PREDICTIVE ANALYSIS OF PROTECTION OF CROPS USING WIRELESS SENSOR NETWORK

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ABSTRACT: Agriculture is the backbone of our country. Over 70% of India's revenue comes from agriculture. The objective is achieved with embedded system design using IOT technology. In this paper we are proposing the model which prevents damage of crops due to heavy rainfall and uneven rainfall using Wireless Sensor Network (WSN). WSN is a group of spatially dispersed and dedicated sensors for monitoring and recording the physical conditions of the environment, these networks are used for environmental tracking such as forest detection, animal tracking, flood detection, forecasting and weather prediction. This proposal helps to reduce the man power and saves time. The main aim is to protect the high graded crops from heavy rainfall by covering the field with a protective shield and also save the collected rain water. The saved rain water is used for feeding animals, cooking etc.

**KEYWORDS: IOT technology, Embedded technology, WIFI module, ARM7 LPC2148.**

INTRODUCTION

In the current system there is no protection of crops when it comes during natural disaster like floods, Rains as well as overheat, which in turn reduces the growth of the plant. There are many farmers who are committing suicide after their crops getting destroyed due to natural weather calamities. Now a days only there is a weather updates given to farmers through media. But there is no exact time alert or there are no such systems that can be used to protect the farmers crops. Here in this project an Intelligent System is been designed to protect the farmers crops from natural weather calamities and also there is a movable panel designed to protect the agricultural field.

During rain or any natural calamities or weather changes the sensors will be connected that will be used to detect heavy rainfall and then an intimation will be sent to the farmers using the IOT technology. Then the farmer can move the panel according to his crop requirement. In case farmers do not reply the system works in the automatic mode such that the moisture sensor that has been connected in the land detects the moisture level in the land and intimates the appropriate action required increasing the yield. The water that is falling on the panel will also be falling on the other side of the land due to the mechanism and by using

the water pump the water can be stored (Rain water Harvesting) and farmer can use it whenever there is requirement. Thus, this reduces the farmers work and saves time. The Wireless sensor network security protocol is used for sensor data protection must be efficient and fast.

SYSTEM REPRESENTATION AND HYPOTHESIS
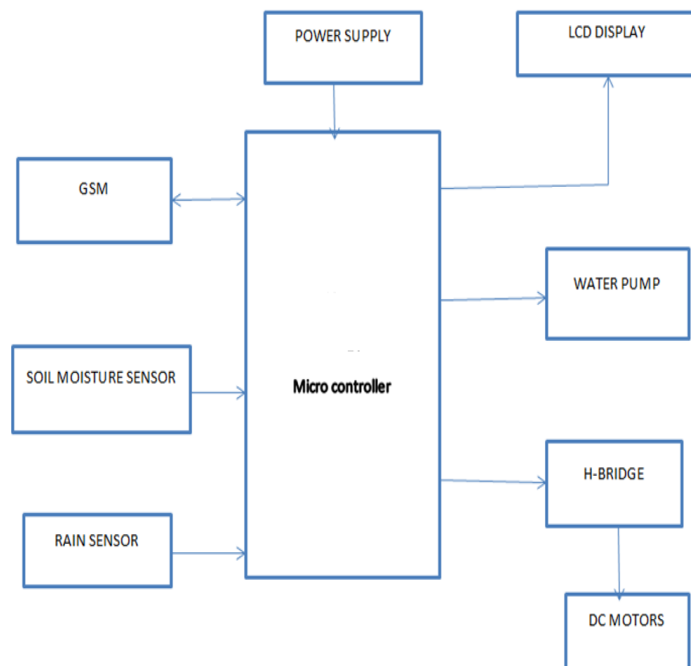
Block Diagram

Micro controller: A compact integrated circuit which mainly consists of processor, memory and input/output (I/O) peripherals on a single chip so as to govern a specific operation on embedded system.

GSM Modem:

The acronym of the GSM modem is Global System for Mobile Communications, it is a wireless communication module used to make a computer or any processor to communicate over a network. The GSM module receives the signal using ICMAX 232 thus microcontroller is enabled. The microcontroller is used to control the operation using the GSM technology which further helps the farmer to control the operation from remote areas.

