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SMART AGRICULTURE SYSTEM USING EMBEDDED SYSTEM

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ABSTRACT

Agriculture is most important for survival of human being on the earth. There are certain crops which doesn't require unwanted rain for their growth such that they must be protected from unseasonal rain and so a specific expandable rain protecting mechanism will be constructed using the rain sensor in this project. In this system an automatic roof is inculcated which works by taking the signals from the rain sensor and then covers the whole field to protect it from rains. Soil moisture sensor is used to provide proper amount of irrigation to agricultural fields by observing the moisture content of soil. The IR sensor detects animals around the fields and activates a buzzer to produces a sound to threaten the animals and also sends a message to the farmer appropriately. Our design is a model which consists of different sensors , Arduino uno and a SIM800L GSM Module. GSM unit acts as a interface between Arduino uno and user mobile and is responsible to update the user about the field.

Keywords: Agriculture, Embedded Systems, Arduino Uno, Sensors, GSM Module (SIM800L).

INTRODUCTION

The economic contribution of agriculture to GDP in most of the countries across the globe is steadily declining with the country's broad-based economic growth while large number of people continues to work in the agriculture sector . Hence, there is an immediate need to improve the System which can increase the yield and produce healthy organic food. In order to improve the crop productivity there is an urgent need to change the manual method to automation . Also considering the water availability which is one of the valuable resources to be protected and saved for future needs. Embedded based automatic irrigation system is suitable for farmers and is available at low cost and also easy to install. This system will help the farmers in feeding water to the crops at stringent time and quantity.

This system observes the moisture around the crop area to gives precis time of operating the motors into ON and OFF state. So automatically avoids the human errors. The GSM which collects the data from different type of sensors and then send it to the main server using wireless protocol. The collected data provides the information about different environmental factors which in turn helps to monitor the system.

The proposed system implemented uses GSM and an Android mobile phone to report the details about irrigation.

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LITERATURE SURVEY

[1] Srikanth N et al :

Srikanth proposed Crops in farms are many times ravaged by local animals like buffaloes, cows, goats, birds, and fire etc. This leads to huge losses for the farmers. It is not possible for farmers to barricade entire fields or stay on field 24 hours and guard it. So here we propose automatic crop protection from animals and fire. This is a Arduino Uno based using microcontroller. This uses a motion sensor to detect wild animals approaching near the field and smoke sensor to detect the fire.

[2] Sudhir G et al:

Sudhir G proposed the for monitoring the growing status of the corn (maize) plant continuously and intimate the agriculturist using wireless sensor network (WSN). But in practice, cultivator faces too much effort in the farmland. This paper makes eases the work of the farmer in cultivated land through the usage of different kind of sensors. The two LDR sensors are interfaced with PIC16F877A microcontroller whereas its top array receives solar radiation for supply current and the bottom of the LDR array is for measuring leaf area index (LAI).

[3] Dr.N.Suma et al:

Dr. N. Suma IOT based smart agriculture monitoring system the newer scenario of decreasing water tables, drying up of rivers and tanks, unpredictable environment present an urgent need of proper utilization of water. To cope up with this use of temperature and moisture sensor at appropriate locations for observation of crops is implemented in. An algorithm elevated with threshold values of temperature and soil moisture can be programmed into a microcontroller-based gateway to manage water quantity. The system can be powered by solar panels and can have a semidetached communication link based on a cellular Internet interface that allows data inspection and irrigation scheduling to be programmed through a web page.

PROPOSED METHODOLOGY

This Model involves sensors, LCD display, and ARM processor. All the sensors will give analog output but processor will accept only the digital data. So to connect all the sensors to the ADC channel pins which are in-built to the processor. LCD will be used for field display purpose. GSM module contains a Subscriber Identity Module (SIM) with which user can communicate with this SIM-Number. When the actual command is activated or given by the user, immediately the corresponding sensor will activate and reads this reading and immediately sends results to the registered mobile number and also displays the reading on the LCD panel. The user will take the necessary action immediately. IR Sensor, Soil moisture and Rain sensors are used. All these devices are connected to the AT Mega328P processor. GSM is used for communication purpose, with the help of AT (attention)-Commands can communicate with the components. Relay is connected to the water pump to pump water to the field.

