SMART AGRICULTURAL USING WIRELESS SENSOR MONITORING NETWORK POWERED BY SOLAR ENERGY

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Abstract— A smart irrigation system in agriculture is made up of a variety of hardware and software applications that use different technologies. Machine learning technology plays a significant part in this. It is a data analytic technique which is to master many types of methods and models information directly from data. The survey measures the impact of applied techniques and it helps the farmers to adapt suitable system according to their requirements. This project presents an open-source technology based smart system to predict the irrigation needs of a field using ground sensing parameter like soil moisture, soil temperature, and environmental conditions along with the weather forecast data from the Internet. The complete system of sensor node data is wirelessly collected over the cloud utilizing web-services and a web-based interface, which has been created and deployed on a prototype scale. Information insight based on the analysis of sensors data and weather forecast data.

I. INTRODUCTION

Agriculture is the backbone of all developed countries. It uses 85% of available fresh water resources worldwide and this percentage continues to be dominant in water consumption because of population growth and increased food demand. As a result, efficient water management is a major challenge in many arid and semi-arid farming systems. To optimize water consumption for agricultural crops, an automated irrigation system is required. The goal of an automated irrigation system is to avoid overwatering and under watering. Over irrigation happens as a result of inefficient waste water distribution or management, resulting in water pollution. In places with high evaporation, irrigation increases soil salinity, resulting in a deposit of harmful salts on the soil surface. To solve these issues and save manpower, a smart irrigation system was implemented.

II. LITERATURE SURVEY

Development of an effective loT-based smart irrigation system is also a crucial demand for farmers in the field of agriculture. This research develops a low cost ,weather based smart watering system To begin an effective drip irrigation system mus be devised that can automatically regulate water flow to plants based on soil moisture levels.Then to makethis water saving irrigation system even more efficient an IOT based communication features is added allowing a remote user to monitor soil moisture conditions and manually adjust water flow.The system also includes temperature,humidity ,and rain drop sensor,which have been updated to allow remote monitoring of these parameters through the present weather conditions. A weather prediction algorithm is employed to manage water distribution. Farmers would be able to irrigate their crops more efficiently with the proposed system[1-6].

III. PROPOSED SYSTEM

Water scarcity is causing a lot of challenges in the agriculture area these days. Smart irrigation systems have been employed to assist farmers in overcoming their challenges. The transmitter module in this system, as illustrated in Fig. 1, consists of a soil moisture sensor and a temperature-humidity sensor that are both interfaced to the microcontroller.The Esp8266, which acts as a Wi-Fi module, connects the microcontroller to the internet [2]. Blynk, an open source IoT (Internet of Things) program, is used to construct a channel. Blynkgives an API key that is used to send sensor data to the cloud and save it in the defined channel and specified fields [3]. The sensor values are collected by the microcontroller and sent to the. Blynkcloud through the internet using the HTTP protocol [4].

3. 1.Esp8266 Wi-Fi Module

The ESP8266 Node MCU is a microcontroller with an integrated Wi-Fi module. It is a device having 30 pins, 17 of which are GPIO pins that are connected to various sensors to receive data from the sensors and transmit output data to the associated devices. Whenever the NodeMCU receives input data from various sensors, it crosschecks the data received and the data stored in it. It delivers a pulse to the Relay Module, which functions as a switch to turn on or off the pump, depending on the data received. The operating frequency of the NodeMCU ranges from 80 to 160 MHZ, and the operating voltage ranges from 3 to 3.6V. The range of the Wi-Fi module presents in the ESP8266 ranges from 46 to 92 Meters.

Fig.1. ESP8266 Wi-Fi module

3. 2 Sensors

A. Soil Moisture Sensor

The moisture content of the soil is measured using a soil moisture sensor. The digital output will be low level (0V) if the soil moisture value detected by the sensor is above the threshold level and high level (5V if it is below the threshold level. The digital pin is used to immediately Read the current soil moisture measurement in order to determine if it is over or below the threshold. A potentiometer can be used to control the threshold voltage.

B. RAIN SENSOR

A rain sensor is a type of switching device that detects the presence of rain. It operates like a switch, and the theory behind it is that whenever it rains, the switch is generally closed.

C .Temperature And Humidity Sensor (Lm35)

The DHT11is a temperature and Humidity sensor with a proportional Digital output voltage to the temperature. It provides output voltage in Centigrade (Celsius). It does not necessitate the use of any additional calibrating electronics. The sensitivity of DHT11is 10mV/degree Celsius. As the temperature and an AC-to-DC adapter or battery powers it. Rises, so does the output voltage.

D. PIR Sensor

A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. PIR sensors are commonly used in security alarms and automatic lighting applications

3.3 Relay

A motor is a device that turns electrical energy into mechanical energy, which necessitates a lot of power. Because the microprocessor is incapable of supplying such high power, the elay with amplifier board serves as a link between the microcontroller and the motor.

IV. WORKING PROCES

The smart irrigation system is a simple model based on IoT technology. It consists of a Cloud page which acts as a user interface, an IoT device which helps in the real-time updation of information in the system. All the background works are handled by the IoT. The IoT device is connected to different sensors, which collects the status of various aspects on the plantation field and transfers the value to the IoT device.

The IoT Device used here is Arduino UNO and WiFi ESP8266 module which helps to connect the system to the network. The information collected in the Arduino UNO from the temperature sensor, soil moisture sensor and humidity sensor are transmitted and saved in the blynkvia this network established using the Wi-Fi ESP8266 module. The soil moisture level sensor is placed in the soil. According to the sensor values we can detect whether the irrigation is happening or not. If the moisture level is found to be below the desired level, the moisture sensor sends the signal to the Arduino Uno which triggers the water pump to turn ON and supply the water to plant automatically. The values recorded by them are sent to the cloud. The status values are then updated in the BlynkFarmers and gardeners who don't have enough time to water their crops/plants are the principal beneficiaries of this endeavour.

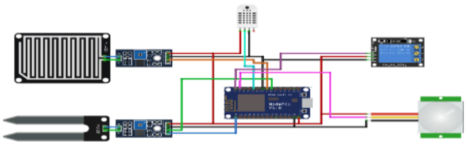

Fig.2. Circuit diagram of Smart irrigation

V. RSULTS

The system is tested in real life conditions on a farm field for 30 days. The system works properly and sensed the soil moisture, rain and the control unit act accordingly to sensed data and controls the water pump. All these sensors value are sent to Blynk cloud. So that we can fetch it using the Blynk tool free application on the mobile phone.

VI. CONCLUSION

The moisture content of the soil is an important factor to consider when designing a smart irrigation system. A variety of climatic factors influence soil moisture, including air temperature, air humidity, UV, soil temperature, and so on. Weather forecasting accuracy has improved dramatically as a result of technological advancements, and weather projected data may now be utilized to predict changes in soil moisture.

Fig.3. Result of smart irrigation

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