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Sheltering of Crop against Heavy Rain and Scheduling Automatic Irrigation

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ABSTRACT: Excessive rainfall during crop growth causes damage and loss of yield. India being an agrarian country is always impacted by heavy and unprecedented rainfall and incurs around 70% of its revenue. This paper intends to protect crop from heavy rain and avoids its spoilage. We have designed and constructed a model which completely covers the field in times of unprecedented heavy rain and protects the crop from potential damage. This system consists of an automatic roof which works by taking the signals from the rain and soil moisture sensors and covers the whole field to protect it from heavy rains. Whenever there is rainfall the rain sensor gets activated. The water level in the soil is sensed by the soil moisture sensor. Whenever there is rain, the rain sensor is ON and when the water level in the soil is beyond the normal level then soil moisture sensor is ON. If both the sensors are ON then this information is given to the controller and the GSM. Then the controller indicates the DC motor to run which opens the roof automatically to close the field using a polythene sheet. Then the roof can be opened manually using mechanical roller. Rain water is collected from the roof and stored in the field which can later be used for irrigation and other purposes. Thus water logging and crop damage is prevented and irrigation is also scheduled accordingly.

KEYWORDS: GSM, DC Motors, Rain sensor, Soil Moisture Sensor.

I. INTRODUCTION

India is an agrarian country and agriculture plays a vital role in Indian Economy. Agriculture involves not only crop raising but animal husbandry agro forestry, pisciculture etc. Any economic endeavour that utilizes directly the natural resources of soil and water for production is included in agriculture. Agriculture still forms the backbone of the Indian economy as well as human settlements and has shaped the socio cultural contours. India ranks second worldwide in farm output. Gross Value Added (GVA) by agriculture, forestry and fishing was estimated at Rs. 19.48 lakh crore (US\$ 276.37 billion) in FY20 (PE). It determines the health of the people as well as the wealth of the nation in more than one ways. The variety of agro-climatic regions enable India to produce infinite variety of agricultural products. Rainfed agricultural systems dominate much of tropical agriculture, and are extremely vulnerable to projected climate change. Nearly 80% of the global agriculture is based on rainfed farming. Rural communities across the world report that rainfall has become more erratic, shorter and heavier within seasons, and that 'unseasonal' events such as heavier rains, drier spells, unusual storms and temperature fluctuations have increased. Dependence on climate-sensitive activities, pessimistic projections for agricultural yield, falling production, poverty, food insecurity and limited capacity to adapt, exacerbate the vulnerability situation. In this project we are proposing the system which prevents the spoilage of crops due to heavy rains. This is achieved with embedded system design. The actual concept of this project is protecting the crops from heavy rainfall by covering the field automatically, save the collected rain water and irrigate the accordingly. In order to achieve this, in this system we use GSM, Rain sensor and soil moisture sensor.

II. OBJECTIVE

The main objective of this project is to prevent the damage caused by heavy and unprecedented rainfall. Excessively wet conditions cause potentially devastating losses[1]. Abnormally high amounts of rain can leach nutrients, the soil. Wet field conditions can prevent the farmer from accessing land with equipments. It also incurs greater loss. Hence this system has been designed to protect and shelter the crops from heavy

rain and store the rain water for further use. The stored water is re-used again for fully Automatic Irrigation in the field.

III.LITERATURE REVIEW

Primary Investigations were carried out in finding the existing approaches and developing the system based on current scenario requirements. The main aim of the project is to prevent the crops from the heavy rain and save the rain water. The primary study for construction is made under the papers [2] and [3]. As cited in this paper [4], the modifications are brought in and the roof cover is constructed depending on the moisture of soil and an automatic irrigation system is also provided. The techniques under the papers [5] and [6] were analyzed while designing the irrigation system. Thus the approach to design this model was to understand the existing systems, make necessary inputs and modify to bring the destined results.

IV. COMPONENTS

1. Rain Sensor

A rain sensor is one kind of switching device which is used to detect the rainfall. It works like a switch and the working principle of this sensor is, whenever there is rain, the switch will be normally closed. Here PCB is used to collect the raindrops. When the rain falls on the board, then it creates a parallel resistance path to calculate through the operational amplifier. This sensor is a resistive dipole, and based on the moisture only it shows the resistance. For example, it shows more resistance when it is dry and shows less resistance when it is wet.

2. Soil Moisture Sensor

The Soil Moisture Sensor uses capacitance to measure dielectric permittivity of the surrounding medium. In soil, dielectric permittivity is a function of the water content. The sensor creates a voltage proportional to the dielectric permittivity, and therefore the water content of the soil. The sensor averages the water content over the entire length of the sensor. There is a 2 cm zone of influence with respect to the flat surface of the sensor, but it has little or no sensitivity at the extreme edges.