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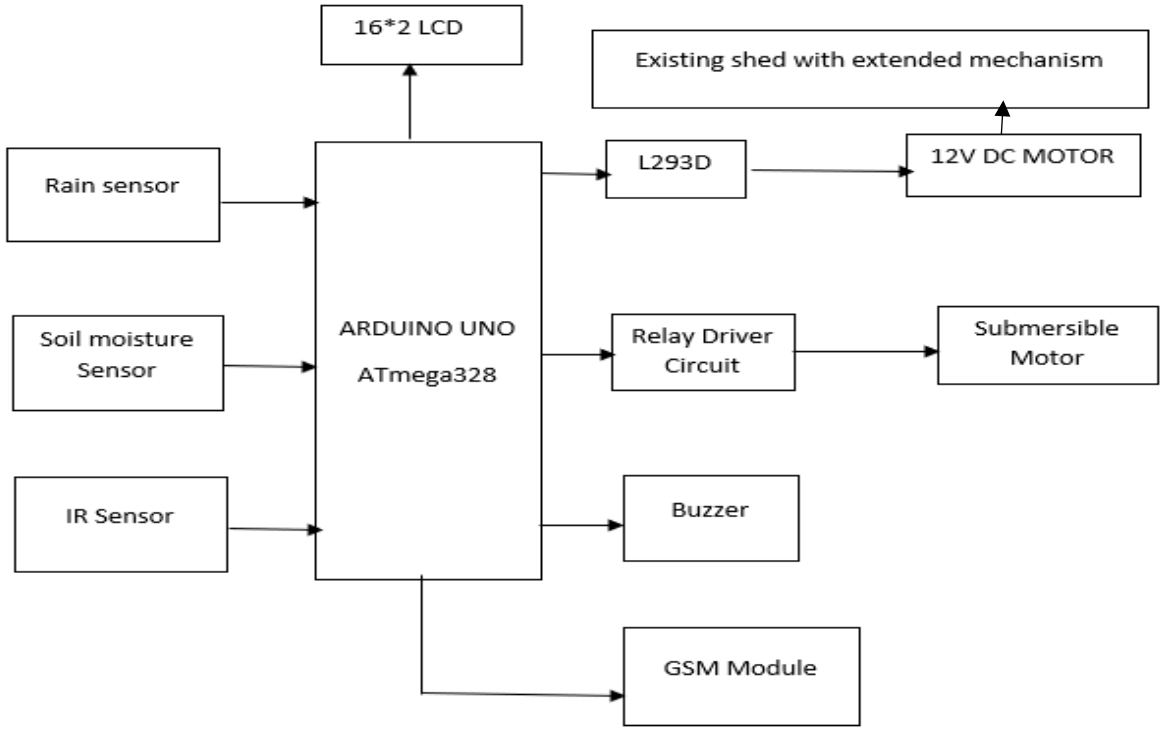

Fig. Proposed Block diagram

SYSTEM REQUIREMENTS

ARDUINO UNO

The Arduino Uno is an open-source microcontroller board. It is The Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is outfitted with sets of advanced and simple information/yield (I/O) pins that may be interfaced to different expansion boards (safeguards) and different circuits. The board has 14 computerized I/O pins (six equipped for PWM yield), 6 simple I/O sticks, and is programmable with the Arduino IDE, by means of a sort B USB link. It tends to be powered by the USB link or by an outside 9-volt battery, however it acknowledges voltages somewhere in the range of 7 and 20 volts.

Fig. ARDUINO UNO

GSM MODULE

A GSM/GPRS modem is a class of remote modem, intended for correspondence over the GSM and GPRS organization. It requires a SIM (Subscriber Identity Module) card actually like cell phones to initiate correspondence with the organization. Additionally, they have IMEI (International Mobile Equipment Identity)

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number like cell phones for their distinguishing proof. It was made to depict the conventions for second-age (2G) advanced cell networks utilized by cell phones and is presently the default worldwide standard for mobile correspondences.

