Smart Irrigation for Digital Village with SMS Alert

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Abstract: In this system, the most important point of the design is to make a smart irrigation system that would be very beneficial for every farmer across our country and the whole world for agricultural purposes. To become a grand success of the embedded system operation their entire system was empowered by a microcontroller called Arduino UNO which holds up the entire operation to operate. The system monitor soil moister condition 24 hours through a soil moister sensor to check out the volumetric water content of the soil to irrigate timely according to the threshold of the sensor and not even merely the system it performs monitoring of soil condition not only this it also work smartly like a smart scarecrow through IR sensor while it gets interrupted it make alert and also call up to the user to through GSM module and along with buzzer to alarming agriculture field from preventing wild animals along with thief. Last crucial thing is that whatsoever the embedded system is carried out at work fields all the current data that is sanded out to the user through SMS by GSM module.

KEYWORDS: Microcontroller, GSM Module, Soil Moisture Sensor Module, Hardware.

I. INTRODUCTION

The smart irrigation system is one of the best irrigation systems which would be sought after in future because of the following crucial features added of the benefits:

1. It irrigate automatically according to the volumetric water content of the soil through soil moister sensor.
2. It sends out current operation data to the user through SMS by GSM module.
3. The system it work like a smart scarecrow because there where install a number of IR sensor around the field so, once an object come under the range of the sensor it detect and alert user by calling up their phone and alarming the buzzer.
4. It reduces manpower on workplace.
5. It prevent from wasting of water.
6. It always monitors soil moister condition.

II. LITERATURE REVIEW

Ashwini B.V smart irrigation system IOT for Surveillance of Crop field.

This project is focuses onto conservation of water by monitoring soil moister condition, temperature and air moister through different sensors used by driving microcontroller. It's not even work out just for an automatic irrigation but instead it work out like a smart by watering the plant automatically through their soil moister condition and by sending whatever work it operation on work field all the data is to sanded out to the user through Bluetooth module.

Dr. Jegathesh Amalraj, S. Banumathi, J. Jereena John Smart Irrigation Systems for Agriculture Using IOT.

The project it focuses on Economic development of country's GDP. We all know that agriculture is a imperative for human life survives so, according to this the project was prepare for ramp up of food production through smart irrigation system by conserving wastage of water by using technology. So, the entire project would work out smartly based on IOT.

M.Sowmiya Manoj and B.Hemalatha are the authors. Irrigation is controlled by a microcontroller and is based on pressure.

The major goals of this initiative are to eliminate human intervention and provide enough water without wasting it. To restrict the entire project, an 8051 series microcontroller was used, which was programmed to take input signals of varying moister conditions from the soil moister sensor, which is how the complete project works on Automatic Irrigation.

UNVP Rajendranath, Dr. V. Berlin Hency Smart Irrigation System,

This project is a smart irrigation system that uses several sensors. The goal of this article is to construct an automated irrigation system utilising sensors that are connected to the microcontroller DHT11 sensor and the soil moisture VH400 sensor. These sensors are connected to the microcontroller, and their main sensor unit is positioned beneath the root zone of the plant to collect soil data and send it to the controller, allowing for smart irrigation. The SIM900A module, which is also connected to the microcontroller, is used to send SMS.

C.Premalatha, Smart Irrigation System Using IOT, Automatic.

The project's major goal is to create an automatic irrigation system that will save a farmer time. The use of automated irrigation technology reduces the need for human involvement. When the humidity of the soil changes, a sensor detects the change and automatically irrigates the field utilising a common technology known as the "Internet of Things."

Mr. Dhanaji Baravade, Mr. Mayuri Mali, and Miss Simran Mulla, please

This project focuses on replacing the old drip irrigation system with an automatic irrigation system that would assist farmers who were experiencing irrigation and manpower issues in their work fields by using advanced electronic gadgets that would send an SMS to the user via the GSM module.

Smart Irrigation System Using Soil Moisture and Weather Prediction, by Dr. S. Velmurugan.

The goal of this project is to develop an open-source technology-based smart system that can estimate a field's irrigation needs by sensing ground parameters like as soil moisture, soil temperature, and environmental factors, as well as weather forecast data from the Internet.