3. Arduino Board

Arduino is an open-source microcontroller which can be easily programmed, erased and reprogrammed at any instant of time. It is capable of receiving and sending information over the internet with the help of various Arduino shields, which are discussed in this paper. Arduino uses a hardware known as the Arduino development board and software for developing the code known as the Arduino IDE (Integrated Development Environment).

4. GSM 800L

SIM800L GSM/GPRS module is a miniature GSM modem, which can be integrated into a great number of IoT projects. The module supports quad-band GSM/GPRS network. SIM800L GSM/GPRS module serves as a solid launching point for you to get you started with IOT. At the heart of the module is a SIM800L GSM cellular chip from Sim Com. The operating voltage of the chip is from 3.4V to 4.4V, which makes it an ideal candidate for direct LiPo battery supply. This makes it a good choice for embedding into projects without a lot of space.

5. Water Level Sensor

A float switch is a device used to sense the level of liquid within a tank. The switch may actuate a pump, an indicator, an alarm, or other device. . It can be easily converted from normally open to normally close by inverting the float. Because the current that the switch can carry is much little (0.5A).

6. Water Pump

An AC pump is designed to pull water out of the drain pan and push it out of the house. AC units create quite a bit of condensation, which they pull out of the air in order to reduce humidity.

7. LCD Display 16X2

Liquid crystal displays (LCDs) are commonly used to display data. Here it displays the availability of moisture content in the soil. 16x2 LCD is named so because; it has 16 Columns and 2 Rows

8. Transformer

Step down transformer converts 230V from AC mains into 12V AC by using a center tap transformer. Transformer selection is based on the fact that regulator ICs require around 11V as input considering drop out voltage, in order to obtain 12V power supply. Transformer steps down AC voltage from 230VAC to 12VAC. It is then given to bridge rectifier. Bridge rectifier converts AC voltage into pulsating DC. It is then given to regulator ICs which output constant DC voltage.

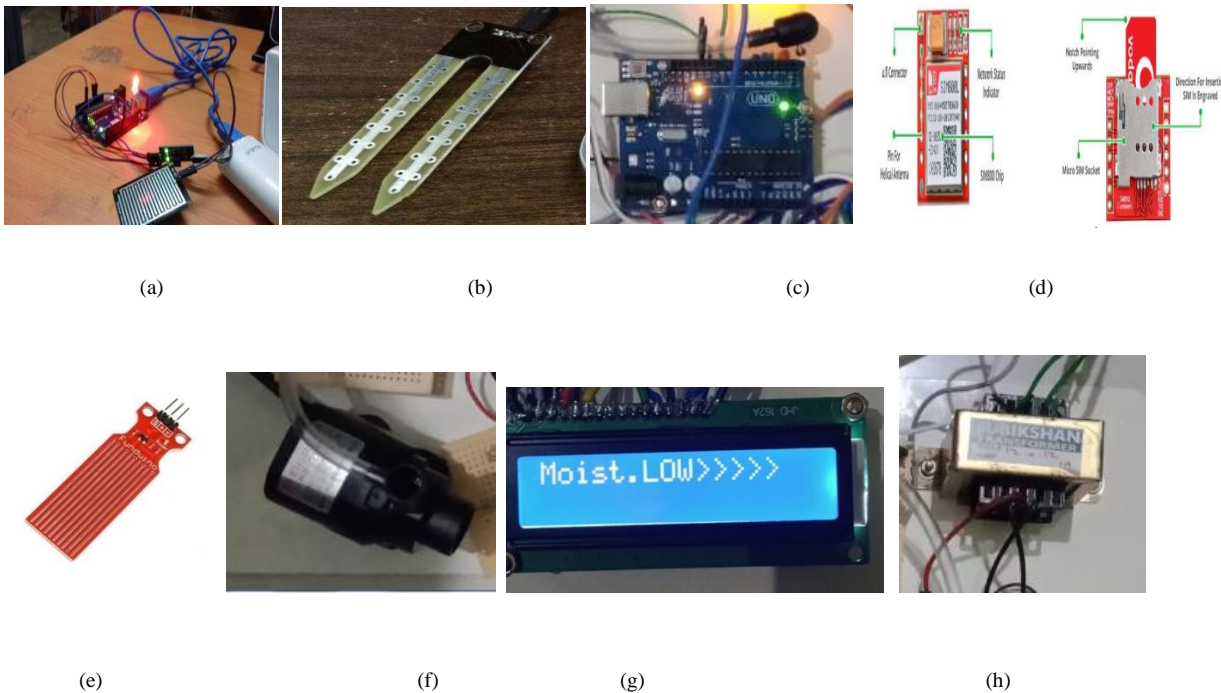


Figure 1. Components (a) Rainsensor (b) Soil Moisture Sensor (c) Arduino Board (d) GSM SIM 800 L (e) Water Level Sensor (f) Water Pump (g) LCD Display 16X 2 (h) Transformer

