

# Implementation of Arduino Based Automatic Irrigation System

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**Abstract:** In India most of the population lives in village and they depend on agricultural farming for their livelihood. In these days exercises related to developing or farm watering are the main social practice and the most work escalated task. No matter whichever atmosphere it is, either hot, dry, shady, or wet, you need to have the choice to control the proportion of water that shows up at your plants. Present-day watering systems could be effectively used to water plants when they need it. Nonetheless, this manual methodology of watering requires two huge perspectives to be considered, when and how much water. To replace manual activities and make work more straightforward, a programmed automatic irrigation system is made. It uses the development to distinguish the dampness level of the dirt and naturally water the plant when there is no dampness perceived in the dirt. This system can be also used at big Agricultural farms.

**Keywords:** Irrigation, Arduino, Soil Moisture Sensor, Relay Module, Bluetooth

## I. INTRODUCTION

This Irrigation is the usage of controlled proportions of water to plants at required ranges. Water frameworks help with creating scenes and revegetate upset soils in dry locales and during seasons of not ordinary precipitation. Water framework moreover has various uses in yield creation, smothering weed improvement in grain fields, and thwarting soil union. This type of water framework structures are similarly used for cooling creatures, dust disguise, the expulsion of sewage, and in mining. This proposed system works according to soil- moisture. Soil Moisture sensor used to capture the moisture of soil. Soil moisture goes low than irrigation start automatically. Soil Moisture goes high or on the set – point of soil moisture than irrigation stop automatically. User can control and the whole system using hand held device through Bluetooth. Bluetooth module is interfaced with Arduino. LCD display is also interfaced with Arduino Board. On which soil moisture is display. This system is easy to use, reliable and low cost. This innovative technology can play biggest role in economical growth. This type of technology can improve productivity and quality.

## II. VARIOUS TYPES OF AUTOMATIC IRRIGATION SYSTEMS

### A. Drip irrigation system:

Drip water system is a kind of miniature water system framework that can possibly save water and supplements by permitting water to dribble gradually to the foundations of plants, either from over the dirt surface or covered beneath the surface.

The main task is to put water straightforwardly into the root zone and limit dissipation. The efficiency and effectiveness of this drip water system are 80-90 percentages if it is properly managed. In flow cultivating, spill water framework is every now and again got together with plastic mulch, further restricting dissipation, and is the method of conveyance of compost. The system is known as fustigation. Profound permeation, where water moves underneath the root zone, can occur if a stream structure is worked for a truly lengthy time span or if the transport rate is unreasonably high.

Spill water framework systems run from astoundingly bleeding edge and computerized to low-tech just as innovative activities. Lower water pressures are needed than for most various types of structures, aside from low essentialness network turn structures and surface water framework systems, and the structure can be planned for consistency all through a field or for accurate water transport to particular plants in a scene containing a mix of plant creature gatherings.

### B. Micro Irrigation System:

Micro water system is an advanced technique for water system; by this strategy water is inundated through drippers, sprinklers, foggers and by different producers on surface or subsurface of the land.

### C. Sprinkler irrigation system:

In sprinkler or overhead water system, water is funnelled to a minimum of one focal space within the sector and disseminated by overhead hard-hitting sprinklers.

A framework utilizing sprinklers or splashes mounted overhead on for good mounted risers is usually indicated as a powerful set water system framework. Sprinklers can be fixed on moving stages associated with the water source. Naturally moving wheeled frameworks known as moving sprinklers may water regions, for example, little area, sports fields, parks. As the tubing is twisted on the drum controlled by the water system water or a little gas motor, the sprinkler is pulled over the field. At the point when the sprinkler shows up back at the reel the framework stop. This sort of framework is referred to a great many people as a "water reel" voyaging water system sprinkler and they are utilized widely for dust concealment, water system, and land utilization of waste water.

### **III.ADVANTAGES OF WATER IRRIGATION SYSTEM:**

#### **A. Decrease Weed Development:**

By presenting a water framework structure expressly planned for your scene, just zones that truly need water will get it. Thus obliging your potential weed advancement accurately. Spill water framework structures are particularly powerful at this: the system organizes water expressly to each plant's basic establishments, instead of sprinkling over the total land.

