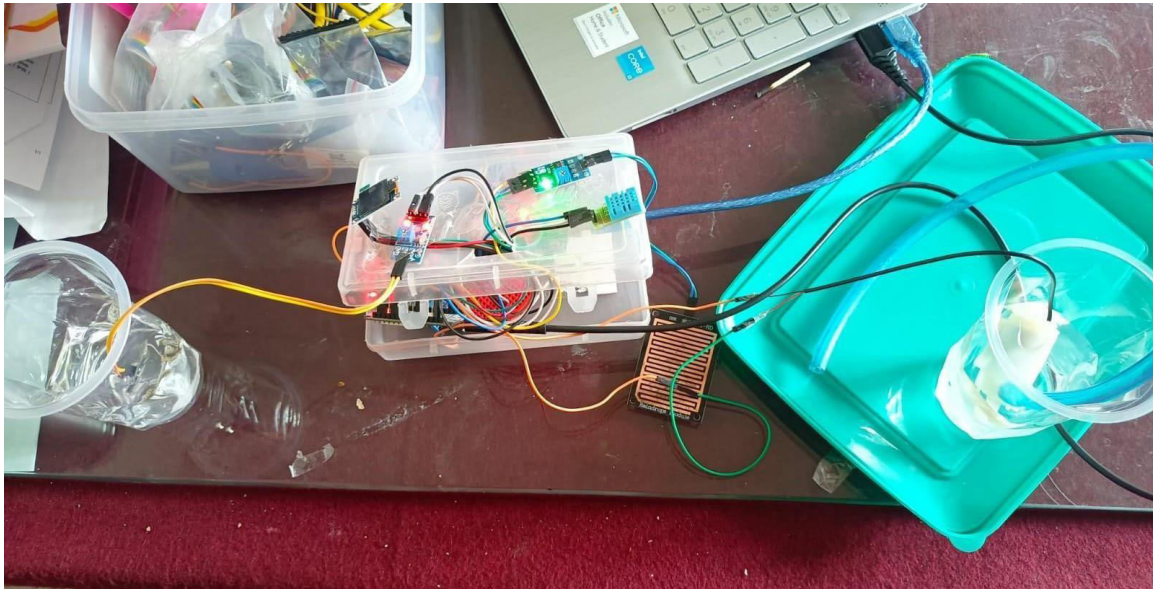


FIG 2. PROJECT MODEL

V. CONCLUSIONS

As water scarcity becomes an increasingly critical issue, smart irrigation systems will become more important than ever, helping to conserve water, improve crop yields, and reduce environmental impact.

The smart irrigation system implemented is cost effective for optimizing water resources for agricultural production. The proposed system can be used to switch on/off the water sprinkler depending on the soil moisture levels thereby making the process simpler to use. Through this project it can be concluded that there can be considerable development in irrigation with those of IOT and automation. Thus this system is a solution to the problems faced in the existing process of irrigation.

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