AUTOMATIC AGRICULTURE MONITORING SYSTEM

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ABSTRACT:
In traditional method of farming, farmer monitors and waters the crop manually. The data collected during the irrigation process may not be precise as well as enormous wastage of water also occurs. In this paper, an internet of things-based automatic agriculture monitoring system has been developed which utilizes various sensors like temperature,humidity, motion, rain and soil moisture sensors, to gather real-time data from plants. In this proposed model, a Node Microcontroller unit integrates all of the detectors and sends the data from those detectors to an internet of things-based cloud framework. This system reduces manual efforts, minimizes plant damage, and maximizes yield.

Keywords— Automatic irrigation system, Micro controller, Sensors, Relay.

INTRODUCTION

Irrigation is the process of instinctively applying water to plants when rainfall is not sufficient enough to maintain a dependable source of crops. It's most frequently used in regions where rainfall is inconsistent or too meager to support life.

The foremost known uses of irrigation date back to around 6000 B.C.E. In Egypt and Mesopotamia, where downfall was inconsistent and flooding was common. Without this practice, it is possible that life in these regions couldn't have been sustained. Traditional systemsof irrigation included digging moats, making use of a pulley system or lever system, and using water wheels to transport water from rivers to the crops. While these practices were cheap and easy to maintain, traditional styles of irrigation aren't as doable to use presently because they are time-consuming, labor-intensive, and produce unwanted run off.

In contemporary world, moistening or irrigation is an essential component of farming, as it helps to provide crops with the necessary water for their growth and development. Lack of access to power can make it difficult for farmers to irrigate their crops adequately, especially in areas where manual irrigation is not feasible due to the sizeof the land or the water requirements of the crops.Irrigating crops manually can be time-consuming and labor-intensive for farmers. This is why it is essential for farmers to adopt efficient irrigation systems that can automate the irrigation process and free up their time for other activities. But, there is a result– "An Automatic Agriculture Monitoring System"not only helps farmers but also others for moistening their gardens as well.

The Internet of Things (IoT) has the potential to revolutionize the agriculture industry by enabling farmers to monitor and control various aspects of farming operations more effectively [9]. IoT can be beneficial for farmers is in irrigation management. By using IoT sensors and controllers, farmers

can automate the irrigation process and deliver water more efficiently to their crops.This can help to conserve water,reduce labor costs, and improve crop yields.

Therefore, we need productive technologies to over come these problems. Hereby we introduce automatic irrigation system which reduces the manpower, time and efforts of people This system uses sensor technology which senses soil moisture level and sends the information to the microcontroller. If the moisture content in the soilis very low it automatically irrigates the field and behaves like smart switching system. PIR sensor is placed in the irrigation system so that it detects the motion of insects or animals around the field. Rain sensor is typically used in detecting the rain and also the water level of the field which works on the principle of resistance ofwater. It prevents over watering that can damage the crop.

Information gathered from the irrigation system by the above sensors is sent toNode MCU. The microcontroller can be programmed to detect the humidity level of the plants at regular intervals throughout the day, and to compare this level to a predefined threshold. If the humidity level is below the threshold, the microcontroller can activate a watering system to deliver the appropriate amount of water to the plants. Overall, using a microcontroller and sensors to automate the watering process can help farmers to manage their water resources more effectively andimprove the health and productivity of their crops. User is conceded about the field when there is any deviation from the anticipated values via text communication in Blynk app.

By using a system, farmers can be confident that their plants are receiving the right amount of waterat the righttime, without the need for constant monitoring or intervention. This can make it easier and more convenient to careforcrops, andcanhelp toensurethatthey thrive and remain healthy over the long term.

RELATEDWORK

ATMEGA microcontroller irrigation system is implemented in [1]. An op-amp is connected with a moisture sensor and the sensor is switched through relay.To handle the complete situation they have used only single sensor.It doesn’t send the detected information directly to the owner. And least sensors are used, that is moisture sensor and water level sensor. In[2], the automatic irrigation system is recommended to take down the parameters of temperature, soil moisture and humidity,using wireless sensor nodes like temperature sensor, soil moisture sensor and humidity sensor. And the information from various nodes are sent to the owner due to the WiFi module or Bluetooth module i.e, ZigBee module. The major drawback of the system is, it cannot determine the best timing of watering the crop. If there is a lack of scarcity in water in soil, then the system will not notify the owner automatically.