METHODOLOGY (PART III)

The smart irrigation system can be simulated in two ways, using both hardware and software:

HARDWARE: Accumulate all the hardware as per the requirements and connect all devices according the Arduino sketch and diagram so, we connect first soil moister sensor pin A0 to the Arduino pin no A2 here we used analogue pin in this system similarly connect others hardware IR sensor out pin to the Arduino pin no 10, connect the two relay to the Arduino pin 13 and 3 which it control as a switch of water solenoid valve and buzzer once the two sensor get interrupt respectively. Connect I2C 16*4 LCD display unto pin SDA to Arduino pin no A4and SCL to Arduino pin no A5 wherein all the operation would showcase on this display of the system. Last connect GSM module which it take a crucial part for the purpose of connectivity to the user. Connect the GSM pin TXD to Arduino pin no 1 and RXD pin to Arduino pin no 0. During the installation of the GSM module there were need to do some set up to establish communication between Arduino by AT commands to send SMS to the provided mobile number. Connect the number of Vcc and GND of the connected devices via breadboard and to the Arduino.

SOFTWARE: To doing this simulation on software the smart irrigation system which we were prefer Proteus 8 software so, during the simulation we encountered number of difficulties because there will not get required library for the simulation and so on. So, we short out eventually by stick to it somehow by applying different method first step was by download the required library on Google and add to Proteus library. So, before simulating the system first we accumulate all the virtual devices on worksheet and we connect almost each pin likewise to the hardware. To doing simulation onto software and hardware there where a vast different between them like to giving process of Vcc and GND to the virtual devices and we gave it to the devices as per to the requirement. If we are talking about hardware there was no need to put hex file onto the hardware just we need to upload the cod merely but in the case of software there were need to put hex file to each devices whatever there were used for simulation like soil moister sensor, IR sensor, GSM module and Arduino UNO. To tasting the system the sensor need to give interrupt so, we used potentiometer. Last crucial thing is that the connectivity between GSM module and user is that Virtual Terminal which is a tool used to view data coming from Serial port.

IV. MODELING AND ANALYSIS

LIS OF COMPONENT USE FOR SMART IRRIGATION SYSTEM

1) Arduino UNO
2) GSM module
3) I2C 16*4 LCD
4) Water Solenoid Valve
5) IR Sensor
6) Relay Module
7) GSM Module

Arduino UNO: Arduino.cc developed an open-source microcontroller board based on the Microchip ATmega328P microcontroller. The board has a number of digital and analogue input and output pins that can be used to connect to expansion boards and other devices. The board features 14 digital input and output pins, six of which can be used for PWM output, and six analogue input and output pins. It can be programmed using the Arduino IDE and a type B USB connector. It can be powered by a USB cable or an external 9-volt battery, with voltages ranging from 7 to 20 volts. It's similar to the Arduino Nano and Leonardo microcontrollers.

GSM module: A GSM module is a physical device that connects to a remote network using mobile phone technology. They are substantially equivalent to a typical mobile phone in the eyes of the mobile phone network, including the necessity for a SIM to identify them to the network. So, in this project, we'll be using a GSM SIM800L module, which is a tiny cellular module that can transmit GPRS data, send and receive SMS, and make and receive voice calls. This module's low cost, small footprint, and quad band frequency capabilities make it an ideal choice for any project requiring long-range connectivity.

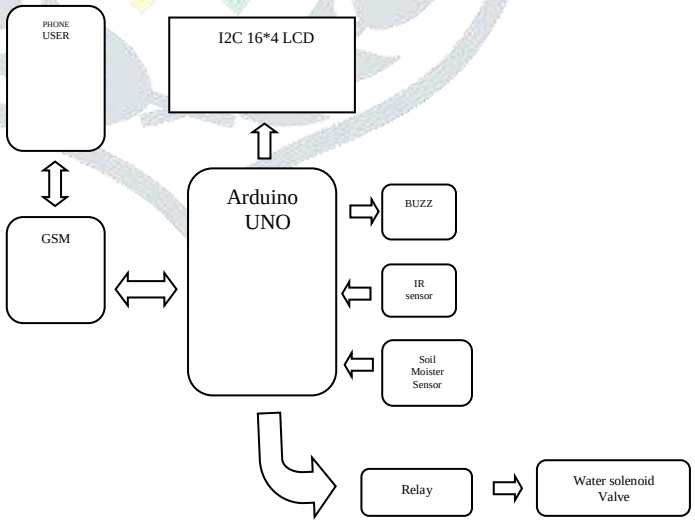
A Soil Moisture Sensor is a low-cost electrical sensor that detects the moisture content of the soil. The volumetric content of water within the soil can be measured with this sensor. The Sensing Probes and the Sensor Module are the two primary components of this sensor. The probes allow current to pass through the soil, and the resistance value is calculated based on the moisture content of the soil. The Sensor Module collects data from sensor probes, processes it, and converts it to digital and analogue outputs. As a result, the Soil Moisture Sensor may produce both digital and analogue outputs. The soil moisture sensor is a sensor that analyses soil moisture content in the active root zone before each scheduled irrigation event and is coupled to an irrigation system controller.