Fig. GSM Module

Soil Moisture Sensor

We make use of YL-69 soil moisture sensor to measure the amount of water in soil. This sensor uses the property of electrical resistance of the soil. Here, it is used to sense the moisture in field and transfer it to micro controller in order to take controlling action of switching water Pump ON/OFF.

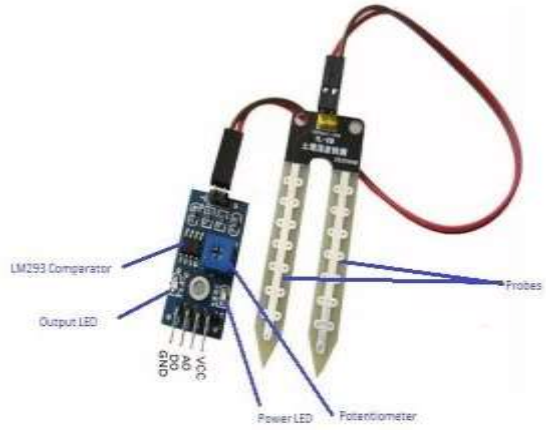

Fig. Soil Moisture Sensor

Rain Sensor

Rain sensor or a rain switch is activated by rainfall. We are mainly using FC-37 rain sensor so that when it senses rain it is able to transfer the information to the microcontroller which in turn sends the message to the farmer so that he commands to cover the crop.

Fig. Rain Sensor

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WORKING MODULE

When the power supply is switched on, the Node MCU modem gets initialized. The GSM modem communicates with the ATMEGA328P board. After the initialization, the system asks the user to select either automatic mode or the manual mode. The LCD display is connected to the ADC pin of the ARM processor, in order to display the message. The IR sensor detects for any animals around the field and sends a message to the farmer appropriately. The Rain Sensor senses the surrounding temperature of the farm. The soil moisture sensor checks for the moisture content in the soil whose maximum threshold is kept at 1000 and minimum of 300. Relay is connected to the pump which starts pumping water when the soil moisture content is less than 300 the water pump will turn ON and water the filed until the sensor measures 1000.

Similarly, when there is an unconditional rain the rain sensor closes the panel automatically to protect the crop. All the above information will be informed to the user using GSM technology.