#### **B. Save Time and Water:**

Both sprinkler and dribble water device frameworks may be set to each day or week with the aid of week watering, just as coordinated for express hours during day or night time. The framework will likewise consequently close the water off while the water gadget technique is completed. Utilizing a robotized framework to disseminate your water flexibly, you do not want to be a physical gift for the water framework to achieve success. The programmed close-off will downplay your water use, and lower your expenses due to the fact much less water could be applied.

#### **C. Plant Development:**

Plants will rise easily and greener when watered with humbler proportions of water over a more expanded period, which is really what water framework systems are proposed to do. Presenting a water framework system will improve your plant advancement impressively.

#### **D. Hold Soil Supplements:**

Watering by hand regularly prompts bounty water immersing the soil. Waterflood soaks by the earth and redirects significant enhancements from your plants. Using a water framework system will save your soil structure and keep your plants holding supplements, not the floodwater.

### **IV.LITERATURE SURVEY**

In this research the system is mainly based on L8051F microcontroller and operating system [1]. They are utilizing a hand-held water system identification gadget to build up the requirements of the saving water system for the harvests planted close karst slant zone. This area has speedy changes and enormous contrasts of the provincial atmosphere. This gadget has a few favorable circumstances, for example, basic activity, simple to convey up, less cost, remote control, etc. By using this gadget, the entanglements can be coordinated between manual control and programmed control. A handheld gadget is the cell phone which is held.

This research paper on "Research of Automatic Monitoring System of Reservoir Based on Embedded System"[5]. This system is completely based on an embedded system. This system presents the automatic monitoring of the reservoir. This system consists of 3 sub-systems Acquisition subsystem. Transmission subsystem. Data management subsystem. This system fulfils all three management's data collection, transmission, and management. It maintains efficiency, low cost.

This research work is on "Water Saving Irrigation Control System based on STC89C52MC, [6]. This system reduces water wastage using communication between PC and Microcontroller using switches and controlling valves. A serial port is used to communicate between MCU and Controllers. In this system, when soil moisture goes high or low. MCU's program receives the signal called by PC. Then receive the irrigation time and start irrigation. When moisture value reaches its pre-defined value irrigation stops. This system involves saving water and accuracy

As we move towards advancement, human requirements for materialistic assets increments [2]. One such asset is water. It is the most widely utilized asset. There is a need to make a stride towards saving water by executing a miniature water system control framework. The goal of micro water system control framework is to supply water for a specific time span relying on the distance through which water needs to go through the line, sort of soil, crop, and so on

Execution of this can help locales that have scant water and needs quick help with water preservation methods.

A lot of rainfall occurs during one specific period of a year when contrasted with different seasons [9]. Plants that endure just in exceptionally wet soils may pass on because of dry spell. This issue can be settled by the water system framework. Water system the executives choose the measure of water that must be siphoned. Water system booking decides time and amount of water. We have different kinds of water system frameworks, for instance, sprinkler and dribble water systems. Trickle water system focuses on an exact conveyance of water to plants' foundations. Sprinkler water system framework is put between the plants and it sprinkles water to all the plants around it. To work on sprinkler framework deciding wetting design, application rate and sprinkler drop are essential. Sprinkler framework is of two kinds: splash type and rotor type.

TABLE I CROPS SUITABLE FOR AUTOMATIC IRRIGATION SYSTEM [13]

| S. No. | Crop Types    | Example  |
|--------|---------------|--|
| 1.     | Flowers       | Rose, Carnation, Gerbera, Orchids, Jasmine etc.        |
| 2.     | Vegetables    | Tomato, Chilly, Capsicum, Cabbage, Onion, Pumpkin etc. |
| 3.     | Forest Crops  | Teakwood, Bamboo etc.                                  |
| 4.     | Oil Seed      | Sunflower, Oil palm, Groundnut etc.                    |
| 5.     | Plantation    | Tea, Rubber, Coffee, Coconut etc.                      |
| 6.     | Spices        | Turmeric, Cloves, Mint etc,                            |
| 7.     | Orchard Crops | Grapes, Orange, Mango, Lemon etc.                      |
| 8.     | Cash Crops    | Sugarcane, Cotton, Strawberry                          |

