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AUTOMATIC PLANT WATERINGSYSTEM

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Abstract

Agriculture is that the supply of living of majority Indian and it's conjointly including an incalculable influence on economy of the country. solar energy has emerged as viable supply of renewable energy over the past few decades and is currently used for varied applications like emergency lighting, water heaters, and industrial application. it's low-cost supply of energy. solar energy is employed as solelythe supply of power to regulate the system. the main objective of our project is to reduced manual involvement by the farmer by exploitation an automatic irrigation system that purpose is to reinforce water for agriculture crops. With embedded technology and internet of Things, during this work we've designed IoT based automated irrigation system for the Indian situation. Our system is ready to deliver optimum water to the plants supported moistures, humidity and temperature levels which are obtained through sensors. The farmer is able to monitor the parameters through the mobile app that is integrated with cloud storage. By analyzing and scrutiny previous year's information and ourcurrent information, we have a tendency to square measure able to with efficiency notice some way to avoid wasting water.

Keywords—*IoT, Soil Moisture Sensor, DHT11 Sensor*

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I. Introduction

Irrigation is making use of water to the land artificially. Water is one of the precious useful resource and important factor for farming. general troubles in farming are underneath watering or over wateringthe problems are nice explained with the aid of answering the easy query that when the water cycle began and the way long watered.? Under watering is starting the water cycle too late and running it for no longer enough periods due to this the crop may be damaged and it impacts the manufacturing. overwatering is beginning the water cycle too early and going for walks it for longer length than whatit is essential by using doing this exercise the crop can be broken and manufacturing reduces. if human intervention is greater than this under and over watering takes vicinity due to small human errors. the primary object of this paper is to reduce human intervention and growth the irrigation performance by automating the irrigation system the use of sensors (moisture and DHT11) and tracking via blynk app.

India owns agrarian economy with 70% of population depending upon agriculture immediately or inat once. in this sort of developing USA wherein digitization is given high precedence, technology is showing its optimization in diverse fields while it nonetheless calls for footprints into irrigation so present-day smart move inside the discipline is significantly advocated. The trouble with modern-day irrigation system is shortage in water and energy definitely required for plant boom traditional methods of farming are accompanied requiring-a great deal man-electricity non remunerative for the farmer as the price of manufacturing is improved. So, there is a need to make a few changes in modern-day device.

In one of the systems, an electromagnetic sensor was used to measure soil moisture. Water saving of about 53% were achieved as compared with the ones using sprinklers. Reducing water use have been achieved, usingsensor-based scheduling of irrigation. A soil sensor and an evapori meter were incorporated in this system.

The use of automated irrigation system to reduce water consumption was done in a system that composed of a distributed network of soil moisture and temperature sensors placed near roots of plants. In this paper, the design and development of a smart irrigation system using sensors and microcontrollers is presented. The aim of the implementation was to optimize water consumption by crops in an agricultural field and also reduce themanual involvement and improve.

II. Existing System

Farming is the cornerstone of our Nation. Long back, agricultural professionals often found that soil fertility and influenced their thinking to improve the type of product. Usually, it was never possible for them to thinkabout

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the water level and especially the inclement weather that threatened the agricultural scientist. They usepesticides to look at a few allegations that lead to a direct effect on the crop if what is right is wrong. The profit depends on the final stage of harvest, upon which the farmer relied.

A.Definition

III. What is IoT?

The internet of things (IoT) is that the interconnections of unambiguously classifiable embedded computing devices at intervals the prevailing internet The "Internet of Things" connects devices and vehicle exploitation electronic sensors and also the net.

A. Introduction

The 'Thing' in IoT may be any device with any quite inbuilt sensors with the flexibility to gather and transfer knowledge over a network while not manual intervention. The embedded technology within the object helps them to act with internal states and also the external surroundings, that successively helps in choices creating method. In a shell, IoT may be a conception that connects all the devices to the web and allow them to communicate with one another over the web. IoT may be a big network of connected devicesall of that gather and share knowledge concerning however they're used and also the environments.

IV. COMPONENTS

1. ESP32
2. SOIL MOISTURE SENSOR
3. DHT11 SENSOR
4. RELAY
5. DC MOTOR
6. LM2596
7. SOLAR PANEL
8. BATTERY

1. ESP32

Espressif Systems' good property Platform (ESCP) could be a set of high performance, high integration

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wireless SOCs, designed for house and power unnatural mobile platform designers. It provides unexcelled ability to engraft wireless local area network capabilities at intervals alternativesystems, or to operate as a standalone application, with rock bottom price, and borderline house demand. an entire and self-contained wireless local area network networking solution; it is accustomed host the appliance or to dump wireless local area network networking functions from another application processor.