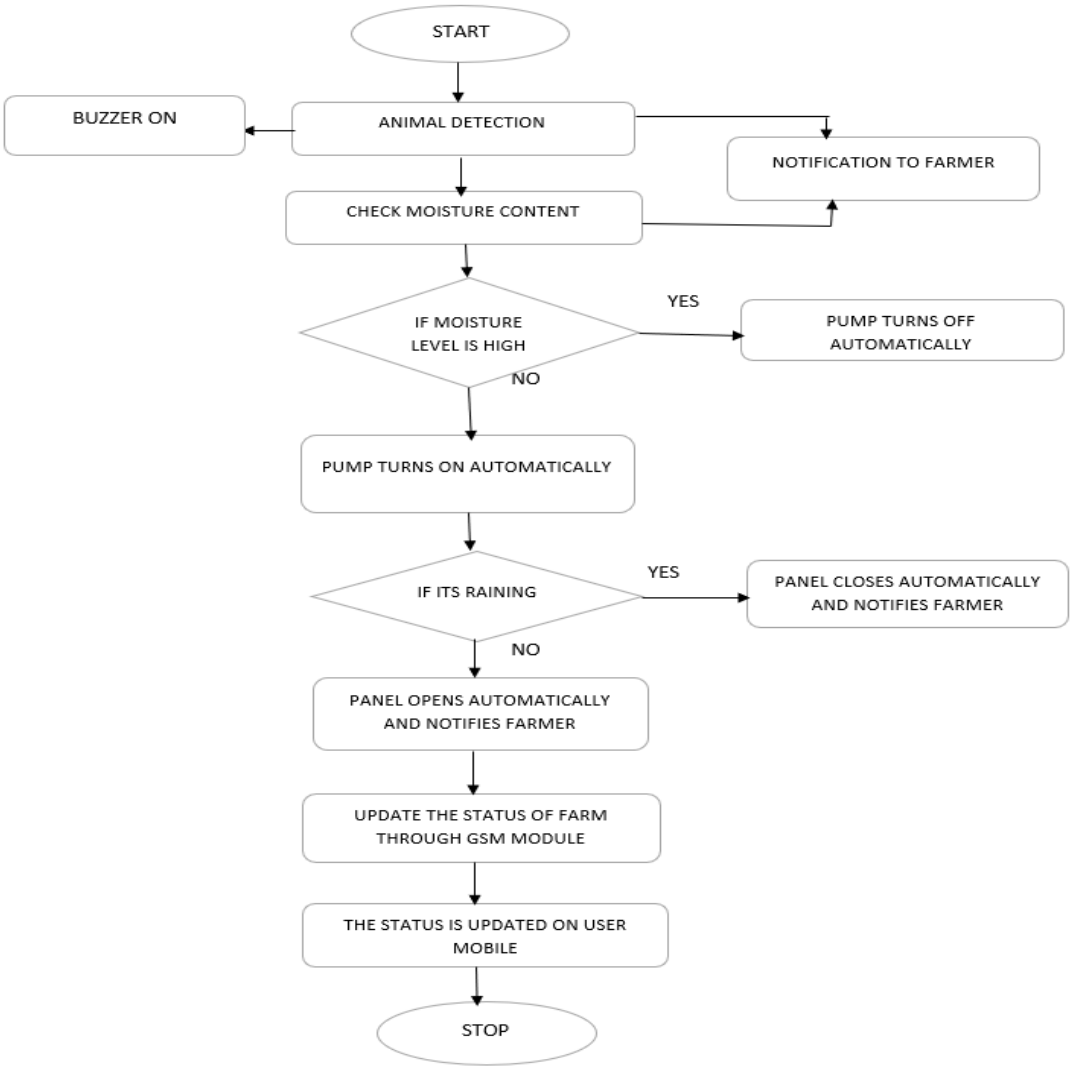

Fig. Working module

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IMPLEMENTATION

In our project we have designed a model to help the farmers in rural zones. By implementing this project we can avoid crop damage against rains and floods and as well a good yield can be achieved in farming lands. The problem of crop Protection by wild animals has become a major social problem in the current time. It requires urgent attention and an effective solution. Thus this project carries an excellent social relevance because it aims to deal with this problem. Hence we've designed a sensible embedded farmland protection and surveillance based System which is low cost, and also consumes less energy. The main aim is to prevent the loss of crops and to protect the area from intruders and wild animals which pose a major threat to the agricultural areas. Such a System are going to be helpful to the farmers in protecting their orchards and fields and save them from significant financial losses and also saves them from unproductive efforts that they endure for the protection of their fields. This System will also help them in achieving better crop yields thus leading to their economic well-being.

RESULT

The System was tested in both the extreme cases of heavy rainfall and less or no rainfall. The obtained results are as shown.
Figure 1 shows the animal detection. The IR sensor senses the intruder in the land and the information will be sent to the user in the form of SMS and will also be displayed on the LCD.

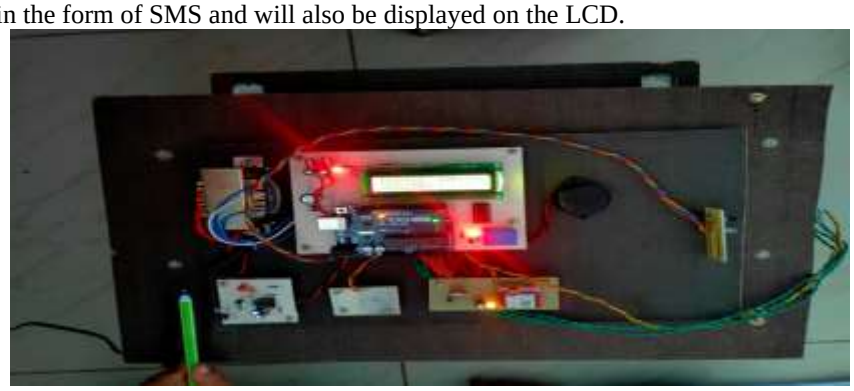

Fig -7.1: Detecting animals

Figure 2 shows the measuring of moisture level in the soil. Moisture Sensor measures the amount of moisture content in the soil. If the land is wet it indicates that the land has water then it turned OFF the water pump, if in case the land is dry, in that case the pump attached to the water storage is turned ON to water the field. and the information will be sent to the user in the form of SMS and will also be displayed on the LCD.