TABLE II EFFECT OF AUTOMATIC IRRIGATION SYSTEM ON CROPS

| S. No. | Crops      | Water saving Through Irrigation (%) | Improvement in yield (%) |
|--------|------------|-------------------------------------|--------------------------|
| 1.     | Ground nut | 40                                  | 152                      |
| 2.     | Sunflower  | 40                                  | 52                       |
| 3.     | Cotton     | 36                                  | 50                       |
| 4.     | Jowar      | 55                                  | 34                       |
| 5.     | Onion      | 35                                  | 95                       |
| 6.     | Wheat      | 35                                  | 25                       |
| 7.     | Sweet lime | 61                                  | 50                       |
| 8.     | Gram       | 68                                  | 59                       |
| 9.     | Chilly     | 65                                  | 32                       |

V. PROPOSED METHODOLOGY

Block diagram of a Automatic Irrigation system is showing. This is system for watering plants; gardens also can be use for farm irrigation. In this system the time interval irrigation is not set. The irrigation is based on soil. When Soil goes dry irrigation/ watering is start. In this system there are two probes. From both of them one probe is use for sense the soil moisture and another probe used to on the relay switch on the particular dryness value. We can connect these relay to any watering system or fogger system for cooling any farm shed to switch the system on automatically for watering the plants.

In the system soil moisture is measure by the sensor which sends the parameters to Arduino Board. Arduino Board controls the whole system. When sensor senses the moisture value and sends it to Arduino if its drops to certain value then the relay module start the water pump. From this a certain amount of water is delivering to the crops. If moisture rate reaches on certain value. The Arduino sends again signals to relay module to stop the watering. LCD display is also interfaced with Arduino where Soil –Moisture displays. User can monitor or set threshold value of soil –moisture through android application on mobile device. Bluetooth Module is interfaced with Arduino Board.

