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Conservation of Crops and Proper Utilization of Rain Water Using cellular IOT

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***Abstract*— Farming plays a crucial role of an Indian economy. In order to increase the productivity of the crops and to minimize the expenses of agricultural practices various IOT methods have been adopted. So to resolve this problem we go for acute agriculture techniques using IOT. This work includes various features like sensor based monitoring, moisture & temperature sensing, security, crop protection from excessive rain and automatic roof covering facility. It makes use of for intimating the cultivators about various environmental factors continuously via SMS. In this work we are proposing the model which prevents spoilage of crops due to heavy and uneven rainfall. The saved water can be used for other purposes such as feeding animals, washing, drinking,, cooking etc….**

***Keywords*— IOT in Agriculture, Wireless Sensor, Rain Prediction.**

1. INTRODUCTION

Agriculture is a backbone of our country. About 70% of India's revenue comes from agriculture. In this work we are proposing the model which prevents spoilage of crops due to heavy and uneven rainfall. This objective is achieved with Embedded System design using GSM technology. The actual idea of this work is shielding the crops from rain storm by wrapping the field mechanised and also to save the collected rain water. [1] The rescued water can be used for other purposes such as feeding animals, washing, drinking, cooking etc.

To achieve this, we are interfacing bidirectional dc motor and GSM module with ARM7 LPC 2148. ARM7 LPC 2148 is one of the extensively used micro-controller ancestry in embedded system application.[3]

A RISC-based computer design approach means ARM processors require significantly fewer transistors than typical processors in average computers. This technique minimize costs, intensity(heat) and power use. These are sensible quality for light, portable, battery-powered devices including smart phones, laptops, tablet and notepad computers), and other embedded systems. A straightforward design facilitates more efficient multi-core CPUs and higher core counts at minimum cost, issuing higher rectifying power and enhance energy competence for supercomputers and servers.[1]

2. INTRODUCTION TO IOT

The Internet of things is a system of interrelated computing devices, mechanical and digital machines provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human human-to-computer interaction and network connectivity that enable these objects to collect and exchange data. IOT[9][10][11] is a combination of Things, People and storage. It relates the people with things like sensors and other devices. It also enables the people to store data obtained from things to be stored on the cloud storage which makes people easily access the data.[4]

2.1. ADVANTAGES AND DISADVANTAGES OF IOT

2.2.1 Advantages:

Access information:

You can comfortably retrieve data and information that is sitting far from your locality, in real time. This is feasible because of the network of appliance; a person can retrieve any information sitting from any chunk(part) of the world. This makes it very suitable for people to go about their work, even if they are not likely to be present.

Communication:

Superior transmission is viable over a network of inter related devices, making the

transmission of devices more translucent, which reduces inefficiency. Processes, where machine have to be connected with each other, are made more systematic and fabricate(produce) better, rapid results. The perfect example for this is equipment at a production unit.

2.2.2 Disadvantages:

Privacy & security:

In today's tech-driven world, each and every device that an individual use is connected via the internet. This expands the risk of any divulge of data that might be important. This is a major drawback of sharing information, as confidential information might not be safe & could be hacked by third parties easily.

Complexity:

A multiple network that joins various appliances is what we call IOT [9][10][11]. A single aperture can result the complete system. This is by far the most tangled feature of the internet of things that can have an immense result.

3. PURPOSE OF WORK

The objective of this work is to protect the crops from heavy rains. But throughout heavy rain storm, the farmers face lot of complications because there cultured crops get moisten or demolished. So in order to avoid this problem this work is designed which helps in protecting the crops from heavy rainfall and saving that rain water to use it for other purposes. The rescue water can be used to starved animals, washing, cooking etc. and can also be reused to dust it back to the area when required.[2][3]

Nowadays farmers take various crops in his farm like grapes or pomegranate as like older techniques, so in this way very important factor to the farmer is like time, water, and also the money are get wasted. And also the farmers are extract crops which is entirely depends on the weather or state of nature. That is if the Rainfall or Ice fall is present then crops will be totally destroyed.[2][3]

4. METHODLOGY

When the power supply is switched on, the GSM dataset gets determined. The GSM dataset linked with the ARM LPC2148 board utilize AT commands. The LCD display is connected to the ADC pins of the ARM processor, in order to exhibit the message. The humidity sensor checks for the soil moisture content whose maximum threshold is kept at 1000ºc and minimum of 200ºc. When the soil moisture content is less than 200ºc the pump motor will pump the water to the field. The temperature sensor will compute the surrounding temperature of the farm. The rain sensor will sense the rain storm and ends the panel to shield the crop. All the above information will be informed to the user using GSM Technology

When the power source is turned on the ARM7 LPC2148 microcontroller and the GSM dataset/GPRS is initialized. After the initialization, the system asks the user either to select automatic mode or the manual mode.