ESP32 hosts the appliance it boots up directly from external flash. In has integrated cache to boostthe performance of the system in such applications.

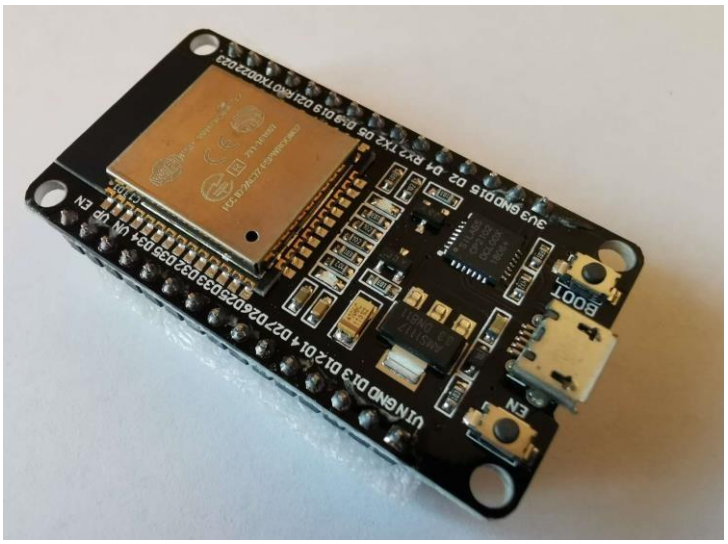

Fig 1: ESP32

2. Soil Moisture Sensor

Soil moisture sensor measure the water content found in soil. Measuring soil moisture is most essential in agriculture to help farmers manage their irrigation systems more efficiently and also save manpower. Not only are farmers able to typically use less water to grow a crop at paddy field,but they're also in a position to increase yields and the fine of the crop by higher management of soilmoisture during plant increase stages.

Besides agriculture, there are numerous different disciplines the usage of soil moisture sensors. Golf publications are now the usage of sensors to boom the efficiencies of their irrigation systems to saveyou over watering and leaching of fertilizers and different chemical substances offsite. The modulemakes use of LM393 comparator to compare the soil moisture level with the preset threshold value.When the soil moisture deficit module outputs an excessive level, and vice versa.

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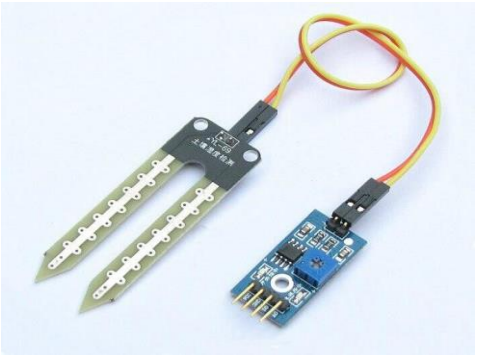

3. DHT11

4. Fig 2: Soil Moisture Sensor

The DHT11 sensor use to measure a Temperature and humidity. The sensor comes with a dedicatedNTC to measure temperature and an 8-bit micro controller to output the value of temperature and humidity as serial data. The sensor is likewise manufacturing facility calibrated and hence easy to interface with other micro controllers. This sensor can measure temperature from 0°C to 50°C and also humidity from 20% to 90% with an accuracy of ±1°C and ±1%.

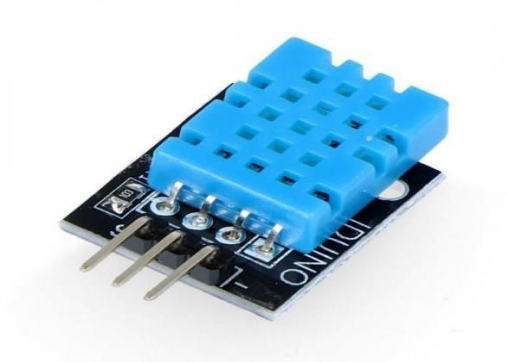

Fig 3: DHT11

5. Relay

A relay is an electrically operated device. It has a control system and (also called input circuit or input contactor) and controlled system (also called output circuit or output cont. actor). It is frequently used in automatic control circuit. To put it simply, it is an automatic switch to controlling a high current circuit with a low-current signal. The advantages of a relay lie in its lower inertia of the moving, stability, long term reliability and small volume. It is widely adopted in devices of power protection, automation technology, sport, remote control, reconnaissance and communication, as well as in devices of electro mechanics and power electronics.