Fig -2:Measuring of moisture level

Figure 3 shows the opening and closing of panels to protect the crop from the rain. If the rain Sensor detects rain then the panels will get close to protect the crops from rain otherwise the panels will remain open and the information will be sent to the user in the form of SMS and will also be displayed on the LCD.

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Fig -3: Opening and Closing of panels

Fig -4: Opening and Closing of panels on field

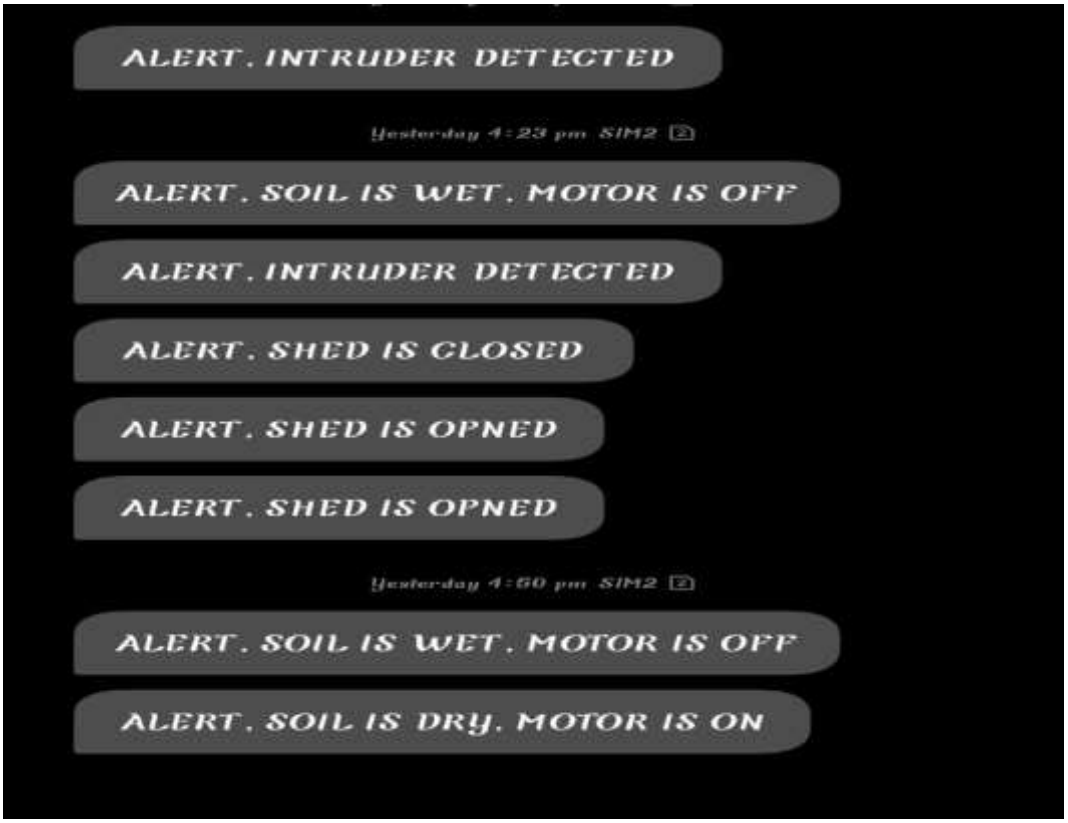

Fig.5-SMS to farmer using GSM

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Taking readings purely depend on the moisture, rain ,IR at that instant of time. Our System keeps on monitoring the conditions for regular intervals of time which is displayed on the LCD and the information will be sent to the user in the form of SMS .

CONCLUSION

In this project a model is designed to help the farmers by sending alert messages and controlling agricultural activities in the land in the presence or absence of the farmer using GSM technology by simply sending a message.

This System is integrated to track the changes accurately, happening in the field like the soil moisture content and also protect the crops from rain and animals.

The Arduino Uno and sensors are interfaced successfully and wireless communication is achieved. Also this proposed System of farming is user-friendly, cost effective and highly robust.

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