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Research paper

Enhancement of Plant Monitoring Using IoT

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Abstract

Agriculture is the backbone of our country; most of the people depend on agriculture. The main issue in agriculture is water scarcity. The water resource is not used in an effective manner, so the water is wasted. In order to overcome this irrigation process can be automated. The use of Internet of things in this field will be helpful to reduce the wastage of water. So that the temprature as well as humidity and light are measured by means of sensors and depend up on the outcome further processing can be performed. We propose a system that will capture all the details about the soil and the temprature by means of different sensors. The sensed information will be send to the processor and depends up on the outcome the alert message will be passed and the appropriate amount of water will be released to the crop. And the further information related to the fertilizer quantity and whether there is any set of serious attack on the crop that will also be identified by the system. The advantage of this system will be finding the current issues in terms of soil condition, humidity and crop condition and the information will be immediately passed to the farmers.

Keywords: *Internet of things, crop monitoring, soil moisture, temprature.*

1. Introduction

Internet of Things (IoT) plays an important role in most of the fields. The use of IoT increased because of the various advantages we can get from that. The agriculture is the area where a lot of improvement is needed because that is one of the essential needs and a large sector of people is involved in that. Most of the area the major problem is the water scarcity because of low rainfall and even though there is rainfall the water is wasted because of no proper arrangement for the storage of water. Many techniques are proposed in IoT in terms of providing a better irrigation to the crop. The IoT devices can also be used in home for monitoring the garden real time. The Raspberry and Ardunio plays an important role in processing the information that is received from various sensors. The cost of these devices will be affordable and the major issue is the usage of large amount of sensors and other devices. Much research focus is on finding the effect of these devices in the environment, if it causes any side effects to the humans. The Rapberrypi is used wherever a large amount of processing is required and Ardunio in terms of interconnecting certain hardware devices and performs a little amount of processing. The installation of the sensors for finding the humidity level is one major factor to avoid the wastage of water. The next process is to identify the temprature and whether there is enough amount of light energy. The final thing is related to the condition of the crop whether the crop is affected by any set of disease and what is the impact of that on the crop. So in this situation what can be the alternate solution that can be taken to protect the crop. The alternate solution can be identified by the farmers itself if they are equipped with a system that can provide the details about the disease and the affected percentage. These set of process will be helpful in the growth of the crop, The farmers will be benefited with high productivity and there will be a growth in their normal life.

2. Related Works

The process of monitroring the agricultural land , percentage moisture in the soil and other factors are propose by many researchers. N.K.Choudhari and Mayuri Harde [1] proposed an cost effective automated irrigation system which can effectively monitor and send the details regarding all the factors that affect the growth of the plant. A.M.Ezhilazhahi and P.T.V. Bhuvaneswari[2] focused on organic farming and they have used the Remote monitoring system where by using the event detection algorithm the event will be generated depends upon the condition is satisified. Judika Herianto Gultom et al[3] focused on the factors that affect the chili plant , the information received from the sensor is processed and according to that appropriate measures are taken to have a better growth. Mustafa Alper Akkasa and Radosveta Sokullub [4] proposed an system based on IOT for measuring the humidity level in Real time and the measured information will be send through the communication module, so that improvement can be achieved in the next set of farming process. K.Lakshmi and S.Gayathri[5] by receiving the images of plant processing is performed and the result is used to identify the current growth of the plant and whether it is affected by any pesticides or by any other external problems, they have achieved a better result in terms of identifying the condition of the plant. Srinidhi Siddagangaiah [6] By sensing all the factors related to the growth the information will be send to the cloud platform using the corresponding module and depends up on the outcome of the process the alert message will be passed to the particular authority, so the farmers can get the data related to the factors that

are affecting the growth immediately. Richa Phalke et al [7] analyzed the use of IOT in the field of agriculture and they also described bout ho it is going to benefit us and detail about the IOT components. Hemant Kuruva and Balumuri Sravani[8] used Raspberrypi and other sensors for monitoring the temprature and the humidity and through the corresponding module the information can be passed to the person immediately , they have done experiments on the home garden. L.Rama Devi et al [9] proposed a method for identifying the water level in the soil by using a sensing unit and the information gathered from the sensing unit is processed by a control unit and that will be send to a GSM module to display the status of the soil condition. Shweta B. Saraf and Dhanashri H. Gawali[10] uses a cloud based module for monitoring ,they have collected the data and the infromation is passed though the Zigbee to the ground station and the further processing is performed to find out the status. Priyadharsnee.K and Dr.S.Rathi[11] have considered both soil and the pesticide detection , both the conditions are gathered by using the appropriate sensor and accurate information is processed to take appropriate action. D. Ramya et al., [12] In order to make the nursey more profitable they proposed an approach by which soil moisture and the temprature level will be identified and according to that proper action can be taken. Yap Shien China et al[13] used Beagle Bone for processing the information received from different sensors and provides accurate information related to the crop growth . Kajendran K and Pravin A[14] proposed the use of IoT devices in their application for providing security. Rahul Kumar and Pravin A[15] discussed about how optimization can be performed in cloud computing to increase the performance. T.Prem Jacob and Pradeep[16] describes the use of task scheduling algorithm in cloud computing environment.[17]

3. Proposed Method

Our work will mainly focus on collecting the information from the field. The sensors devices can be used for collecting the information, The type of sensors that can be used are soil monitoring sensor, light sensor and temprature sensor.

