IoT based Solar Powered Irrigation System and Farm Monitoring

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Abstract*: *Agriculture plays a important role in Indian economy. The main issues which are faced in farming are water deficiency and high costs expected by labours. These major issues can be solved using smart automated irrigation system. So we proposed an renesas based smart farming using solar panel. This system consists of 3 sensors temperature, soil moisture and luminosity and senses the soil level. when soil moisture is less than the threshold level, the water is pumped to the crop. Various numbers of operations are performed in the agriculture field. Very basic operation is seeding. But the present methods of seeding are problematic. The equipments which are used for seed sowing are inconvenient to handle. So there is a need to develop the system which reduce the efforts of farmers. This system introduces a efficient mechanism which aims to drop seeds at desired position with specified distance between two seeds and lines while sowing. These operations are controlled by the human using mobile using GSM. The Reneses controller passes the information which is gathered from various sensors to Amazon web server utilizing GPRS.

Index Terms*: *GSM, Amazon web server, GPRS, Renesas controller

I. INTRODUCTION

At present, undersupply of water and too much penetration of water into the soil became an uncontrolled problems to solve with. Water is an essential component and plays a major role in every life. In India, agriculture is facing a lot of drought issue and it can be resolved to some extent with the usage of new technology. The technology should be user-friendly which is reasonable in price as well as it should be efficient and it can be achieved by using renesas board. Nowadays, it is easy to send alert message to IoT platform through smart phones and computer. The entire architecture is divided into two sections. The first section includes configuring Renesas controller and interfacing with temperature, moisture and luminosity sensors. The second section includes establishing the IoT platform and attaching to the server. In order to establish the faster transmission GPRS is used. The proposed model consists of two motors -one used for water pump and another for seed sowing. Farmer can switch on or switch off the motor based on the condition of the field. The proposed system is developed to eliminate the problems faced in existing system.

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II. LITERATURE SURVEY

In paper[1],a novel technique for smart agriculture was proposed by developing a smart sensing framework and irrigator equipment using wireless sensor technology. This approach focuses on checking of external parameters like soil moisture, pH of soil and nutrient level and based on the measured parameters the essential amount of water supplied for the crops via irrigator system which is placed on crane system. In paper[2],Mobile integrated smart automated irrigation scheme which includes soil and temperature sensors. The principle objective of this framework is to manage the water and take care of the plants over cell phone which empowers the farmers to water the plants without human nearness and get the state of motor and the temperature status on mobile. In paper[3],proposed an automated smart irrigation system using Arduino and Raspberry pi where the user inputs are refined on Raspberri pi and on or off messages are received by the Arduino microcontrollers from raspberry pi with zigbee technology. Aim of this system is to water the plant by sending an mail without the need of human presence to monitor watering.In paper[4],Irrigation regulation with system security was proposed where the main objective of this system maintain the necessary amount of water in field and throw up the excess water by using two pumps and wireless messaging is used to provide the information about the land.The system consists of water sensor which is cost effective and helpful to find the water content in the field. In order to provide the security for the pumps and other equipments password lock system has been used.In paper[5], Arduino based irrigation system with wifi technology was proposed and the system consists of soil moisture,pH ,temperature sensor where it senses the values from the soil and according to that the water is supplied. Arduino obtain the data from sensors and update with the cloud.In paper[6],Irrigation system using soil moisture sensor,air humidity sensor and air temperature sensor was proposed for vegetable crop .The main goal of this project is to overcome the drawbacks faced in traditional approach. This system provides 96% accuracy in command control.

By referring all the papers no system provides the integration of automated irrigation as well as seed sowing in a single system and we achieved this in our proposed system.

III. PROPOSED SYSTEM

System consists of three sensors i.e soil moisture sensor, luminosity sensor and temperature sensor as described in figure1.The soil moisture sensor senses the moisture content from the field. Luminosity sensor determine the light intensity on the plant. Every sensor is structured so that it ought to have the threshold value which is acquired in an experimentation premise and the threshold values are coded in the code. These sensors are connected to the renesas which is 58 I/O pin,16 bit microcontroller. This entire IoT device is placed on a robot. The proposed framework is structured in such a way that the moisture sensor sense moisture content not less than the threshold value, at that point the plant ought to be watered. This Framework comprises of GSM module which is interfaced with the renesas to start a mobile communication between the client and system. After the addition of sim card to GSM module the client can control the development of robot just as seed sowing activity by means of instant message to the controller.