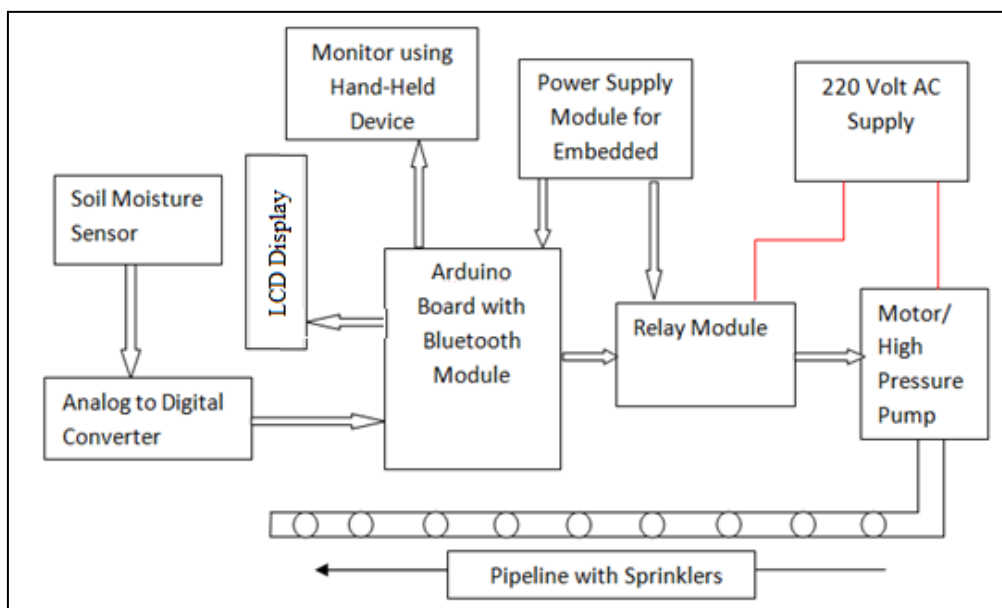


Fig 1 Block Diagram of Proposed Automatic Irrigation System

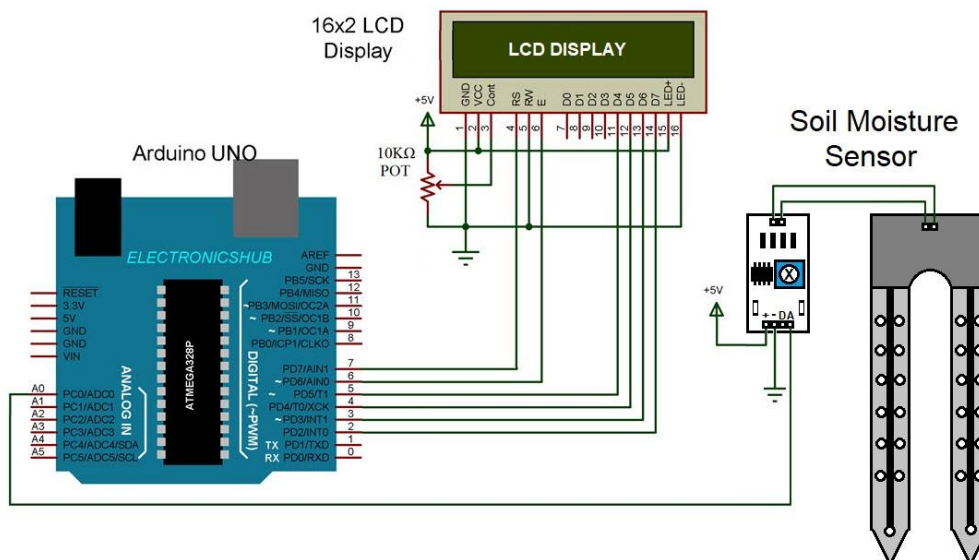


Fig 2 Circuit Diagram

## VI. MAIN COMPONENTS OF THIS SYSTEM

### A. Soil Moisture Sensor:

In this system hygrometer type soil moisture sensor is used to measure the dryness and wetness of the soil. There are two parts of this sensor or we can say this sensor setup is consisting of two pieces. The first one is Electronic Board and the second one is fork-shaped probes with a conductor that detect the soil moisture. This fork-shaped probe works like a variable resistor. The resistance of these probes varies according to water in the soil. Resistance is inversely proportional to the soil moisture. When the water content in soil is high then it creates good conductivity and lower resistance. When the water content in soil is low then it creates poor conductivity and high resistance. This sensor produces voltage output according to the resistance by which we can measure the moisture level.

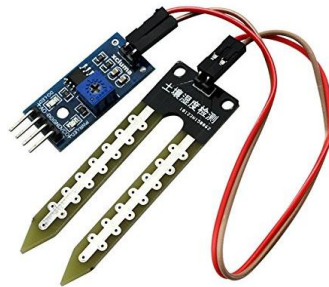


Fig 3 Soil Moisture Sensor

This electronic module is also connected to this sensor that interfaces the probe with Arduino. This electronics module produces O/P voltage. This electronic module contains a comparator that converts this analog output voltage into a digital output voltage. This digital output can be high or Low according to the water content in the soil. We can set the threshold value using a potentiometer. When the soil moisture exceeds this threshold value the output is low. If soil moisture below the threshold value the output is high.

### B. Arduino:

Arduino is consisting of both physical programmable board and software. It is an open- source electronic board. In which we can upload code. Basically it is a microcontroller kit. This is set of Analog and digital I/P O/P. In this system Arduino is interfaced with electronic module of Soil Moisture Sensor.

## VII. CONCLUSIONS

An automatic Irrigation system reduces the wastage of water. Mainly this system is designed for farmers and gardeners who have lean time to water their crops. This system is user-friendly. This system can contribute to the economic development of India by reducing water waste throughout irrigation. As we have a tendency to all apprehend "If there's Water, there's life". The main objective of this automatic irrigation system is to make it more efficient more reliable, user friendly than the previously existing systems. In this irrigation system, water is directly transferred to the roots of crops or plants; it maintains the soil moisture ratio. Therefore this method is additional economical and reliable to the setting. This method reduces the manual work of the farmer. Improve agricultural quality

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