Protection of Crops and Proper Usage of Rain Water

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Abstract: Agriculture is a mainstay (pillar) of our country. About 70% of our country's income comes from agriculture. Now a days, during rainy seasons the cultivated crops gets ruined due to heavy rainfall. The main composition of this project is that to avoid the crops from heavy rain and save the water and use it for other purposes like washing, cooking, feeding animals etc. And if necessary we can reuse it for farming field. In this system to protect the crops we are using polythene sheet 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. Whenever there is rain, the rain sensor is ON and when the water level in soil is beyond normal level then soil moisture sensor is ON. If both sensors are ON it sends notification to the controller, GSM and it will indicate to the DC motor to run which opens the sheet automatically to close the field using a polyethene sheet. If there is any problem in opening roof, then it sends message to farmers through SMS to their mobile phone using GSM. Then the roof can be opened manually using mechanical roller. In this project, emerging applications of GSM is used in this system. The power source to this project is supplied through 3-phase main power supply.

Keywords: Mainstay, Composition, polyethene sheet, GSM, DC motor, rain sensor, soil moisture sensor, PIC microcontroller, 3-phase main supply.
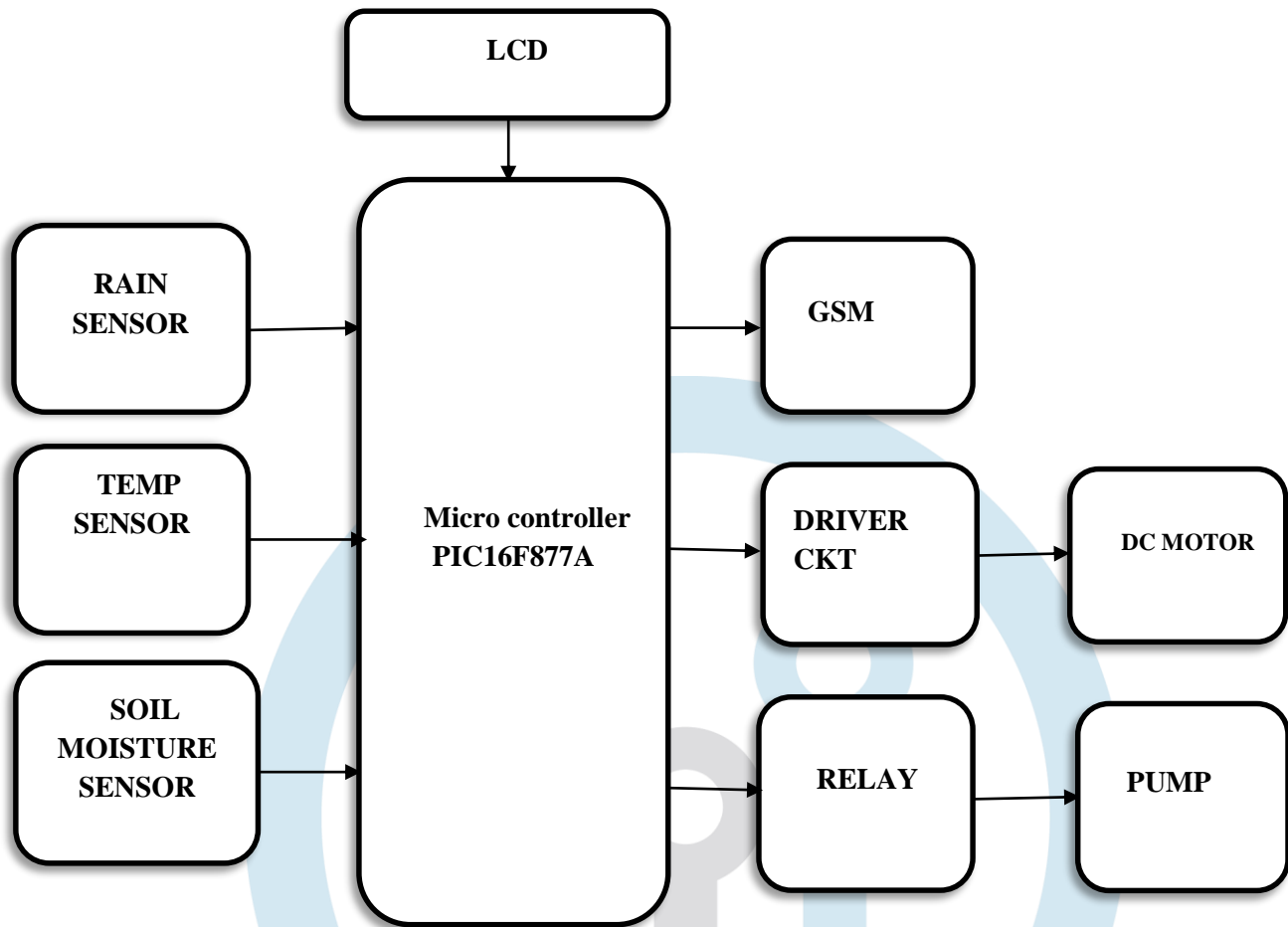
I.   INTRODUCTION

In this project we are proposing the system which prevents the spoilage of crops due to heavy rains this is achieved with PIC16F877A microcontroller design using GSM technology. The actual concept of this project is protecting the crops from heavy rainfall by covering the field automatically and also to save the collected rain water. In order to achieve this in this system we use GSM, rain sensor, soil moisture sensor and temperature sensor. This system mainly based on sensors one where the pump will start only when there is the need of water to the land. The auto roof is mainly depends on the sensors as the rain falls 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 set to the 16F877A microcontroller. 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 polyethene sheet then the rain water in the roof is collected to the water tank when there is water shortage in agriculture field, the collected water is pumped out when required to the field. In this way the wastage rain water is saved the collected rain water can also be use for multipurposes through GSM the farmer gets the notification that the system has been operated hence, this system helps not only in protecting the crops but also in making use of rain water.