Sensors: It is a device used to respond to a physical stimulus such as heat, motion, temperature etc. and it transmits a resulting impulse.

Rain Sensors:

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.The rain sensor module includes nickel coated lines and it works on the resistance principle.This sensor module permits to gauge moisture through output pins & it gives a digital output while moisture threshold surpasses. This sensor is used as a water preservation device and this is connected to irrigation system to shut down the system in the event of rainfall. Thus, this sensor can also be used for guarding the internal parts of the automobile against the rainfall.

Soil Sensors:
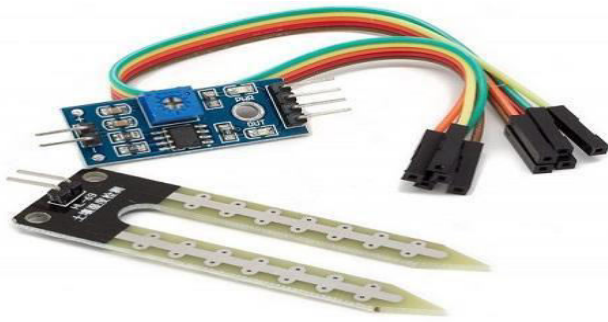
Soil is one of the most important natural resource just like another resource alike water or air. For monitoring the health of any particular soil we use soil moisture sensor. Soil moisture sensor or volumetric water content sensor is used to measure the water content in soil, and can be used to estimatethe amount of storedwater in a profile, or how much irrigation is required to reach a desired amount of saturation. These sensors can be mobile and used for instant measurements or installed for long-term monitoring which helps farmers to get the notification easily and helps to protect their crops from getting damaged. Thus, the soil sensors can be used for agricultural purposes, landscape irrigation, department of research and also helps in gardening purposes.

Temperature Sensors:
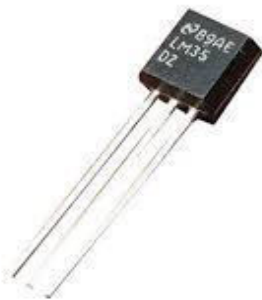
The most commonly measured physical parameter is temperature whether it is used in any industrial work or in any laboratory system. For exact measurements it needs for many applications such as medical applications, materials research in labs, studies of electronic, biological research etc. Thus, temperature sensors are used to measure temperature in circuits which control a variety of components. With the help of this sensor the temperature as well as the humidity quotient of soil can be measured and this can easily be notified to the farmers so as to protect the crops from getting excess of humid.These are used for measuring the engine oil temperature and engine bearing temperature types. Also, these are used in the heating control systems for some buildings where temperature control are controlled by using of switch on or off.

LCD Display:

The Liquid Crystal Display is an electronic display module which is used to produce a visible and clear image for any particular text. The 16*2 LCD is a very basic module commonly used in circuits. It translates a 16 display characters per line in **2** such lines. In this each LCD character is displayed in a 5×7 pixels matrix which is highly useful. Thus, it is very commonly used in CD Players, DVD players, Computers and also in digital watches etc.

DC Motor:

A DC motor is a direct current motor which is basically used for the one flow of current i.e. one direction flow motor. It converts the dc energy to mechanical energy. It can be of either 5V or 12V. Comparatively 12V is better as it takes both inputs i.e. electrical as well as mechanical. Thus it is more durable and reliable than 5V. Commonly DC motor is used in boring, fans, shapers etc.
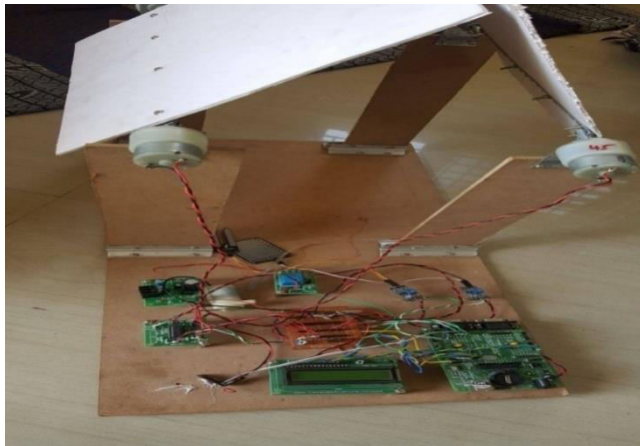
Experiment