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6. DC Motor

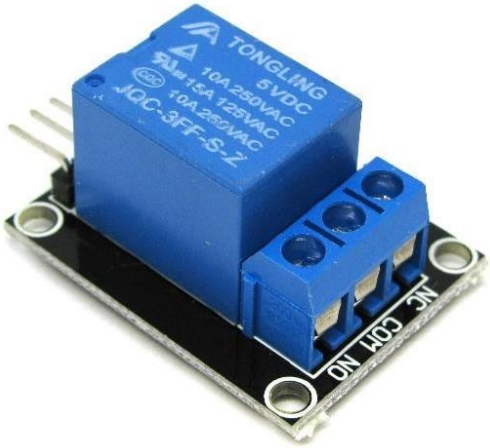

Fig 4: Relay

DC motors acts as water pump in this which operates at an voltage of 3V to 6 V with the flow rateof 80 to 120 L/H.

Fig 5: DC Pump Motor

6. LM2596

It is LM2596 HV DC-DC Buck Converter with voltage rating 4.5-40V to 3-35V. This step-down power module is adjustable with a potentiometer. It acts as a power supply.

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Fig 6: LM2596

7. Solar Panel

Solar panels are also called photovoltaic or PV modules it directly converts sunlight into electricity. It reduces the amount of electricity coming from fossil fuels by supplying your operations with clean, renewable energy from the sun.

Fig 7: Solar Panel

V. Working and Block Diagram

IoT based automated irrigation system which is capable of automating the irrigation process by analyzing the moisture of soil and the surrounding condition. Also, the data of sensors will be displayed on Blynk App page.

When the power supply is on the microcontroller checks the soil moisture content present in soil. If the moisture content is not up to the threshold value, then it makes the motor to get on automatically and

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turns off automatically if reaches the threshold value level. When the weather condition is suchthat it is raining then the microcontroller put off the motor till then raining. After the raining it checksfor threshold value and makes the necessary action. If the power supply is off suddenly then after the power is on microcontroller turns on automatically there is no need of manually turn on and off the motor. All the data from the sensors and water is graphically shown in the thing speak IoT cloud web page which is used for monitoring Advantages of these method is that it is a cost-effective irrigation and also save the wastage of water, increase efficiency and easy to monitor, reduces manpower and cost, reduced runoff water and nutrients.

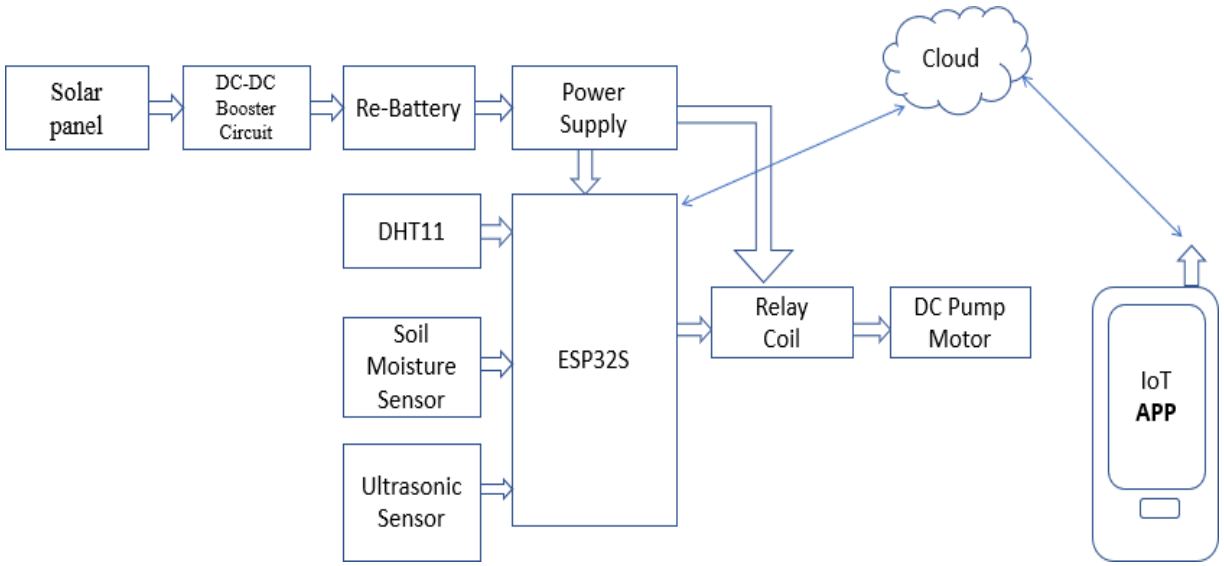

Fig 8: Block Diagram

VI. Software Implementation

The working starts with creation of the graphic interface-based application. The application hasbeen developed over Blynk platform and the interface is as shown in Fig.9.

