

Smart Irrigation System Using Bluetooth Module and arduino

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ABSTRACT

Agriculture is the backbone of Indian economy. It ranks among top five countries globally in the production of agricultural products. About fifty percent of Indian population depends on agricultural sector to meet their day-to-day expenses. the current irrigation system practiced in India are sprinkler water irrigation, tank water irrigation, inundation irrigation etc these irrigation methods are less efficient as they do not scatter to the requirement of the moisture level of soil and do not make efficient use of water resource. In future, as population increases, demand for food crops increases which eventually results in depending on water resource on a large scale. Currently, India requires technological up gradation to meet the demand for irrigation purpose. The smart irrigation system enables efficient utilization of water as soil is constantly monitored with the help of moisture sensor and based on the readings crop is irrigated with the help of motor. This is done using the IOT technology. Main ideology behind this project is to reduce human intervention and efficiently make use of water. This is made possible by sending the received data to the android device using Bluetooth technology using Bluetooth module. The entire System is controlled and executed by Arduino Uno Board microcontroller.

Keyword: - economy, sprinkler water irrigation, Smart Irrigation system, Moisture Sensor, Arduino Uno Board, Bluetooth module, microcontroller, android device, IOT.

1. INTRODUCTION

India's major source of income is from agriculture sector as it adds to 14.6% of GDP and about 55% of employment. Agriculture is the backbone for India's Economy. Since most of the cultivable land in India receives very moderate amount of rainfall, it is not possible to depend on the rainfall for irrigating the crops. Hence Irrigation plays a vital role in maintaining the moisture content of the soil for crops to grow. Various methods such as sprinkler irrigation, surface irrigation, localized irrigation, drip irrigation is currently used to irrigate the fields. But in current scenario water scarcity proves to be a major hurdle in employing these methods. Moreover, Power supply in various parts of India is irregular i.e; power cuts are quite often and can exist for hours. When the motor is switched on and after a while if the motor is not switched off, it results in huge amount of loss of water and also there is possibility of loss of crop yield. Hence to prevent such situations and to meet the future demand advanced technology must be equipped along with the current methods to efficiently utilize the water resource and increase the crop yield. Also with less human intervention we can ensure that labor work is reduced as well. The project mainly focuses on efficient use of water and to boost the cultivation in order to increase the economy.

The Internet of things has currently gained immense popularity as it has proved to be highly efficient in solving day-to-day problems. IoT allows exchange of data without human intervention as this ensures that data is highly secured. This enables efficient communication and faster access to huge amount of data. Today, Internet of things is focusing primarily towards agriculture sector to ensure that farmers solve their issues they face. This enables

farmers to utilize the technology to meet the increasing demand and to efficiently make use of adequate resources available.

The System is an IOT enabled Technology, where the moisture sensor constantly monitors the moisture level. The Arduino board plays the role of a microcontroller where it is coded to accept the readings of the sensor as input. Based on the constraints in the coding specified, the motor is either switched on or off. Meanwhile, the readings are continuously transferred to the smart phone using Bluetooth module linked to the arduino.

1.1 LITERATURE SURVEY

This system is used to monitor the moisture content of the soil using soil moisture sensor. The data collected from the sensor are sent the user's mobile using the Bluetooth connection between the arduino board and the mobile. The Bluetooth connection is made possible using the Bluetooth module.

Nikesh Gondchawar et al., [1] proposed work on IoT based smart agriculture. In this system the sensors are places in the agricultural field. The data from the sensors are collected through internet.

Rajalakshmi P.et.al., [2] described to monitor the crop-field using soil moisture sensors, temperature and humidity sensor, light sensor and automated the irrigation system. The irrigation is automated if the moisture and temperature of the field falls below the brink. In greenhouses light intensity control can also be automated in addition to irrigation. The notifications are sent to farmers' mobile periodically.

Tanmay Baranwal et al., [3] this project concentrates security and protection of agricultural products from attacks of rodents or insects in the fields or grain stores.

M. N. Umeh et al., [4] this paper concentrates on controlling the irrigation system using the microcontrollers. The microcontrollers examples are arduino board.

B. N. Getu et al., [5] this paper proposed that how the DTMF technique can be used to control the agriculture pump system remotely.

2. PROPOSED SYSTEM

The proposed system consist of moisture sensor, Arduino board, smart phone, Bluetooth module, d.c. motor, laptop. The soil is irrigated as and when required by constantly monitoring the moisture level.

