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AUTOMATIC RAIN WATER AND CROP SAVING SYSTEM

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Abstract - *Agriculture is a backbone of our country. About 70% of our country's revenue comes from agriculture. But during heavy rain falls, the farmers face lot of problems because there cultivated crops get washed off or destroyed. So in order to avoid this problem this project is designed which helps if protecting the crops from heavy rainfall and saving that rain water to use it for other purposes. The saved water can be used for feeding animals, washing, cooking etc. and can also be reused to sprinkle it back to the field when needed. In this system an automatic roof is inculcated 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 send to the controller. then the controller indicates the DC motor to run which opens the roof automatically to close the field using a polythene sheet. If there is any problem in opening of the roof, then this is performed manually by the farmers.*

***Key Words*: Auto roof, Rain Sensor, Temp Sensor, Soil Moisture Sensor, Bluetooth module, PIC18f4520 Microcontroller, LCD.**

1. INTRODUCTION

As human beings we cannot control the natural phenomenon such as rain, humidity, high temperature, etc. Some of the measures are taken against this environmental hazard but they are performed manually. In the Current system there is no protection for crops against natural disasters such as Floods, Rains and as well as from over Sun heat. Which are in turn Reduces the plant growth in turn reduces yield. 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 using GSM technology. Here comes the need of automation. Automation greatly decreases the need for human sensory and mental requirements as well. An automation system consisting of a connection between hardware and software has freed the individuals from their day to day chores. In this paper we try to establish new intelligent system which helps to protect the user daily home application and other useful material against environmental impact like rain.

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1.2. LITERATURE REVIEW

Survey played a very vital role in this project, we analyzed the existing products for protection of vehicles and clothes during rain, there were many demerits which we noticed during the survey, some of them are the existing products are to be operated manually, and if in case there's no one in the home to operate the switch then the clothes easily get wet and the product will be of no use, and secondly if there's a disabled person in the house then he/she will not be able to operate the system and this kind of system needs knowledge regarding the operation. So, we chose to do automatic system which doesn't require any manual operation, which has rain sensors which get activated during anytime of the day or night. Some methods through various papers which we have surveyed are as follows

A. An Automatic Sliding Door Using Infrared Sensor: In this research work, an Automatic sliding door System using an infrared sensor was developed. It uses a sensor, a control unit & drive unit to open and close doors at the entrance of a public building. The primary aim of this research work is to learn in details about how the automatic door system works and to understand the concepts involved. The secondary aim is to fabricate a simple circuit model to show how the system works. The main activities involved in this work are the research done on how the automatic door works, sketching a detailed circuit & then fabricating a simple model [1].

B. Intelligent Windshield for Automotive Vehicles: Windshield control is a vital operation of driver during driving. The mountings fitted in the windscreen or also called windshields are essential to use for smooth driving. These can be automated by using sensors and microcontroller. A complete windshield controlling system has been developed here to increase human comfort and flexibility. The wiper has been controlled by a water level sensor which regulates the wiper motor through sensing the level of water or rain. A dust sensor has been integrated to spill some water in the

windscreen and then wipe it. It senses when a certain level of dust get accumulated in the screen [2].

C. Automatic Rain Water And Crop Saving System Using Embedded Technology: Now a day, during the rainy seasons the cultivated crops gets affected due to the heavy rain fall. The main theme of this project is that to prevent the crops from the heavy rain and save the rain water. The rain sensor and soil moisture sensor is used for the working of automatic roof. This system involves protects the crops by the auto roof which covers the whole field. The rain sensor is activated when there is a rain fall. The soil moisture sensor will sense the water level in the field [3].

2. PROPOSED SYSTEM

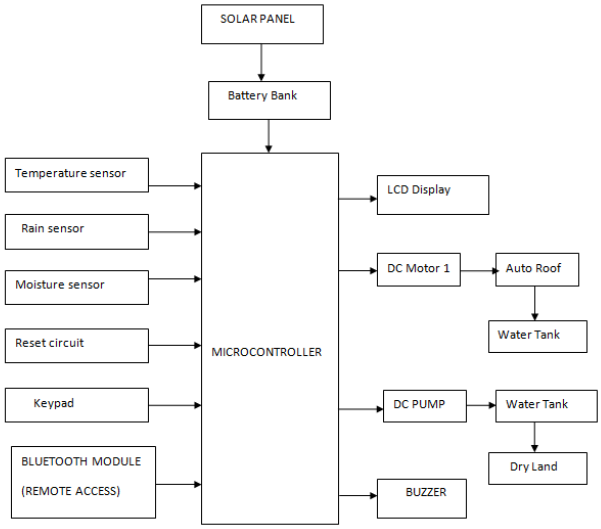

Fig 1: **Block Diagram of System**

In this, we present the theory on "Automatic rain water and crop saving system". In this proposed block diagram consist of several sensors (rain sensor, moisture sensor, temp sensor, Bluetooth module) is connected to our controller. The system is based on Bluetooth (remote access), Rain sensor, Temperature sensor and soil moisture sensor. This system uses renewable energy sources as solar power that is generated from solar panel. Then generated solar power is stored in DC battery. During cloudy season, the power supply is recovered from DC battery. The auto roof is mainly depends on the rain sensor, soil moisture sensor and temperature sensor. Here remote access having major role for automatically closing roof. Remote access is acting as a control system for our project. If there is any problem in sensors then roof is manually set by using remote access. Based on rainy season and sunny season it will control the auto roof. The decision making capability carried out by PIC 18f4520A.Then the rain water in the roof is collected by the Water tank. This way the wastage rain water is saved. The controller gets command from Bluetooth remote control by user. According to sensor value as well as Bluetooth command 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, these 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.

