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SMART IRRIGATION USING ARDUINO & GSM

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Abstract

The farm, we are depending on the rain water.Today we are living in 21st century where automation is playing important role in human life. But from the last few years there is uncertainty in the falling of the rain. Therefore the efficient So all the things are done with the help of automation.Sixty Percent people of our country are doing agriculture and for the irrigation water management and also the smart irrigation is needed. We have planned one low cost smart irrigation system with help of wireless sensor network which is cost effective and a middle class farmer can use it in farm field.This paper focuses on the effective irrigation and prevention of water wastage in uncontrolled irrigation.New irrigation electrical control technologies could improve irrigation efficiency, promoting waterconservation and reducing the environmental impacts. The objectives of this project were to avoid wastage of water and increase irrigation efficiency by using a PLC based irrigation system with the help of soil moisture sensor, water level sensor, and GSM controller. It also improves the traditional irrigation system enabling the irrigation system to have high efficiency and low water usage. The existing irrigation system is tedious, time consuming and very wasteful in water usage. This PLC based sprinkler irrigation system gives the best feature than the traditional one.

Index Terms: *LM 35 Sensor,Arduino,GSM Module, etc.*

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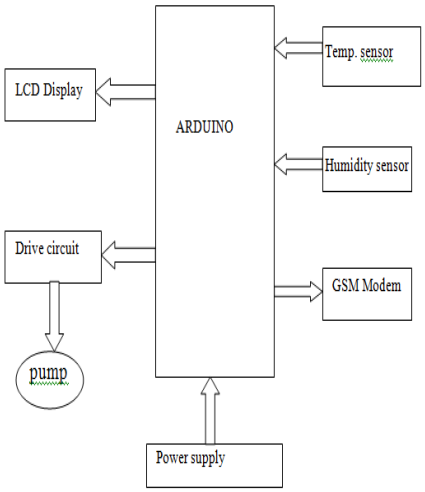
1. INTRODUCTION

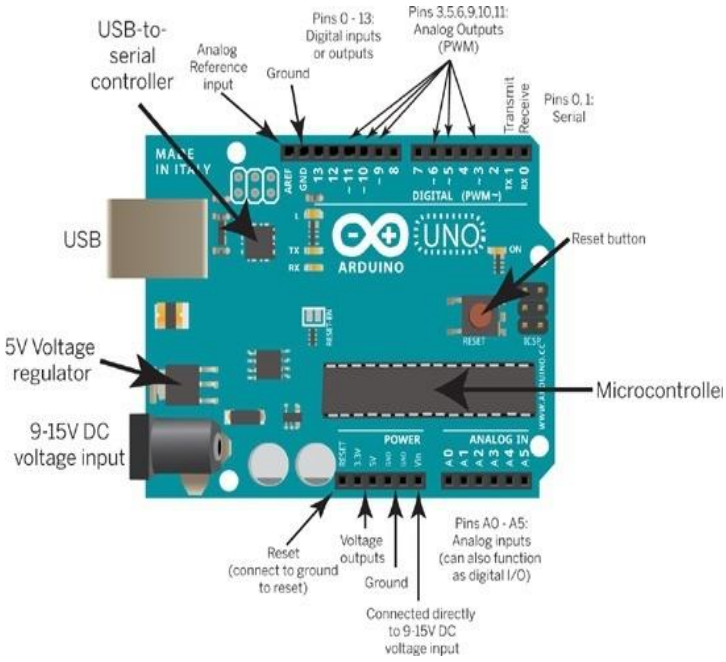
Agriculture started at least 10,000 years ago, but no one knows for sure how old it is. The development of farming gave rise to the new revolution whereby people gave up the migration for food and settled in particular areas that became cities. Irrigation is a scientific process of artificially supplying water to the land or soil that is being cultivated. Traditionally in dry regions having no or little rainfall water had to be supplied to the fields either through canals or hand pumps, tube wells. But this method had severe problems such as increase in workload of farm labor and often it lead to problem such as over-irrigation or under-irrigation, and leaching of soil.

The rainfall of some countries dependent on the monsoons. Rainfall controls agriculture. But the agriculture is said to be, "the gambling of the monsoon" as the monsoon rainfalls are uncertain, irregular and uneven or unequal. So irrigation is essential for agriculture. The following are the primary reasons of irrigation. (1) About 80 per cent of the total annual rainfall occurs in four months, i.e. from mid-June to mid-October. So it is essential to provide irrigation for production of crops etc, during the rest of the eight months. (2) The monsoons are uncertain. So irrigation is necessary to protect crops from drought as a result of uncertain rainfall. (3) It does not rain equally in all parts of the country. So irrigation is necessary for agriculture in less rainfall areas. (4) Soils of some areas are sandy and loamy and therefore porous for which a major portion of rainwater sinks down very quickly. So, sandy and loamy soils can't retain water like the alluvial soil and the black soil. That is why irrigation is essential for farming in the areas having, sandy and loamy soils.(5) The rain-water flows down very quickly along the slopes of hillsides. irrigationis necessary to grow crops in such areas. The water available in wells, lakes

2. BLOCK DIAGRAM& ITS DESCRIPTION



ARDUINO CONTROLLER



The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial port.