Fig 1: proposed system block diagram

When automatic mode is selected, Relay is linked to the pump which initiates inflate water when the moisture sensor senses the area as dry. Moisture sensor is used for detecting the soil moisture of the crop area to feed them water with the help of 3-Phase power source, whenever the area gets dried below the threshold level of moisture of land which is suitable for the growth of crops.

The temperature sensor detects the surrounding temperature of the area. When it initiates raining, the pump motor will end pumping the water to the crop area and modernize the user using GSM/GPRS technique. When there is an heavy rain fall the panels furnished will be closed mechanically to preserve the crop. An Alpha numeric LCD is used to exhibit the data.

When the manual mode is selected, the information about the area field will be modernize

to the user only when he calls to an validated the number given.

5. IMPLEMENTATION

In this WORK we have to identify the input and output variables. Then we use light and day sensors to checks for solar power to turn ON the pump main. If solar power is available then pump gets turn ON else its runs on main supply. If pump is not ON then an SMS is sent to user. Then we to check the temperature using temperature sensors and the values are displayed on the LCD display. The dryness of the soil is tested with the temperature value. If the soil is dry then it senses for rain. If the soil is not dry then the pump starts and collect the water. If the soil is dry then it turn the motor ON automatically and send the message to the user about the water requirement to the crops. If the amount of water for the crops becomes maximum then the shatters are closed and stop the water requirement for the crops.

This process happens when motor is ON. If the motor is OFF then it checks for the rain using rain sensors. If the rain becomes maximum pump gets ON and store the water. It re checks for motor status if the motor is off the panels are closed.

If the motor is on then the panels are open and protecting the crops from heavy water of rain. This status is updated to the farmer through the message when the farmer sends request to the system for the updated status. Later the final update is given to farmer through a message