The interface provides the user with two dominant functionalities:

a. Status monitoring (ON / OFF control)

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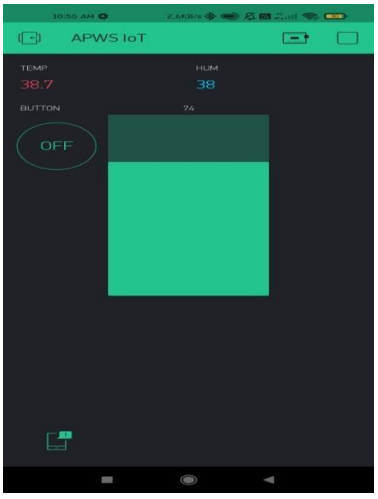
b. Monitoring temperature and humidity via DHT11 sensor and controlling status based on the monitored data as well as M-2-M feature.

It provides us with an interface with two predominant options: “Registered user” and “Create a Dashboard”. Clicking on the “Registered user” redirects us to dashboard with all the appliances which have been added into the application for monitoring and control process. This feature helps the user to have a customized dashboard according to one’s preference related to control and monitoring application with a volatile schema. Second option, “Create a Dashboard” facilitates the user in building a graphic interface by simply clicking on “Add Devices” push-button which redirects us to an interface where the user can add features specific to the control and monitoring ofa particular device. The controlling action is through MQTT protocol which can be controlled fromanywhere in the world via ESP32S module.

The authentication and authorization layer of schema for ESP32S module maps a particular userunder a specific account to the devices added under its credentials for the control and monitoringpurposes. The credentials required are namely; SSID and user-defined password.

The next stage is predominantly related to communication layer of the schema which is sending notificationsfrom the ESP8266 via text message and E-mail. IoT devices constantly alert users when something is happening or simply at regular intervals, for example to report data. We have used the ESP8266 to send e- mail as well as text messages. We have used IFTTT web service that can put two web services in contact via“recipes” that are activated by a trigger which in return triggers an action. The implemented hardware prototype is shown in Fig.10.



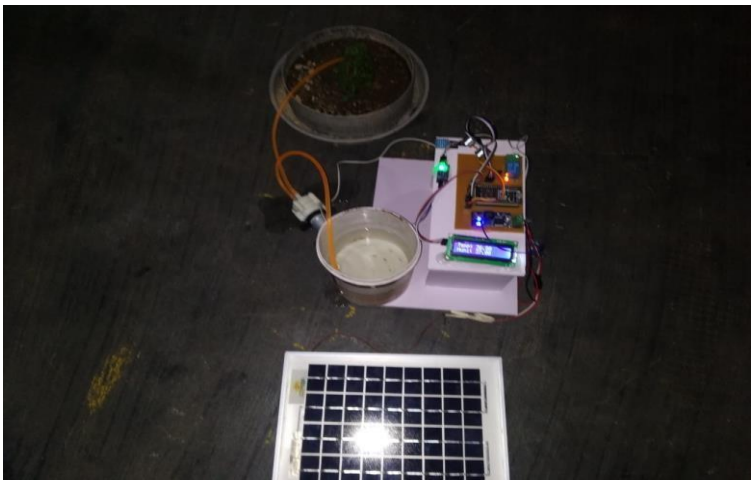


Fig 9: Blynk Dashboard display

Fig 10: Implemented Hardware prototype

VII. Conclusion

In this paper, SSIS in addition to a complementary Android App has been successfully implemented.The automated irrigation system prototype, namely SSIS, is an efficient and cost-effective alternativeto the manual irrigation systems which are labor intensive and results in wastage of water resources.It helps in regulating the water usage of an agricultural land by periodically monitoring the soil moisture, humidity and temperature via sensors. This mechanism not only helps in maintaining the alkalinity and pH balance of the soil but also prevents drought like situation by maintaining the underground water table. The timely received data for moisture levels of soil from the sensors at particular intervals is recorded and analyzed via graphical representation. When the moisture level isbelow the desired level, the moisture sensor directs the signal to the ESP32S microcontroller, powered via PV module, triggering the DC Pump to turn ON and supply the water to site. The prototype alsogives the status of the motor and temperature on mobile. If there is absence of solar power, the backupis provided by the lead-acid battery in the system, hence, maintaining a continuous
monitoring and controlling operation.

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