V. METHODOLOGY

The working of the system is explained through the flow chart below. The rain sensor detects the rainfall and sends the signal to the micro controller. Thus the roof at the corner of the field is covered automatically. The controller sends this information to the GSM and DC motor to run so that the automatic roof gets opened and the field gets covered by the polythene sheet. Then the rain water in the roof is collected to the Water tank. The automatic roof can be operated manually through mechanical roller. So whenever there is any fault in the working of the system then the roof can be operated manually. The irrigation system connected to it detects the soil moisture and irrigates accordingly. When the moisture in the soil is above the threshold, the microcontroller displays a message mentioning the same and the motor is off. When the output from the soil sensing arrangement is high i.e. the moisture of the soil is less. When the moisture in the soil is above the threshold, the microcontroller displays a message mentioning the same and the motor is off. When the output from the soil sensing arrangement is high i.e. the moisture of the soil is less.

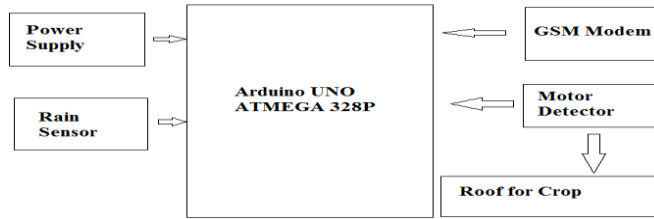


Figure 2. Block diagram of Roof Control

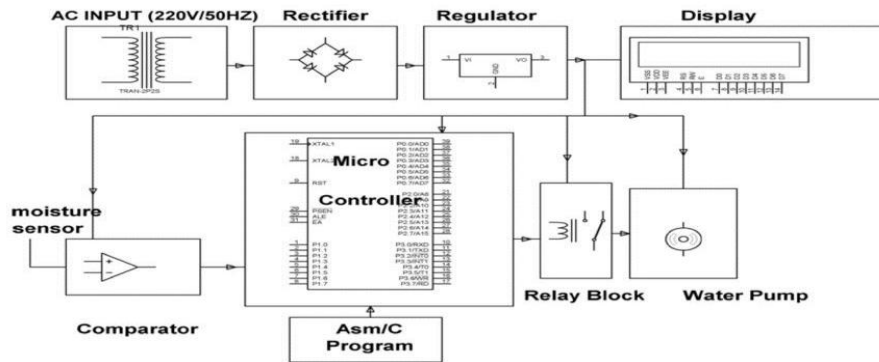


Figure 3. Block diagram of Automatic Irrigation

VI. RESULTS AND DISCUSSIONS

Development of shelter against rain and automatic irrigation is completed effectively. This works a real time model and provides protection against the extreme weather conditions. This is done with the help of the available water level threshold. Hence it also works as an automatic irrigation system. The generated power is stored in DC battery. During cloudy season, the power supply is recovered from DC battery. This system mainly works on the sensors, the automatic roof works when both the sensors are ON. Here the auto roof is mainly depending on the rain sensor and soil moisture sensor. As the rain starts the rain sensor is ON also when the moisture of the soil is above normal level then soil moisture sensor is also ON. Then this information is sent to the controller. The controller sends this information to the GSM and DC motor to run so that the automatic roof gets opened and the field gets covered by the polythene sheet. Then the rain water in the roof is collected to the Water tank. When water scarcity in agricultural field, the collected water is pumped out using sprinkler. In this way the wastage rain water is saved. The collected rain water can also be used for other purposes. When there is no threat of heavy rainfall, this can be completely used as automatic irrigation system alone. Therefore, this system helps not only in protecting the crops but also in making use of rain water. The automatic roof can be operated manually through mechanical roller. So whenever there is any fault in the working of the system then the roof can be operated manually.



Figure 4. Status of Water Level and Pump

VII. CONCLUSION

Thus the mobile based, "Sheltering of crop against rain and scheduling automatic irrigation" is designed using the sensors required and proves to be handy for farmers at times of unprecedented rainfall. This monitoring system serves as an efficient and reliable technology to prevent crop damage and avoid water logging conditions in the field. The need of manpower is highly reduced and is time saving too. Rain water harvesting improves the ground water level in the field and the stored water can be utilized for various other purposes. The automatic irrigation system supplies water only when the humidity in the soil goes below the reference. Thus the system is efficient and compatible to changing environment. In this proposed system the existing technologies were analyzed and a model is constructed bringing vital inputs and additions to them. Thus this system intends to shelter the crops in times of heavy rainfall and to store rainwater for other purposes and the irrigation system supplies water to crop based on its requirements. This is a real time model which can be used to automatically cover crop against rain water and protects from excess amount of rain water and also saves water from wastage. The irrigation system in this project supplies water to the crop accordingly. By using Arduino, the entire system is going to be controlled and thus it saves electricity, maximizes the productivity and intends to save losses of farmers. Hence it is very handy for farmers to combat losses against water logging and reduce manpower while irrigating the field.