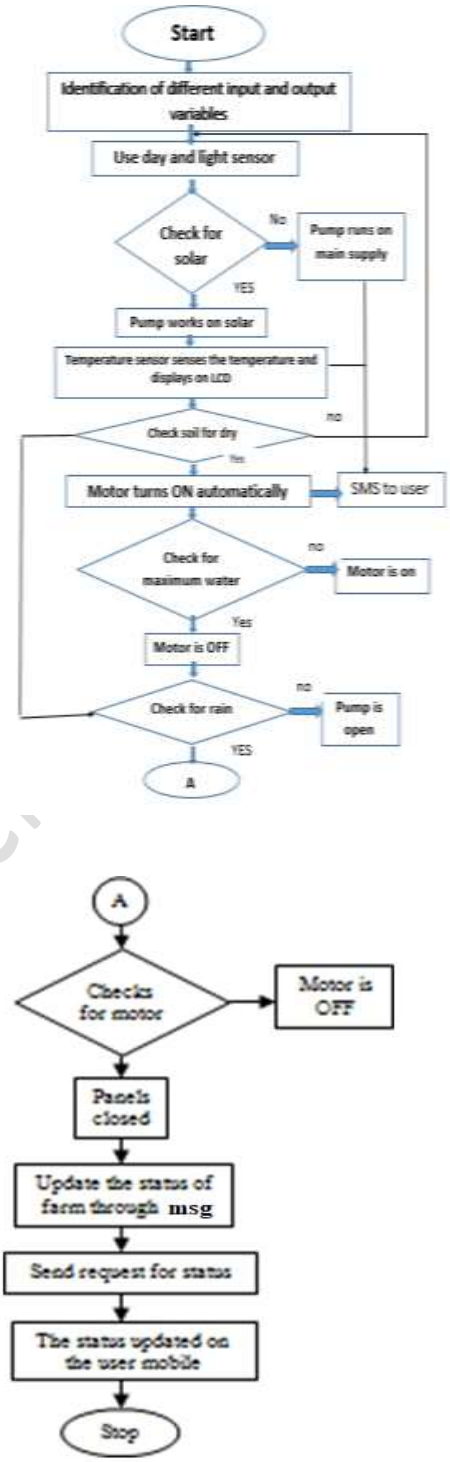

Fig 2: Flow chart for Implementation

6.HARDWARE DESCRIPTION

6.1. Microcontroller Unit:

The functioning of the device is written using codes and saved in the microcontroller in ROM. According to the written program the system operates and do not change its working over the life time until and unless its program is changed. The design and edict of the micro controller are revamp to handle data in bit and the byte size.

6.1.1 Microcontroller Core Features:

- High performance RISC CPU
- Only 35 single word instructions to learn
- All single succession edict except for code Branches which are two succession
- Eight level deep hardware stack
- Direct, indirect and relative addressing modes
- Power-on Reset (POR)
- Power-up Timer (PWRT) and
- Oscillator Start-up Timer (OST)
- Computer operating properly (COP) with its own on-chip RC
- Oscillator for reliable operation
- Programmable code protection
- Power saving SLEEP mode
- Selectable oscillator options
- Low power, high speed CMOS FLASH/EEPROM Technology
- Fully static design
- In-Circuit Serial Programming (ICSP) via two Pins
- Single 5V In-Circuit Serial Programming capability
- In-Circuit Debugging via two pins
- Processor read/write access to program memory
- Wide operating voltage range: 2.0V to 5.5V
- High Sink/Source Current: 25 mA
- Commercial, Industrial and Extended temperature

6.2 Solar Panel:

The solar collector are made of electrolytic cells. A photovoltaic cell or a solar cell, is an electrical device that converts the solar energy directly into electrical energy by using the photovoltaic effect, which is a physical and chemical phenomenon. A solar panel is a packed of photovoltaic modules.

6.3 Rain Sensor:

A commuting device which is mobilized when rain ensue is called rain sensor or a rain switch. Rain sensors for irrigation device are available in both wireless and hard-wired versions, most exploit absorbent disks that distend in the presence of rain and wane back down again as they blight -- an electrical switch is in turn glum or released by the absorbent disk stack, and the rate of drying is typically adjusted by controlling the ventilation reaching the stack. However, some electrical type sensors are also marketed that use tipping bucket or communication type probes to estimate rainfall.

6.4 Soil Moisture Sensor:

Estimating soil moisture is important for agricultural applications to help farmers manage their irrigation device more energetic . Having the knowledge of the exact soil moisture conditions on their fields, not only are farmers able to generally use less water to grow a crop, they are also able to increase yields and the quality of the crop by improved management of soil moisture during censorious plant growth stages Soil moisture sensors Estimate the scale of water content in soil. soil moisture sensors estimate the scale of water content indirectly by using some other property of the soil, such as ohmic resistance, dielectric constant.

6.5 GSM:

GSM is a device which is used to control or operate appliances from longer range of distances. GSM (Global System for Mobile Communications, originally Groupe Special Mobile) is a Merit developed by the European Telecommunications Standards Institute (ETSI) to narrate the compact for second-generation (2G) digital cellular networks used by mobile phones.

6.6 DC Motor:

Here the DC motor is used to make the crown spontaneous in opening and closing whenever it rains and when the rain stops respectively. A D.C. motor is a machine that converts D.C. electrical energy into mechanical energy D.C. motor works on the theory that, when a current carrying director is placed in a magnetic flux, a applied force is experienced on the director , the supervision of which is given by Fleming's left hand rule and hence the director moves in the supervision of force.

7. ADVANTAGES AND DISADVANTAGES

7.1 ADVANTAGES:

- To protect crops from heavy rain.
- Crop monitoring automatically
- Crop yield is becomes more.
- Rain water and solar panel power generation.
- Power saving.

7.2 DISADVANATGES:

- For floods we can implement these methods.
- If the crop is rainy season crop only it is applicable.

8. ABOUT OUR WORK:

The graphs showing measurements in the morning and evening through sensing the data from soil moisture sensor.[6].