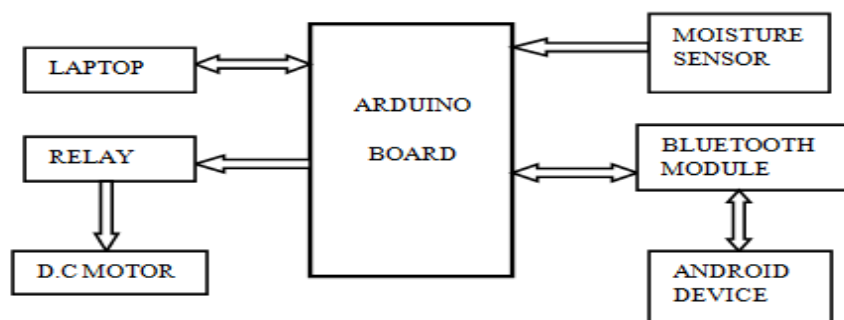


Fig -1:proposed system design

2.1Component description

Arduino Uno Board : The Arduino is an open source computer hardware and software and user-community. It is a single board microcontroller. It has 14 digital input/output pins, 6 analog inputs, 16 MHz quartz crystal, USB connection, a power jack, an ICSP header and a reset button. Connect the board to the system using USB. Arduino Software(IDE) is used to code the microcontroller.



Fig -2: Arduino Uno Board

Soil Moisture Sensor: Moisture sensor estimates the level of water content in the soil by measuring the dielectric permittivity of the soil. The sensor contains on board LM393 comparator, power indicator LED and digital switching indicator.



Fig -3: Soil Moisture Sensor Module

Bluetooth Module: The Bluetooth module HC-05 is a master/slave module. The data collected by the moisture sensor is transferred to the android application in the smart phone via Bluetooth technology using this module. It works on serial communication.



Fig -4:Bluetooth Module

3. IMPLEMENTATION

In the Arduino IDE the code is specified to evaluate the readings taken by the moisture sensor.

```

#include<SoftwareSerial.h>
SoftwareSerial BTserial(0,1);

void setup() {
  // put your setup code here, to run once:
  BTserial.begin(9600);
}

void loop() {
  // put your main code here, to run repeatedly:
  int sensorValue=analogRead(A0);
  BTserial.print(sensorValue);
  delay(100000);
}

```

Fig -5:Code snippet of Arduino IDE

The sensor is connected to the GND port, Analog pin(A0) and (V1) port. Bluetooth module is connected to the GND port and 5V supply port, digital ports 0 and 1. The USB cable is connected to the Laptop i.e; Arduino IDE. Connect the single port relay to the arduino board and connect the d.c. motor to the relay. The reading from the sensor is read through the analog pin of arduino and is transferred to the Bluetooth terminal HC-05 application in the android device through Bluetooth technology. Based upon the readings, the end-user can switch on or off the motor from the android device.



Fig -6: Project setup

Table -1:moisture level

Moisture level	Motor Applications
1000	ON
980	ON
870	ON
550	ON
300	ON
250	OFF
230	OFF

112	OFF
70	OFF
40	OFF
0	OFF

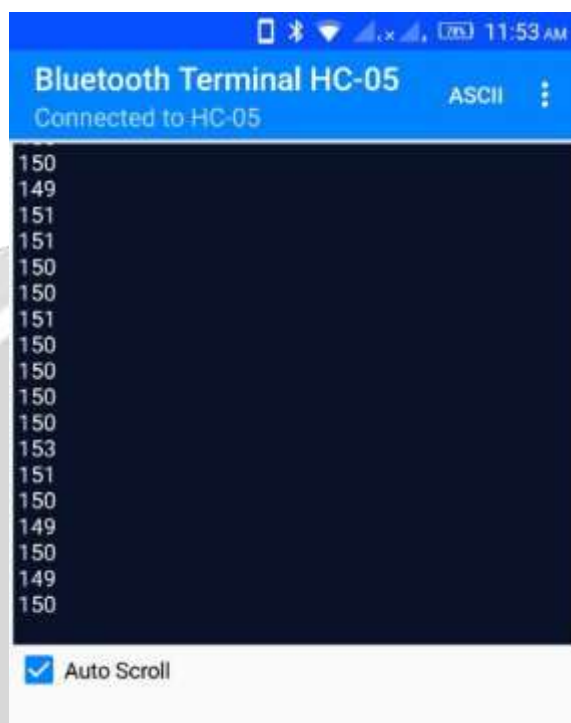


Fig -7 :Readings of sensor in the Bluetooth HC-05 terminal application in android device

4. CONCLUSIONS

In this work, we have successfully implemented the smart irrigation system to efficiently irrigate the crops with less human intervention and efficiently make use of water resource. The project mainly focuses on people engaged in the field of agriculture, where the system automates and regulates the watering to the crops.

The moisture sensor senses the moisture level and if the moisture level is below the desired level then automatically the motor is switched on. After the moisture level reaches the desired level the motor is switched off. The primary application of the project is for the farmers and gardeners who don't have enough time to water the plants. The proposed system is designed in such a way that it is highly efficient in consumption of power, cost effective and is user friendly. The System is developed to accommodate the changes in future and to cater the needs of future consumption. Later, the system can be extended and experimented for using it in fields.

5. REFERENCES

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