Using a solar power an automatic irrigation system has been considered [3]. The solar power system faintly works during the stormy season or winter. When the crops are at shaded zones or shaded region, the crops doesn’t get water, thus this function or method may fail. "GSM based smart Irrigation System uses the resources effectively and the planning of crop is designed by using android mobiles" [4]. In this paper they have used GSM based embedded system for irrigation.The status of the soil is continuously observed by the sensors and the flow of water is controlled by sending a message from the mobile using GSM. Therefore, there will be a network issue due to the use of GSM.

This model [5] explains about the design and development of a Automatic wireless detectors network for anagricultural environment. It monitors the various elements of crop such as temperature and humidity etc. The capability to observe and note the changes in parameters of

interest has become profitable. Several researches were performed for a remote monitoring system using Wi-Fi, along with wireless sensor nodes which are based on WSN802G modules. These nodes transmit the data to a central server through wireless media, which collects andstores the data, and the stored data is displayed using various peripherals. Thus, by comparing this project [4] withsmart agriculture monitoring system, they have used an Arduino, which is connected to a temperature and soilmoisture detector. Arduino collects the information where as smart phone receives the information from Arduino.Therefore, smart phone acts as a receiving node which receives the information through wireless network. However,as an extension to the previous project [4] micro web server is implemented in the Arduino which can control other appliances remotely using android based smartphone application. Therefore, the circuitry become more complex and expensive due to the usage of wireless remote and external Wi-Fi module.

The investigator has used agricultural monitoring server system for monitoring the information from outdoor agricultural production environment nodes which uses Wireless Sensor Network technology [3].This model collectsthe surroundings and soil information from outdoors wireless sensor nodes. It also gathers the information of imagethrough CCTVs, and also gathers the information of its locale through GPS modules. The collected data has converted into a database through the agricultural environment monitoring server, it manages the collected information from the wireless sensors, an image director manages data which is collected from CCTVs, and a GPS director, processes positions data of the environmental monitoring server system, and gives it to the producers.

IMPLEMENTATION OF PROPOSED SYSTEM & METHODOLOGY

This section will provide an explanation of the steps involved in implementing and the operating principle of theproposed Automatic Agriculture Monitoring System.Moreover, the section will feature presenting the outcomes obtained during the practical tests.

3.1 Agriculturesystemimplementation

In our daily progress we use a lot of water. Mostly the utilization is not made properly. The water resource is themajor resource which plays a major criteria in the world of living. For every living organism water is must. Similarlyfor plants or the greenery around us needs water. One of the major practices in which a lot of water utilization takes place is farming.To maintain and grow a crop it takes time, utmost care and measures. So for a healthy crop yield the soil moisture, temperature, humidity and water are vital parameters.

Generally according to the type of crop we vary the parameters and monitor the crop. The excess water to the crop may also lead to the bad yield production. And in most of the places the availability of water varies inaccordance to the place. So based on all these points we are going to have a proper resolution by introducing the topic IoT. By using this concept we could utilize water properly and also drive the crop to the desired yield.

In this project we are going to monitor the moisture levels, humidity, temperature and water utilization manually by using an application called Blynk. Here we are using a PIR sensor for the motion detection near the crop so thatwe could have a clear idea of anything entering the crop. The rain detector helps us with rain detection so the crop'srespective measures would be taken by the farmer. For every 3 to 5sec the parameter values would be updated in the Application server. We could make note of it to have an idea of healthy growth. Initially when the soil is dry we get a notification popping “water the crops”. Nowwe could irrigate the land properly. As soon as the soil becomes wet to aparticular moisture level weagain get notified. From a humidity and temperature sensor we would know the atmospheric conditions around the crop. By the motion detection sensor we would know whether a person or anything entering the crop area. The rain detection sensor sends a notification “It’s raining” so that we could instruct the person maintaining the crop to take respective measures.

The majority of the process is done by the sensors. These sensors continuously record the values and these valuesare generated in the Blynk Application. Through this application we control the system designed. This system is easyto understand and control. Even the illiterate could use it with ease. We can easily change the notification pop up intotherespectiveuserlanguage.

The maintenance cost of the system or the build cost of the system is very less. As the technology is growing rapidly and the manpower is decreasing, we could reflect the same in our project. Iot is one of the most accurate and prescribed technologies in today’s world.