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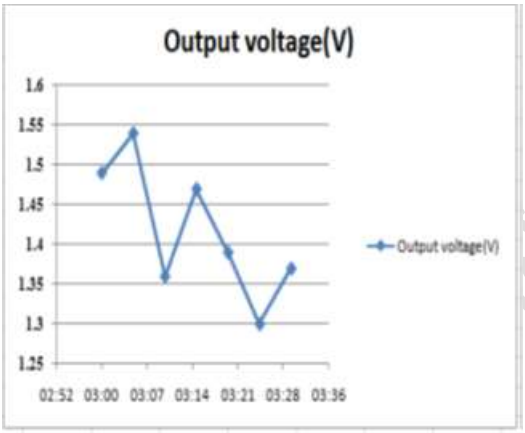


Fig:3 Moisture graph

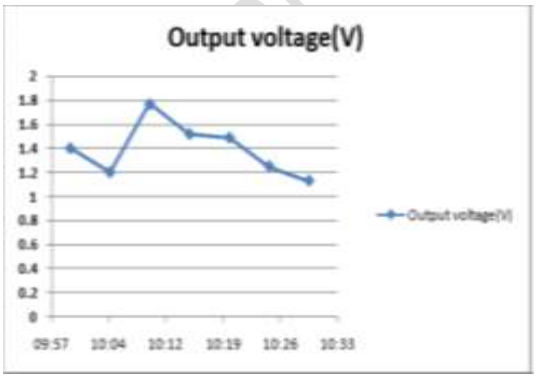
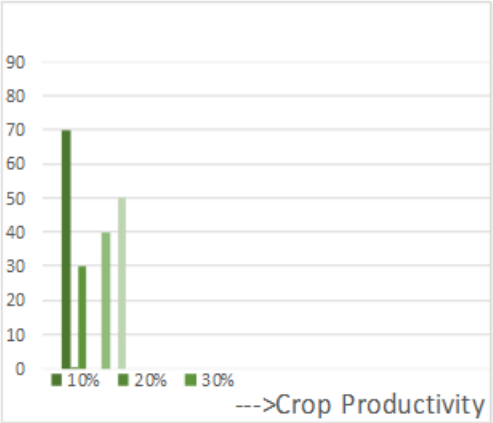
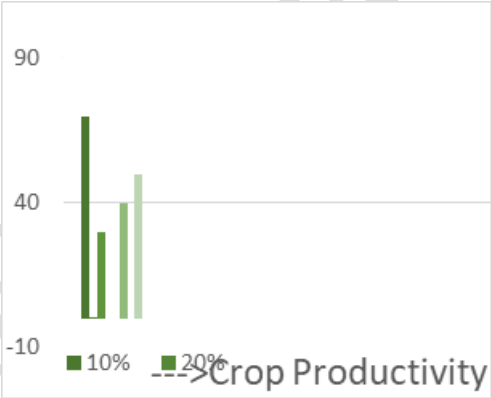


Fig:4 Moisture Graph

9. Results:





Crop productivity

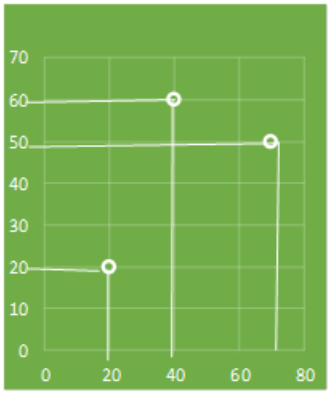


Fig:5 Moisture Readings

The results of the moisture values are displayed on the LCD. Rain Sensor module allows to measure moisture via analog output pins and it provides a digital output when a threshold of moisture exceeds. The predictive pumping system has been in use during high rainfall. Data from local weather and here we took some random values to predict the rainfall and to protect the crops through the sensors.

10. CONCLUSIONS

In our work we have designed a model to help the farmers in rural areas. Our Remote Controller could be installed on existing pump sets for a nominal cost.

Operating our Remote Controller does not require any special skills. It is as simple as sending a SMS or a missed call.

The user can send a SMS message from anywhere in the world to operate this equipment. The security feature in the software will make sure that it works only with pre-assigned phone numbers We conclude that we have arranged with the hardware components so that we can see the output on the hardware components. Implementation of Wireless Sensor Networks.

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