The purpose of the ARM7 processor is to connect all the components associated with the project kit. Number of pins in ARM7 processor is 64. Each pin is assigned with particular component of the kit for performing particular function. The threshold value of the sensors is set in LPC 2148 processor which is responsible for the automatic ON and OFF of the motor which is coupled with the pump for pumping water to the agricultural land. temperature sensors use amplifier that converts absolute temperature(measured in Kelvin) into either Fahrenheit or Celsius depend on it configurations.. The humidity sensor measures the moisture level in the soil. The threshold value is reached (1 RH%-100 RH%) this limit can be set in the microcontroller if its goes above beyond 10 RH% conditions will be abnormal. The values can have

updated to system through IoT gateway. The features of humidity sensor are Excellent linearity, low power consumption, wide measurement range, quick response, anti-pollution, high stability, high performance price ratio. Water level indicator is used to measure the water level in irrigation land. In the water level sensor value measure by using scale level and it is represented in centimeter. If the water level reaches the bottom of the metal rod it indicates abnormal condition and the control will automatically turn ON, the motor. If the water reaches the certain level the motor can be turn OFF automatically. Wi-Fi module suitable for adding Wi-Fi functionality to an existing microcontroller project via a UART serial connection. The module can even be reprogrammed to act as a standalone Wi-Fi. IoT requires 3.3V power. It will automatically configure IP addressing DHCP (Dynamic Host Configuration Protocol). Each IoT module has the unique ID (Device Identification). In the development stage itself they integrate code for transmitter and receiver operations such that gather data from multiple sensors by using microcontroller and these values can be send to the IoT modules. These statuses can be continuously updated to the system using IoT. The Internet of things (IoT) is the internetworking of physical devices, vehicles, buildings and other items embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. These devices collect useful data with the help of various existing technologies and then autonomously flow the data between other devices. Small amount of rain is always good for crops, the system collects information from above devices. Incase of heavy rainfall, the farmer sends message or signal to start the operation. As the GSM module receives the signal, microcontroller is enabled. The first operation of microcontroller is to activate the DC

motor in such a way that it starts rotating in clockwise direction. When DC motor starts rotating in clockwise direction crops are protected by Double coated polythene sheet. When the rain stops, DC motor starts rotating in anticlockwise direction, so that crops are uncovered by Double coated polythene sheet so that crops are exposed to sunlight. The water is collected and water is pumped in tank through water pump. Later the water from tank is used for irrigation.

Results

Front view of experimental setup
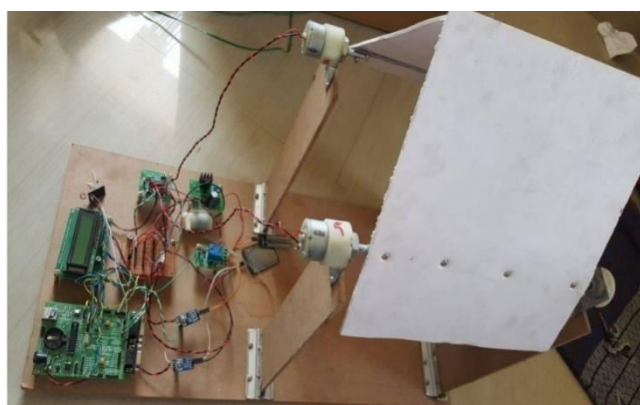
Side view of the model

1.Protection of crops against rain and adverse weather conditions.

2.Intelligent Sensor based switching

3.Automatic intimation to farmers

4.Improvingefficiency,productivity and profitability of crops.

5.Rain water harvesting.

CONCLUSION

By the implementation of the paper we can avoid damage of crops from heavy rainfall. The wireless sensors that are used helps the farmers to get an intimation in case of heavy rainfall. By the use of the IOT technology a good yield can be achieved in farming lands. By the use of solar roof tops instead of normal panels there will be generation of energy from it and same can be used for agricultural activities.

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