Figure 1: Different Sensors used in collecting information

The types of sensors that are used are given in figure 1. The temprature sensor will give the temprature details, the water content in the soil can be measured by using the soil monitor sensor and the light sensor is used to measure the field light intensity.

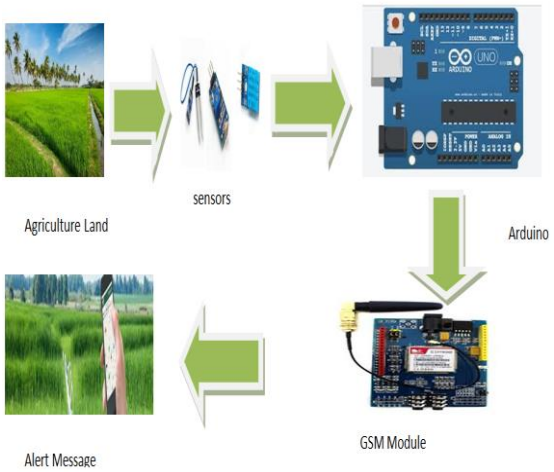

Figure 2: Process flow

The above figure 2 shows the entire process flow of the proposed work. The initial data is collected from the agricultural land by the sensors. Different types of sensors are installed in the land for collecting different set of data that will help the farmers in predicting the growth of the crop. The information that is collected by the sensors will be passed to the Arduino and depends upon the data received the corresponding action will be taken. The other process will be the information is send to the farmer through the GSM module .The farmers can get the details about the current condition of the farm from any location.

The other mechanism will be depends upon the result of the process what are the actions to be taken .The humidity sensor will send the data related to the water level and the data is processed and depend upon the outcome whether the level is low or high corresponding action will be taken .The water level is low then the pumping mechanism is turned on and appropriate water will be supplied to the crop and if the level is high the mechanism will stop the water flow.

Figure 3: Adruino water pump and realy

The above figure 3 gives the water pump and the Relay that is used in the process of providing appropriate water to the crop depends on the processing outcome. The temprature can be displayed in the device. The programming part is done by using the Audrino IDE, different set of actions are initiated depends upon the functionality that is given in the program.

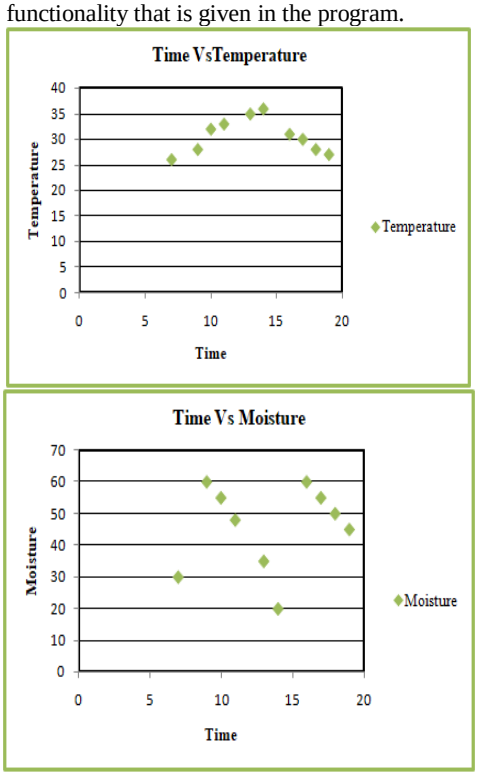

Figure 4: a)Time(Hrs) Vs Temperature(Celcius) b) Time(Hrs) Vs Moisture Level

The graph shown in figure 4 describes both the Time Vs Temprature and the Time Vs Moisture level. The temprature will be increasing depend on the time from Moring to evening and then it will start decreasing or may be staying at a constant level .This condition is for normal days and depends upon the season it will differ. The moisture level will be decreased depends upon the time and if the moisture level goes below a particular level the system will allow the motor to pump the water and will stop. The moisture level will be monitored and the corresponding action will

be taken. This process will maintain the moisture level of the soil and it will in turn make an increase in the growth of the plant. The growth is monitored and according to that the productivity will be increased.

4. Conclusion

The main problem in agriculture is the usage of water and our approach gives a better result. We have used the sensor for finding the water level and according to that further operation is performed. The other factor that is addressed is the temprature and the light, whether proper amount of temprature and light is available for better growth of the crop. The information is immediately transferred through the GSM module so that the farmers will get alert immediately. The farmers can take further action depends on the information gathered.

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