An infrared sensor is an electrical device that emits infrared light in order to detect certain features of its environment. An infrared sensor can detect motion as well as measure the heat of an item. These types of radiations are undetectable to human sight, but an infrared sensor can detect them. The emitter is a simple infrared led, and the detector is a simple infrared photodiode that detects infrared light of the same wavelength as the IR led. When infrared light strikes the photodiode, the resistances and output voltages change in response to the intensity of the IR light.

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of radiations are invisible to our eyes, which can be detected by an infrared sensor. The emitter is simply an IR led and the detector is simply an IR photodiode that is sensitive to IR light of the same wavelength as that emitted by the IR led. When IR light falls on the photodiode, the resistances and the output voltages will change in proportion to the magnitude of the IR light received.

Electrical energy is converted to mechanical energy by solenoid valves, resulting in a magnetic response. When an electrical current passes through the wire coil, the solenoid activates.

V. BLOCK DIAGRAM



V. BLOCK DESCRIPTION

The Arduino UNO block is the main block that executes all of the operations of the Arduino UNO hardware, which is a microcontroller capable of executing all hardware.

When an Arduino UNO is turned on to do its function, the sensor checks the status of the soil moister using variable resistance, which means the resistance is inversely proportional to the soil moisture content on the soil:

1. The more water in the soil, the better the conductivity and the lower the resistance.

2. The lower the water content in the soil, the worse the conductivity and the higher the resistance.
3. The sensor generates an output voltage based on the resistance, which aids in the determination of soil moisture levels.

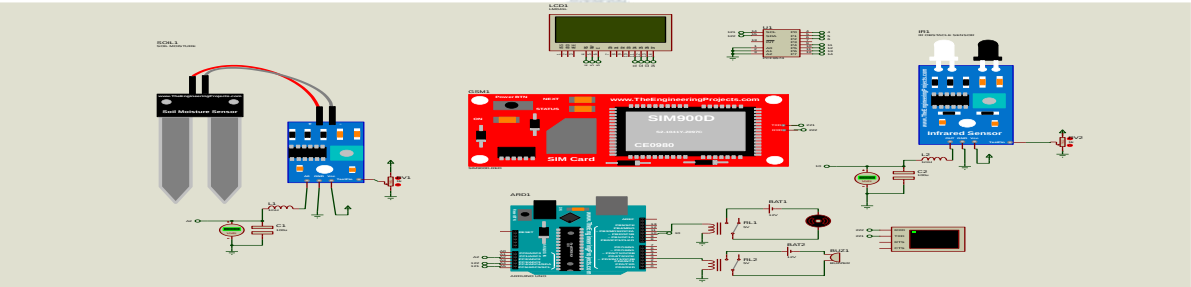
Relay and water solenoid valve block diagram: A relay is an electronic switch in this water solenoid valve that becomes active when the water level falls below a certain level, causing the relay to activate and turn on the water solenoid valve until the soil moisture sensor's threshold is met.

Diagram of a block IR sensor and Buzz: In this embedded system, the IR sensor acts as a smart scarecrow, detecting and sending interrupts to the microcontroller anytime a moving object enters within range of the IR sensor. When the microcontroller receives an interrupt, it turns on the alarm.

GSM module and phone blocks: These two blocks play a critical role in providing dependable connectivity between users and agricultural fields in these systems.

I2C 16*4 LCD Block: Ii is an electronic device that is used for showing on electronic devices, and it is also used in this system for displaying the entire internal operation of their system.

IV. RESULTS



The smart irrigation system was made possible by the employment of various electronic devices, and their name suggests that "smart irrigation system" is all about the reason that substantial and specialized gadgets were utilized to wisely constrain the complete system. The soil moisture sensor, IR sensor, and GSM module all play important roles in making this embedded system work. We are ecstatic to be working on this smart irrigation system since we are able to play a small part to preventing farmer's problems, such as water scarcity, by irrigating efficiently without wasting water. The second is a smart scarecrow that protects crops from wild animals, and the third is a smart scarecrow that provides GSM communication between the user and the farm area.

V. CONCLUSION

In this current era if we are comparing our lifestyle as before due an advanced technology today it's change our lifestyle drastically. Likewise to the smart irrigation system if we are compare their system it has been upgrading their system day by day adding bit of extra features unto the system which means it keep up with our today's advanced technology with paralleling. So among the upgrade version today it is also the one of them which is come under the upgrade version. The main advanced features added in this smart irrigation system is that there were added an IR sensor and GSM module which it work out smartly by alerting users via call phone and alarming people near work field through saurian. Along with it the smart irrigation system which it work out like a trustworthy security by surveillances the work field all the time with free of cost. The greatest advantage of using the smart irrigation system is that it increase food production and give proper protection of the food.

V. ACKNOWLEDGMENT

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