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IOT BASED SMART IRRIGATION AND MONITORING SYSTEM

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ABSTRACT : This paper proposes smart irrigation and monitoring system using internet of things (IOT), which can be used for controlling irrigation of plants and monitoring temperature, humidity and light intensity in nurseries. This system also provides a reliable real time video streaming (live video streaming), which broadcasts over a local area network (LAN) with remote access. Micro controller ATMEGA328P on Arduino Uno platform is used to implement the control unit. The setup uses soil moisture sensor which measure the exact moisture level in soil. The sensors of Humidity, Temperature and Light Intensity are used for monitoring purpose. Information from the sensors is thoroughly updated to THINGSPEAK IOT platform which is an international open source platform by using ESP8266 WIFI Module. . The Raspberry Pi module with camera is used for live streaming.

KEYWORDS -ArduinoATMEGA328P , IOT, Raspberry Pi 3, Thingspeak, USB Camera

I.INTRODUCTION

Agriculture is considered as the basis of life for the human species as it is the main source of food grains and other raw materials. It plays vital role in the growth of country's economy. It also provides large ample employment opportunities to the people. Growth in agricultural sector is necessary for the development of economic condition of the country. Unfortunately, many farmers still use the traditional methods of farming which results in low yielding of crops and fruits. But wherever automation had been implemented and human beings had been replaced by automatic machineries, the yield has been improved. Hence there is need to implement modern science and technology in the agriculture sector for increasing the yield.Everything in the farm is totally dependent on humans. In order to check the level of water inside the farm humans are required. As now we are using motors to turn ON the bore wells or in order to send the water to the farm and later we need to turn OFF the motor after checking the availability of water in the farm. All these activities truly indicate that humans are essential in a farm. To reduce the necessity of farmers, this system provides the automatic irrigation.In this system, all the

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information that is received from the sensors and the various parameters are given to Arduino Microcontroller ATMEGA328P as the respective analog and digital inputs. A preset value of soil moisture sensor is fixed in micro controller, when it goes beyond the particular threshold value, water is automatically irrigated to plants and once required amount of water is fulfilled, it stops. The microcontroller transmits the information of measured parameters on internet through WIFI Module ESP8266.

Thingspeak is a platform providing various services exclusively targeted for building IOT applications. It offers the capabilities of real-time data collection, visualizing the collected data in the form of charts, ability to create plug-in and apps for collaborating with web services, social network and other APIs.For real time video streaming in this system, Raspberry Pi 3 Model B is used which is the third generation Raspberry Pi. It is a capable little computer which can be used in electronic projects. It is a general purpose computer which operates with a Linux operating system, and ability to run multiple programs. Python Integrated Development Environment is used to programming the Raspberry pi. USB Camera Module is used for live streaming which is connected to Raspberry Pi.

II.METHODOLOGY

IOT based smart irrigation and monitoring system block diagram is shown in figure 1.

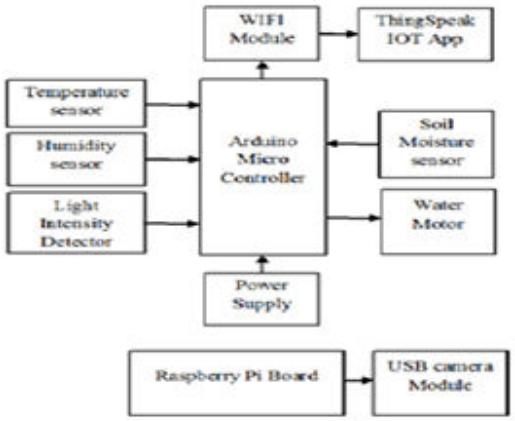

Figure 1: IOT based smart irrigation and monitoring system block diagram

1.Arduino:

Arduino is based on ATmega328p Microcontroller. It is an open source computing platform based on input or output board and a development environment. It can used to design and implement the real time applications. By dumping the program into the microcontroller, the operation of a particular application can be performed. An LCD display connected to arduino which can be used to display the monitoring parameters.