A. PIC 18f4520 microcontroller:

Data Memory up to 4k bytesn Data register map - with 12-bit address bus 000-FFF

- Divided into 256-byte banks
- There are total of F banks
- Half of bank 0 and half ofbank 15 form a virtual (oraccess) bank that is accessibleno matter which bank isselected – this selection isdone via 8-bits
- Program memory is 16-bits wide accessed through a separate program data bus and address bus inside the PIC18.
- Program memory stores the program and also static data in the system.
- On-chip program memory is either PROM or EEPROM.
- The PROM version is called OTP (one-time programmable) (PIC18C) The EEPROM version is called Flash memory (PIC18F).
- Maximum size for program memory is 2M n Program memory addresses are 21-bit address starting at location 0x000000

Fig -2: **PIC18f4520**

B. Rain sensor:

It is used for the detection of rain. It can also be used for measuring the intensity of the rain. It has both digital output as well as analog output. This module measures the moisture through analog output pin and when the threshold of moisture exceeds too much it provides a digital output. The more water or the lower resistance means lower output voltage. Whereas, the less water means higher resistance, i.e, high output voltage on the analog pin.

Fig -3: Rain Sensor

C. Soil Moisture Sensor:

Measuring soil moisture is important for agricultural applications to help farmers manage their irrigation systems more efficiently. Knowing 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 critical plant growth stages Soil moisture sensors measure the volumetric water content in soil. Soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content. The relation between the measured property and soil moisture must be calibrated and may vary depending on environmental factors such as soil type, temperature, or electric conductivity.

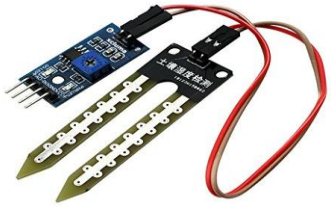

Fig -4: Soil Moisture Sensor

D. LM35 Temperature Sensor:

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full -55 to +150°C temperature range. Low cost is assured by trimming and calibration at the wafer level.

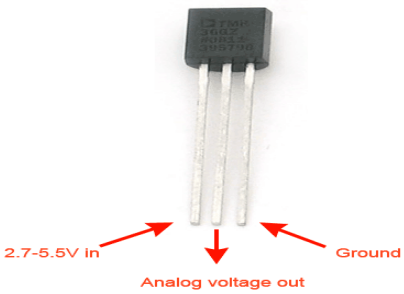

Fig -5: LM35 TEMP Sensor

E. LCD display:

A **16x2 LCD** means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD.

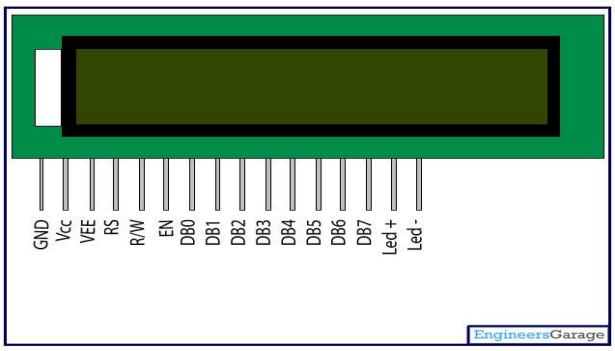

Fig -6 LCD display

F. Bluetooth module:

HC-05 is a Bluetooth module which is designed for wireless communication. This module can be used in a master or slave configuration. It is used for many applications like wireless headset, game controllers, wireless mouse, wireless keyboard and many more consumer applications. It has range up to <100m which depends upon transmitter and receiver, atmosphere, geographic & urban conditions. It uses serial communication to communicate with devices. It communicates with microcontroller using serial port (USART).

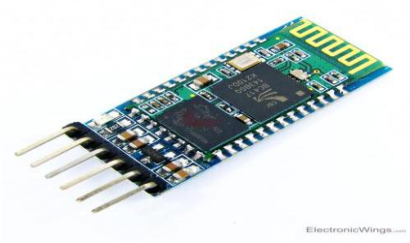

Fig -7 Bluetooth Module

3. CONCLUSIONS:

This is real time model which is used to automatic rain water and crop saving system protects crops from excess amount of rain water and also saves water from wastage. By using microcontroller operations of the entire system is going to be controlled these system saves the electricity, maximizes the productivity during both rainy season and sunny season. Solar energy is also the best outcomes of this project. Controlling of system on users virtue can also be achieved through device like Bluetooth. Hardware implementation is reliable and cheap of this project. The corrective action can be taken and reduce the human power, but it also allows user to see accurate changes in it.

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