II.   METHODOLOGY

In this system the temperature sensor will measure the surrounding temperature of the farm. When rain drop falls on the rain sensor board it gets activated and sense the rain droplets and sends the signal to the PIC16F877A microcontroller, the soil moisture sensor will sense the water level in the field when the water level in soil is beyond normal level then soil moisture sensor is ON.

When the power supply is switched ON, the GSM modem gets initialized, the GSM modem communicates with the PIC16F877A microcontroller. A microcontroller is used to control the whole system by monitoring the sensors. Then the microcontroller will send command to relay driver circuit the contacts of which are used to switch ON the DC motor to run which opens the sheet automatically to close the field using a polythene sheet.

When the rain is stopped the sensor indicates that rain is OFF and it will be displayed on LCD then the polythene sheet will be automatically opened and these signals operate under the control of software which is stored in ROM of the microcontroller. The condition of the pump i.e, ON or OFF is displayed on a 16*2 LCD which is interfaced to the microcontroller. The collected water can be re pumped to the field whenever required and it can also be used for other purposes.

III.   HARDWARE DESCRIPTION
1.   PIC16F877A Microcontroller:

Micro controller is single chip which contains CPU, non- volatile memory for program (ROM), and volatile memory for input and output(RAM). And input output control unit. The main purpose of microcontroller is to regulate the operation of machine using fixed program i.e, stored in ROM and that will not change over the life time of system. Architecture and instruction set of controller are optimized to handled data in bit and byte size. And applications of this can be found in control process, manufacturing process, medicine, instrumentation etc.

PIC stands for peripheral interface controller, which is very popular microcontroller worldwide microchip is the 1st manufacturer of 8 pin RISC MCU. Operating speed of DC-20MHZ clock input, upto 8kX14 words of flash program memory, upto 368X8 bytes of data memory (RAM) and EEPROM is also featured in it which is helpful in storing the information permanently like transmitter codes and receiver frequencies and some other data. The cost of this controller is low and easy to handle.

2.   LCD:

Liquid crystal display a 16X2 intelligent alphanumeric dot matrix display capable of displaying 224 different characters and symbols. LCD's uses very low power than cathode-ray tube counterparts. Which allows serial control of display. The firmware enables microcontroller to visually output user instructions or readings onto an LCD module. The LCD is used to display field characteristics like temperature and whether soil is wet or dry.

3.   RELAY:

A relay is very important electromechanical devices used in industrial application. It is used to drive the motor to ON/OFF the system. It majorly includes coil, spring and contact. Two types of relays, SPDT relay which can switch the output circuit between ON and OFF states. DPDT relay used to change the polarity at the terminals of a device at output.

4.   RAIN SENSOR:

The rain detector module is an easy tool for rain sensing. It is used as a switch when raindrop falls through the raining boards and measuring rainfall intensity. Each a set of standardized parts features, a rain board and the control board that is separate for more the state of being able to proceed with something without difficulty.

5.   TEMPERATURE SENSOR:

LM35 series is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature in degree celcius. It is better than thermistor this sensor circuitry is sealed and not subject to oxidation etc.

6.   DC MOTOR:

DC motor is used for providing auto roof depending on the field moisture, temperature and rain detector. Here the dc motor is operated clockwise and anticlockwise for opening and closing the roof. And used to pump out the water from the tank whenever required.

7.   SOIL MOISTURE SENSOR:

Soil moisture sensor will sense the water level in the field. And if it go beyond the normal level it indicates to the microcontroller. Soil moisture sensor measure the energy level at which water is being carried by soil.

8.   GSM:

Global system for mobile communication is very important to the mobile phones in the world. GSM is a short message service which is widely used to transfer data from one place to other place. If the users cell is powered off or has left the coverage area, here message is saved in cloud and send back to user when cell is ON. GSM is used around the world like 2 billion people across more than 212 countries and territories.

In GSM we also use a variety of voice codes to squeeze 3.1HZ audio into between 5.6 and 13kbit/s. we use the two codes, named after the types of data channel they were allocated that is half rate and full rate.

IV.   HARDWARE AND SOFTWARE USED
1.   Hardware used:
- PIC16F877A
- Rain sensor
- Soil moisture sensor
- Temperature sensor
- Relay
- Pump
- GSM
- LCD
- DC motor
2.   Software used:
- MP Lab
- Pic kit2 programmer

V.   RESULT

The system has been designed and operated by using a software called MP LAB and pic kit2 programmer here the sensors plays vital role i.e, when the rain sensor detects the rain and soil moisture sensor detects moisture content in the land and are displayed in LCD display. Microcontroller receives the data from these sensors and will analyze the data, take correct action. Microcontroller will notify the message to user through GSM. The temperature sensor, rain sensor, soil moisture sensor detects the value that sent to microcontroller. Based on the delay provided in the coding the opening and closing of roof is performed. Thus the system is time saving, and helps to minimize human errors and prevents the wastage of water where the stored water can be reused whenever required. Hence the system increases net profit of farmers.

VI.   CONCLUSION

The protection of crops and proper usage of rain water, in this system it protects the crops damaging from the excess amount of rain water and also saves water from wastage. Here the human power were eliminated by providing auto roof. The GSM based agriculture monitoring system serves as a reliable and efficient system for monitoring agricultural parameters. The project is thus

carried out using PIC16F877A microcontroller with the help of GSM technology the security feature in software will make sure that it works only with pre-assigned phone numbers.

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