2.ESP8266 (WIFI Module):

ESP8266 offers a complete and self-¬contained Wi-Fi networking solution, allowing it to either host the application or to offload all Wi-Fi networking functions from another application processor. When ESP8266 hosts the application, and when it is the only application processor in the device, it is able to boot up directly from an external flash. The processed data from Arduino can be transmitted to the IOT

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platform through this WIFI Module. Temperature and Humidity sensors are used to monitoring their respective parameters and measured parameters are given to Arduino. These sensors data is given as digital input to Arduino. Soil moisture sensor can be used to read the amount of moisture level present in the soil. This sensor has two probes to pass current through the soil from one probe to other probe. More water makes the soil conduct electricity more easily, while dry soil conducts less electricity. Light Intensity Detector can be used to detect the intensity of light in the fields. These are photo resistors which are necessary to detect the presence of light.

3.Raspberry Pi:

This Raspberry pi Board consists of 64-bit Quad core ARM Cortex-A53 CPU and Broadcom BCM2837B0 system-on-chip is used. It works like minicomputer. It process the data from USB Camera and uploads to host network.Working procedure for this system is explained in following steps

Step 1: Start the process.

Step 2: Initialize the power supplied to the Arduino, Motor relay circuit and the Raspberry pi.

Step 3: Check the moisture level, Temperature, Humidity and Light intensity

Step 4: If the moisture level reaches beyond the threshold level, Motor is OFF or else Motor is ON.

Step 5: Display the parameters on Screen.

Step 6: Send the Monitoring Parameters from microcontroller to IOT Platform by using WIFI Module.

Step 7: Reveal the parameters of sensors in terms of plots in the IOT platform.

Step 8: Process the data from camera and transmit the video signal to Local area network.

III.EXPERIMENTAL RESULTS

These results taken from experiment conducted. In figure 2, there are two plots. In this, the upper plot represents the variation of humidity with respect to time and the lower plot represents the variation of temperature with respect to time. In figure 3, also there are two plots. In this the upper plot represents the variation of soil moisture with respect to time and the lower plot represents the variation of light intensity with respect to time. In figure 4, a screenshot takes place which is captured during the monitoring of video streaming.In figure 5, the measuredparameters are displayed on the LCD screen which is connected to the arduino.

Figure 2: Plots of humidity and temperature with respect to time

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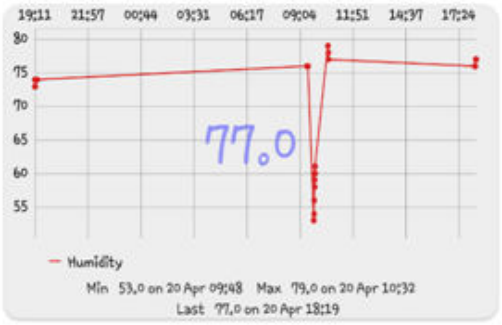
Figure 5: Monitoring parameters are displayed on the LCD screen



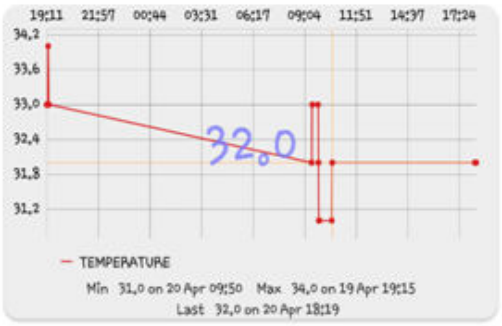


Figure 3: Plots of Soil Moisture and Light Intensity with respect to Time

Figure 4: Screenshot captured in the videostreaming

IV.CONCLUSIONS

This paper proposes an automatic irrigation system which reduces the direct human involvement and monitoring of parameters like Temperature, Humidity, Light intensity and Soil Moisture and upload the data to the cloud by using new technologies. This paper also proposes the live video streaming and display the video signal in the host network for surveillance purpose.

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