This system additionally utilizes GPRS so as to transmit every one of the information to the cloud. Amazon Web Services provides a cloud computing platform for every individuals on metered payments, we utilize this gateway to transfer information got from sensors in ordinary interim of time. As a test case we have taken coffee crop and gathered earlier year's information in India's farmers entryway. This is fundamental so as to contrast the threshold data and a gathered data for temperature, moisture and have the goal of controlling the overflow of water and furthermore we can make sense of how much measure of water we spared.

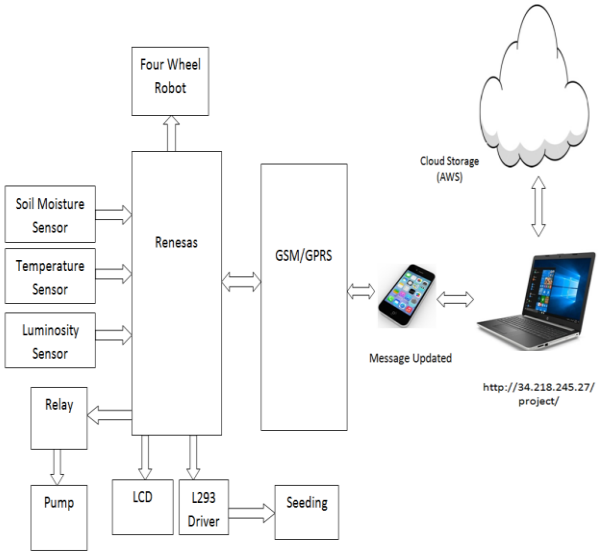

Fig 1:Block diagram of Proposed System

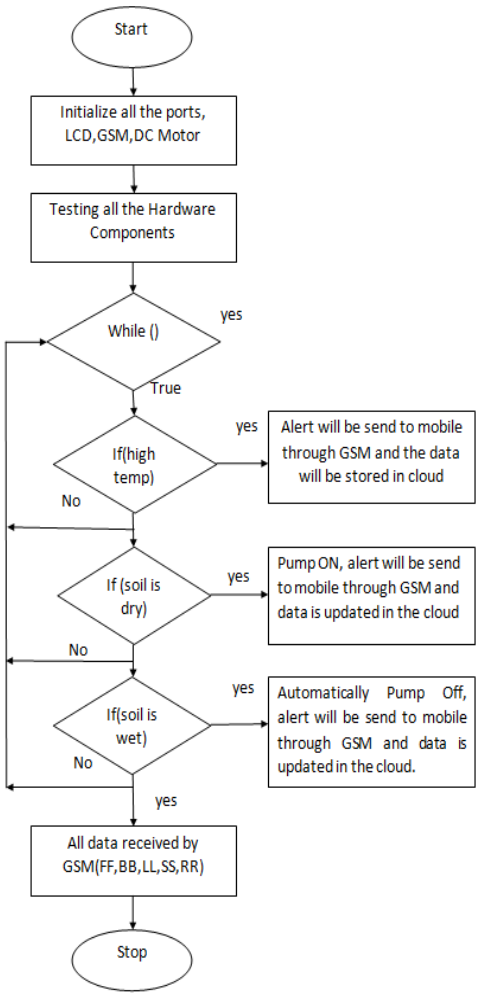

Fig 2:Flow chart of Proposed System

IV. RESULTS

Soil moisture sensor records the moisture substance of the soil.At the point when the moisture level is beneath the threshold level,the pump is consequently turned on and it is automatically turned off when it reaches the threshold level and the temperature sensor sense the temperature from the earth. Luminosity sensor detects the light in the event that on the off chance that it is an overcast day, at that point the counterfeit light can be utilized to improve the development of the crop. All the sensor got values are shown on the LCD. Renesas board is mostly powered by outer connector of 12V.The application CubeSuite+ is utilized for coding and composing projects and this information is sent through renesas flash programmer. This application goes about as an emulator and given as input to renesas microcontroller and the arrangement of codes is given as input to the motor driver which as the responsibilty of movement of the motor.

Therefore the motor is turned over and water is

provided to the plants and a similar code is sent to the output of renesas controller. Proposed Iot device is placed on a robot machine.GSM HC-05 powered by 12V power supply, is used to transmit the instruction given by the users to robot machine to move in forward, backward, left and right direction to drop the seeds at particular position with 2 seconds delay. Four wheels are connected at the base of the robot and these are operated using four motors.SMS is sent to control the robot to drop the seeds. The entire project process is displayed on LCD screen and solar energy produce the power for the movement of robot unit through sun light .This system also uses the GPRS in order to send all the information from renesas to cloud.

