Implementation of Automatic Irrigation System
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Abstract:
This paper is taken up as India is an agriculture oriented country and the rate at which water resources are depleting is a dangerous threat hence there is a need of smart and efficient way of irrigation. In this paper we have implemented sensors which detect the humidity in the soil (Agricultural Field) and supply the water to the field which has water requirement. The work is 8051 microcontroller based design which controls the water supply and the field to be irrigated. There are sensors present in each field which are not activated till water is present on the field. Once the field gets dry sensors sense the requirement of water in the field and send a signal to the microcontroller. Microcontroller then supply water to that particular field which has requirement till the sensors get deactivated again. In case, if there are more than one signal for water requirement then the microcontroller will prioritize the first received signal and irrigates the field accordingly. The development of the automated irrigation system based on the microcontrollers and wireless communication at experimental scale within rural areas is presented. The aim of the implementation is to demonstrate that the automatic irrigation can be used to reduce water use.

Keywords: Arduino Module; Automatic irrigation; Soil moisture sensor; Relay module; Pump auto cut sensor.

I. INTRODUCTION
In the fast paced world human beings require everything to be automated. Our life style demands everything to be remote controlled. Apart from few things man has made his life automated. In the world of advance electronics, life of human beings should be simpler. Hence to make life simpler and convenient, we have made “AUTOMATIC IRRIGATION SYSTEM”. A model of controlling irrigation facilities to help millions of people. This model uses sensing arrangement technology with microcontroller to make a smart switching device. Continuous increasing demand of food requires the control in highly specialized greenhouse vegetable rapid improvement in food production technology. In a production and it is a simple, precise method for country like India, where the economy is mainly based on irrigation. It also helps in time saving, removal of human agriculture and the climatic conditions are isotropic, still error in adjusting available soil moisture levels and to we are not able to make full use of agricultural resources. The continuous extraction of water from usually for assisting in growing crops. In crop production earth is reducing the water level due to which lot of land is it is mainly used in dry areas and in periods of rainfall coming slowly in the zones of un-irrigated land. Another shortfalls, but also to protect plants against frost. Very important reason of this is due to unplanned use of Types of Irrigation water due to which a significant amount of water goes to surface irrigation waste. Irrigation has always been an ancient practice which has evolved through so many stages over the years. Our ancestral farmers in a bid to irrigate their farm sought for various methodologies. Manual irrigation using buckets and watering cans, flood irrigation, drip irrigation, sprinkler irrigation were and are still being used today. The existing system has several limitations; leaching off of soil nutrients, erosion due to flooding, loss of water from plant surfaces through evaporation, water wastage which can result to water scarcity in drought areas and production of unhealthy crops.

II. COMPONENTS AND RATINGS

III. COMPONENTS SHORT DETAILED

• Arduino-UNO: Arduino is the center of this system which connects all the required hardware. It Is inbuilt with Atmega328P microcontroller software IC. It is use to control the
operation of this automatic irrigation system. It is operate on 5 volt supply.

- **Relay Module**: A relay is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism mechanically.

- **LCD Display**: A liquid-crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals. It is operate on 5 volt supply.

- **LM393 Driver**: It is operate on 3 volt supply voltage. It is use to maintain the resistance of soil moisture sensors.

- **Soil moisture sensors**: It measures the level of moisture from the soil and it is transferred to the arduino board to process and make decision.

IV. BLOCK DIAGRAM

![Figure 1. Block Diagram of Automatic Irrigation System](image1.png)

V. BLOCK DIAGRAM EXPLANATION

The block diagram of Automatic Irrigation System is shown in Figure 1, the main reason for choosing AT89S52 as the microcontroller is due to its numerous advantages and cost effectiveness. In this system, soil moisture sensors senses moisture level of the soil. If soil will get dry then sensor senses low moisture level and automatically switches on the water pump to supply water to the plant. As plant get sufficient water and soil get wet then sensor senses enough moisture in the soil. After which the water pump will automatically get stop by cutoff system and when the water level decreases then the water pump will get ON in dry soil automatically. Here we have used water pump in this system using 230 volt AC motor. It will require a relay module, so, to reduce all this hardware complexity. The Soil moisture sensors measures the level of moisture from the soil, and it is transferred to the arduino board to process and make decision and for that we have used the microcontroller Atmega328P software IC to get the output on the LCD display. The automatic irrigation system was designed to continuously sense the moisture and temperature level of the soil. The system responds appropriately by watering the soil with the exact amount of water required and then shuts down the water supply when the required amount of soil moisture is achieved. The reference amount of soil moisture is already fed to the microcontroller beforehand. The moisture sensors and temperature sensors were designed using probes made from corrosion resistant material which can be stuck into soil sample. Voltage levels corresponding to the wet and dry status of the soil sample were computed by measuring the resistance between the moisture probes and matching them to output voltage of a comparator circuit.

VI. MODEL IMPLEMENTATION DIAGRAM

![Figure 2. Model Implementation of automatic irrigation system](image2.png)

VII. SOFTWARE USED

**MICROSOFT OFFICE VISIO**: It is use to draw the circuit diagram of automatically controlled irrigation system by using simulation lab of visio software.

**Arduino 1.8.10**: The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuine hardware to upload programs and communicate with them. Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension .ino. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom right hand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor.

VIII. ADVANTAGES AND DISADVANTAGES

**Advantages**:

- It is a simple and a precise method as well as it helps in time saving, reduce the human attention, also reduce cost of labor.
- It maximize the net profit and quality of crop.
• It avoid the loss of water during irrigation as it sense the required moisture content.

Disadvantages:
• Difficult in case of failure of GSM modem.
• Kit is to be protected from reaching water.
• Watermark sensors are required to be calibrated for each soil types.

IX. RESULT OF DISPLAY

Figure 3, shows the design set up of the Automatic Irrigation System.

X. CONCLUSION

The primary applications for this project are for this project are for farmers and gardeners who do not have enough time to water their crops or plants. It also covers those farmers who are wasteful of water during irrigation. This principle can be extended to create fully automated gardens and farmlands. In agriculture lands with severe shortage of rainfall, this model can be successfully applied to achieve great results with most types of soil.

XII. REFERENCES