3.2 Blockdiagram

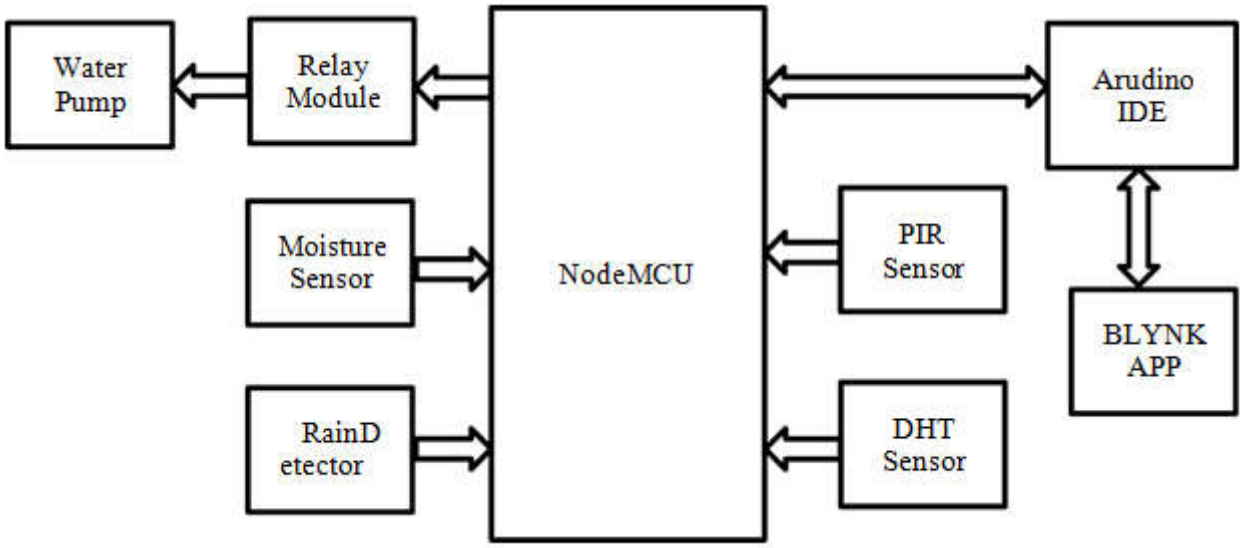

Fig.1: Block diagram

FromFig1,there are seven interfacing circuits, Relay module, Node MCU, PIR sensor, moisture sensor, DHT11 sensor, Rain detector and 5v pump. Here Node MCU acts a heart of our project, in the above block diagram we can see that there are four sensors which acts as input interface to the microcontroller and pump, relay module acts a output interface to the microcontroller.

Here the input and output interface can be indicated with the arrow lines with respective to the microcontroller and performs their respective commands and programmed on Arduino software (ArduinoIDE).