2. COMPONENT & DESCRIPTION

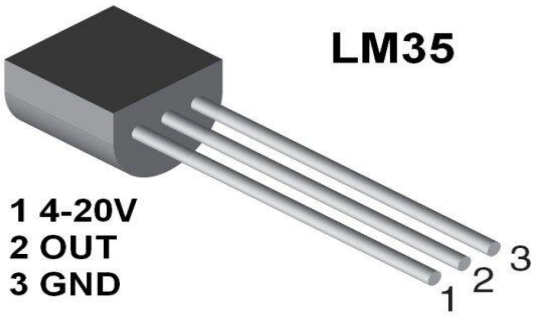
Humidity Sensor

The 10HS humidity sensor is measures the dielectric constant of the soil in order to find its volumetric water content . Since the dielectric constant of water is much higher than that of air or soil minerals, the dielectric constant of the soil is a sensitive measure of volumetric water content.

The 10HS has a low power requirement and very high resolution. This gives you the ability to make as many measurements as you want over a long period of time with minimal battery usage.

Fig No. 3 Humidity Sensor

TEMPERATURE SENSOR



LM35 Temperature Sensor

The LM35 series are precision integrated-circuit temperaturesensors, whose output voltage is linearly proportional to theCelsius (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 Centigradescaling. The LM35 does not require any externalcalibration or trimming to provide typical accuracies of ±1⁄4°Cat room temperature and ±3⁄4°C over a full −55 to +150°Ctemperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance ,linear output, and precise inherent calibration make

Interfacing to readout or control circuitry especially easy. Itcan be used with single power supplies, or with plus and minus supplies. As it draws only 60 µA from its supply, it has very low self-heating, less than 0.1°C in still air. The LM35 is rated to operate over a −55° to +150°C temperature range, while the LM35C is rated for a −40° to +110°C range (−10°with improved accuracy). The LM35 series is available package

3.4 GSM Module(GSM900)

GSM network is divided into 3 major system, the Switching subscriber related function. The base station subsystem is the section of a traditional cellular telephone network which is responsible for handling traffic and signaling between a mobile phone and a network switching subsystem. The BSS carries out of Transco ding of speech channel s to phone s, paging, transmission System , Base Station System and Operation and Support System. Switching system is responsible for call processing and reception over the air interferences and many other task related to the radio network. Bus transceiver section or, BTS, contains the equipment for transmitting and receiving radio signals, and equipment for encrypting and decrypting communication with the base station controller .

Fig No. 6 GSM Module

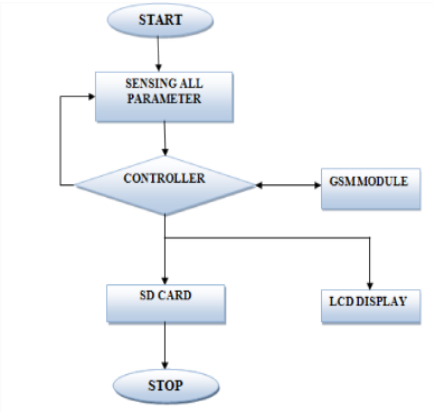
3.5 Display Unit

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. 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. The data is the ASCII value of the character to be displayed on the LCD.

Click to learn more about internal structure of a LCD.

Fig No. 7 Display

3.6 Flowchart



4.ADVANTAGES

A. SAVE WATER:- studies shows that this type of automated irrigation system consumes 40-50% less water as compared to the traditional system

B. IMPROVE GROWTH:- ideal growth condition is been provided when small amount of water is been applied over large amount of time. This smart irrigation system extends watering time for plants, and provides ideal growth condition.

C. SAVE TIME:- in this sprinklers moving and setting is not required hence it saves time and timer delay as per the environmental condition can be added for automatic watering Adaptable: this smart irrigation system can be adjusted and modified according to the changing environment.

D. SIMPLER METHODE:- it is simple to operate it starts by designing the map of your garden and marking the location of planting. Then the required distance is been measured for length of plastic tubing so that the desired area can be r

5.DISADVANTAGES

1. Excessive seepage and leakage of water forms marshes and ponds all along the channels. The marshes and the ponds in course of time become the colonies of the mosquito, which gives rise to a disease like malaria.

2. Excessive seepage into the ground raises the water-table and this in turn completely saturates the crop root-zone. It causes waterlogging of that area.

3. It lowers the temperature and makes the locality damp due to the presence of irrigation water.

4. Under irrigation canal system valuable residential and industrial land is lost

5. The soil, which must be used to convey the water over the field, has properties that are highly varied both spatially and temporally

6.CONCLUSION

This type of system requires less man power for operation. The water is been supplied by the system only when the soil humidity goes below the reference level. The soil ratio at the root zone is been maintained constant at some extent by providing direct transfer of water to the roots which further result in less water consumption. The system helps minimizing the overall watering and crops production cost .The automated irrigation system that will be implemented would be feasible and cost effective for optimizing water resources for agricultural production. The system would provide feedback control system which will monitor and control all the activities of drip irrigation system efficiently. This irrigation system will allow cultivation in places with water scarcity thereby improving sustainability. Using this system, one can save manpower, water to improve production and ultimately increase profit.

Integration of additional monitoring devices such as a Wi-Fi camera to monitor growth of agricultural product

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