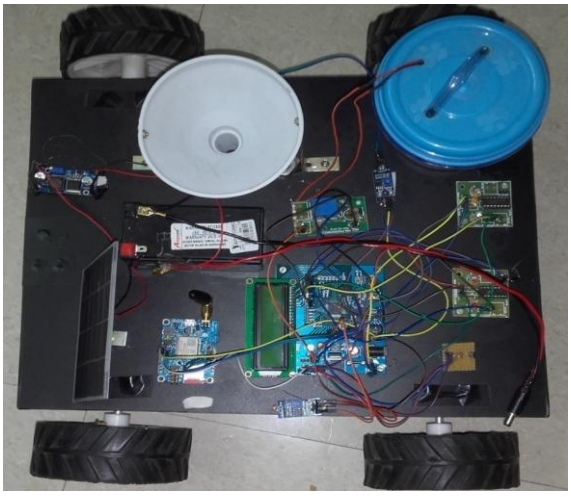

Fig 3: Implemented Project

The overall implemented project is shown in Fig 3. If the soil is dry then an alarm message is sent "DRY DETECTED" then automatically the motor is turned on. Once it reaches the threshold value then the alarm message is sent "WET DETECTED" to the mobile then the motor is turned off.

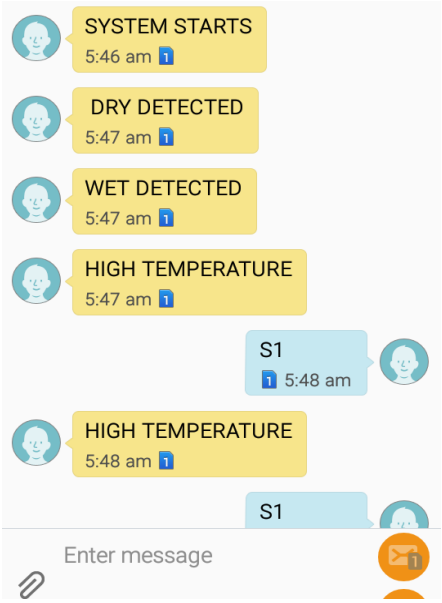

Fig 4 :Snapshot of Alert Message

If the temperature is more than the threshold value then the alarm message is sent "HIGH TEMPERATURE" to the mobile. The user can process seeding operation by giving S1 command in mobile and control the robot by giving FF,LL,RR,BB commands as shown in Fig 4. This system uses an AWS server for storing of all the data and it is updated for every 15 seconds delay as shown in Fig 5. The overall implemented project is shown in Fig 3

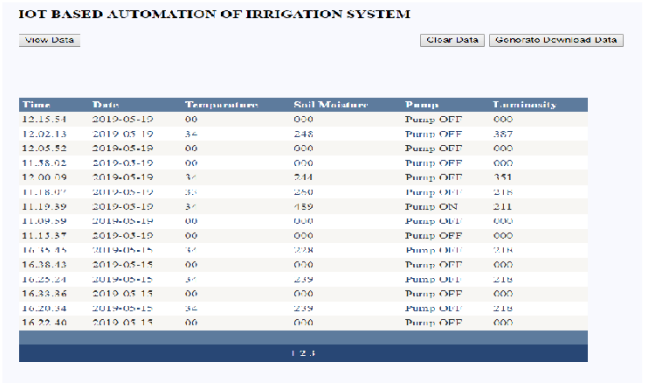

Fig 5:AWS Data Storage[http://34.218.245.27/project/]

V. CONCLUSION

This system provides an automated irrigation which helps in analyzing moisture level of the soil. The primary application of this project is for farmers where they do not have the enough idea that how much amount of water is needed for the crop. But in the proposed system moisture and temperature sensors measure the water content and the temperature of the soil. If the moisture level is less than the threshold level then the sensor send the signal to the renesas controller and sends an alarm message to turn ON the water pump and supply the water till it reaches the desired level. Without visiting the field the farmer will get the status on his mobile using GSM and he can also get to the information from cloud utilizing AWS. This system features for power efficiency,cost effectiveness and scalability.

VI. FUTURE WORK

Alarm framework can be utilized so as to alarm the farmers if there arise an occurrence of any abnormal activites : this can accomplished by utilizing sensors around the field and introducing a live observation so as to recognize unordinary behaviour by image processing .

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