Flowchart

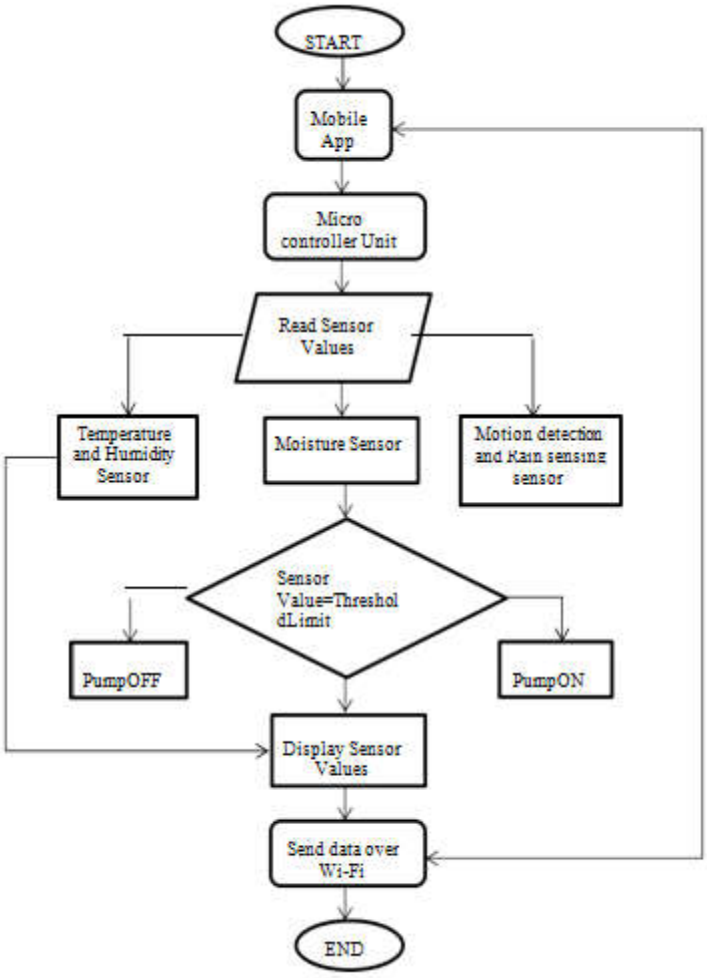

Fig.2:Flow chart

Working

Hereby we introduce automatic irrigation system which reduces the man power, time and efforts of people. This system uses sensor technology which senses soil moisture level and sends the collected data to the micro controller.

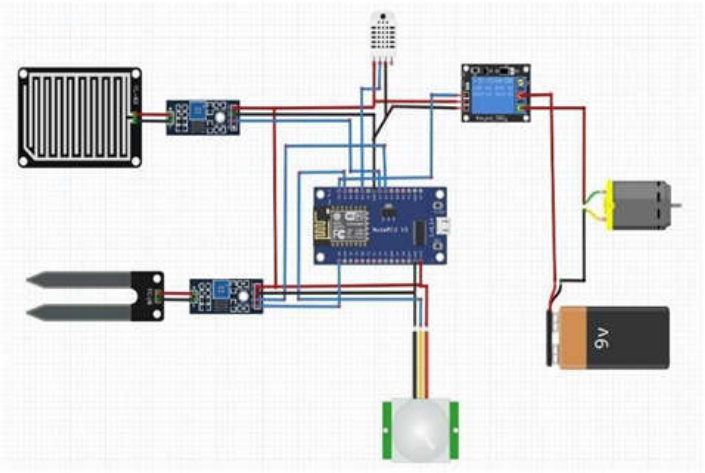

Fig.3:Circuit diagram

If the moisture content in the soil is very low it automatically irrigates the field and behaves like smart switching system. PIR sensor is placed in the irrigation system so that it detects the motion of animals around the field. Rain sensor is typically used in detecting the rain. It prevents over watering that can damage the crop.

Information gathered from the irrigation system by the above sensors is sent to Node MCU. The complete decision making process will be done by the micro-controller I.e is Node MCU . The user will be alerted through the Blynk app whenever there are any deviations in the field.

3.3 Results and Discussion

Fig.4:Hardware connections and sensed result in Blynk App

The hardware components which are having various special features have been deployed in it. Every hardware module contributes to the bestworking of the system. The project is implemented based on fast growing technologies using highly advanced IC's. Hence, the project is designed and tested successfully. This system willmeet the challenge of crop production and low cost of operation. This system has been developed for the use of bestyielding conditions of the crop by

managing the wastage of water, and the damage of crop from over flowing of rainwater and from the damage of animals or intruders.

1. CONCLUSION

This system is designed to take a benefits of time and maintenance I.e this design is for the farmers or gardeners who doesn't have much time to water-soak their crops or shops. Compared to the traditional practices of irrigation,the modern farming is 70% more beneficial to the crop, farmers as well as water resource. This irrigation system allows civilization in places with water failure there by perfecting sustainability.The automated irrigation system presented in this work was set up more doable, and it can manage the water resources efficiently in the agriculturalyield. It helps to optimizes the use of water resource for irrigation purpose. When the moisture sensor predicts themoisture levels properly in the agricultural yield then the consumption of water will be reduced. It approaches automating the husbandry assiduity, it provides a sustainable and computationally efficient approach predicated ontheInternetofThings.

2. FUTUREENHANCEMENTS

In future, by using machine learning algorithms, the system could be trained to identify patterns and makepredictions based on historical data. For example, it could identify which types of plants thrive under certainconditions, or predict when a plant is likely to require more water ornutrients. Additionally, multi-spectral imagingcan provide detailed information about plant health by capturing different wavelengths of light. This could help toidentify nutrient deficiencies, disease, or stress before it is visible to the naked eye. Further, an automatic plantmonitoring system can be collaborated with other smart home appliances, to optimize plant growth and reduceenergyusage.

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