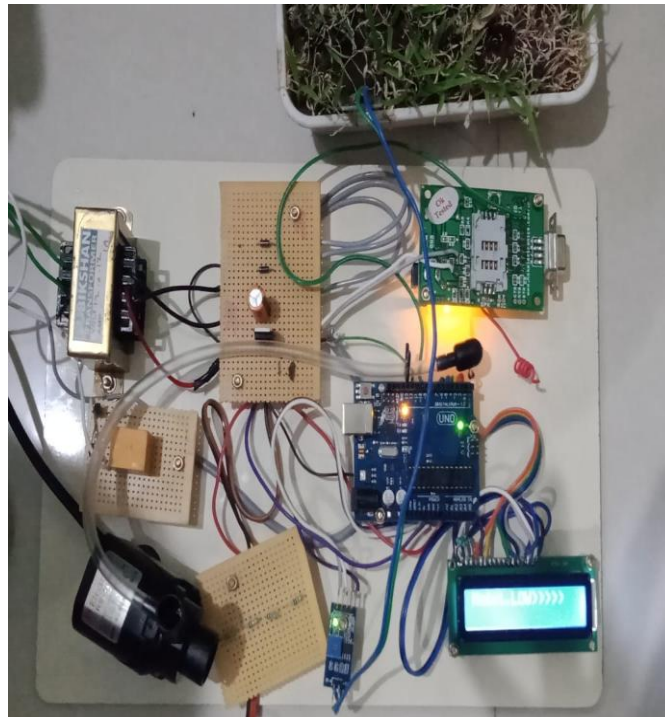


Figure 5 . Prototype of Roof Cover System and Automatic Irrigation

REFERENCES

- [1] K. Krishna Kumar, K.Rupa Kumar,R.G. Ashrit,N.R. Deshpande, J.W.Hansen, —”Climate Impacts On Indian Agriculture”, International Journal Of Climatology, Int. J. Climatol. 24: 1375 - 1393 (2004)
- [2] AHM FazleElah; Mohammad ShafiurRehman; — Intelligent Windshield For Automotive Vehicles || ,17th International Conference On Computer And Info. Technology 22-23 December 2014. International university, Dhaka bangladesh
- [3] KadakiaNishant, A Kothari, Mohit A Shah, Amit V Patel Vipul R: || Automatic Rain Operated Wiper System in Automobile || , International Journal for Scientific Research & Development Vol. 3, Issue 02, 2015.
- [4] R. Balathandapani, D. Boopathi, S. Jotheeshwaran, G. Arundeva, C. Saranya: — Automatic Rain Water And Crop Saving System Using Embedded Technology || ,International Journal of Science, Engineering and Technology Research (IJSETR) Volume 4, Issue3, March 2015.
- [5] Halcrow, S.W. and Partners. 1981. Small-scale solar powered irrigation pumping systems: technical and economic review. UNDP Project GLO/78/004.Intermediate Technology Power, London, UK. A. Harmim et al., —Mathematical modeling of a box-type solar cooker employing an asymmetric compound parabolic concentrator, || Solar Energy, vol.86, pp. 1673 - 1682, 2012.
- [6] Haley, M, and M. D. Dukes. 2007, || Evaluation of sensor-based residential irrigation water application || ,ASABE 2007 Annual International Meeting, Minneapolis, Minnesota, 2007. ASABE Paper No.072251
- [7] Fang Meier D. D., Garrot, D. J, Mancino C. F and Husman, S. H., “Automated irrigation systems using plant and soil sensors”, American Society of Agricultural Engineers, ASAE Publication, 1990, pp. 533-537
- [8] Webin Huang, Guanglong Wang, Research of Wireless Sensor Networks for an Intelligent Measurement System Based on ARM pp.1074-1079, 2011
- [9] Sezen SM, Yazar A, Irrigation Management on Yield and Quality of Tomatoes Grown indifferent Soilless Media in Glasshouse, 41-48, 2010
- [10] N. Shah and I. Das, “Precision Irrigation Sensor Network Based Irrigation”, a book on Problems, Perspectives and Challenges of Agricultural Water Management, IIT Bombay, India, pp. 217–232, April 2008



- [11] Shinghal K., Noor, A., Srivastava, N., and Singh, R., Wireless sensor networks in agriculture for potato farming International Journal of Engineering, Science and Technology, Vol. 2, No. 8, 2010, pp. 3955 -3963
- [12] Manish Giri, Dnyaneshwar Natha Wavhal (2013). Automated Intelligent Wireless Drip Irrigation Using Linear Programming. International Journal of Advanced Research in Computer Engineering & Technology (IJARCET)Volume 2, Issue 1



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