

# GSM Based Auto Irrigation System

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**Abstract:** As in India 60% of India's land is used for agricultural land. And irrigation play a vital role for the human and animal but agricultural also share 20% of India GDP (Gross Domestic Product). As there is around 263 million or 22% of the population are directly involved in the agricultural industry. In India there is many serious problems regarding to the agricultural and the most important one is water. How much water should we provide of the crops for the better growth and give us best result. As In India, the agricultural depends on the monsoons which is not sufficient source of water for the agricultural or irrigation. We have to adapt the smart technology which is going to be future of agricultural for entire world. That is GSM Based AUTO IRRIGATION SYSTEM. Through this system we can provide the exact and smartly how much water is needed to crop. For this we have used three soil sensors because every crop needs different amount of water. And this system can used through your mobile phone so you don't want go to the land and give every information like the motor is on or off how much percentage crop need the water. This information is send using Relay module and Arduino Uno R3. Using this system, we can save water for the future generation

**Keywords:** Arduino Uno R3, GSM, microcontroller, relay module, smart irrigation, soil sensor.

## 1. Introduction

Farming, or Agriculture plays an important role for human and animal as it provides a food. And food is very essential for living. Farming, or Agriculture plays a very decisive role in the GDP (Gross Domestic Product) for entire world. As it contributes 20% in total GDP of the India. It also inspects that 70% of India population is depend on the irrigation. In rural India almost 80% depends on agriculture sector. India Agriculture sector need to modernize as due to unintentionally use of water the ground water level is deteriorate, less rain water is also results in deteriorate in ground water. As agriculture is a main area where water is required in an enormous amount i.e., 85% of the fresh water. Due to this there is some time over irrigation in the field that led to wastage of water and destroy the crops. As over utilization just not harm the crops but our "mother nature" too. And our project is small initiative to make people aware for how to manage the water resource. Mainly today we use 'tube well' system to irrigate our fields which is also reason for the depletion of the ground water. Nature has provided us all the resources but by over utilizing

we just not harming our present but our future too. To sustain water for the upcoming generation and proper usage of water, it is required to acquire some technology so that wastage of water is minimal and we can sustain the water. There is technology which we can used to sustain the water and there will be minimal wastage of water and the technology is "IOT" (Internet of Things). Using IOT we can create a system that will monitor the water level for the crop even when you are not present and that system is "GSM Based Auto Irrigation System". In GSM Based Auto Irrigation System we mainly used Relay module, GSM, Soil Moisture Sensor, Arduino Uno R3. We have used three soil moisture sensor which is going to place in the soil at the different level with the crop. The soil moisture sensor then checks the soil moisture level and then send the signal to the Arduino if required i.e., if the moisture level is below the threshold value (because every crop need different amount of water to grow) then only soil moisture sensor will send the signal. Then Arduino will choice to switch on the motor or switch off the motor (the choice will depend on the soil moisture threshold value). If the Arduino choice to switch on the motor i.e., the threshold value is less and if the soil moisture exceeds the threshold value, then the Relay module automatically cut the power of the water and the water supply will immediately stop. And everything which is happening in system is send to your mobile through GSM module which is install in the system. Due to this you can save the water and you have the detail when the system is on and when it is off.

## 2. Proposed System

In this system the soil sensor is connected to the Arduino through input pins. The values which are generated by the sensor is in analog values which is converted in the digital output values using Arduino. The value is then sent to the user mobile by GSM module. Then the water motor will switch on/off automatically base on the fixed threshold values

### 1) Algorithm

- Step 1: Start the methodology.
- Step 2: Power is supplied to the GSM module.
- Step 3: The soil sensor checks the threshold value.
- Step 4: If the threshold value is greater than the fixed value then there is no need of irrigation.

- Step 5: If the threshold value is less than the fixed value then the motor will automatically switch on.
- Step 6: After the procedure is finished. It will move to unique state.
- Step 7: Stop the procedure.

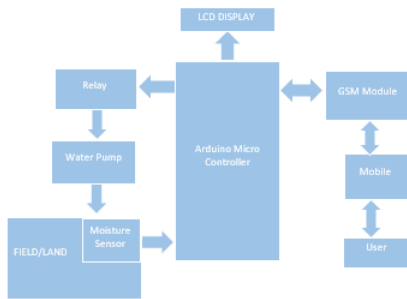


Fig. 1. Block Diagram of GSM Based Auto Irrigation System

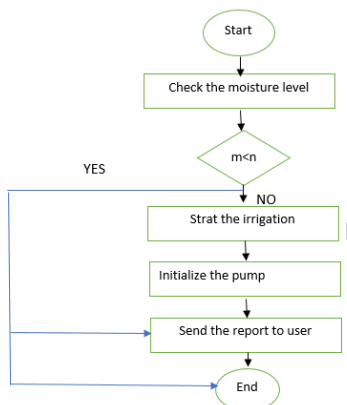


Fig. 2. Flowchart of proposed system

### 3. Component Description

#### 1) Soil Moisture Sensor

Soil Moisture Sensor is used for Sensing the humidity level in the soil. This Data is used for watering the plants or Crops. Soil Moisture Sensor consist of two parts – Sensor and Control Board. It mainly works on the principle of Voltage Comparison. Process Involve in it are, a particular amount of current released by sensor in the soil. As we know water is the good conductor of electric current, thus if the resistance generate in the flow of current shows the dryness in the soil and indicates the amount of water required to meet the need of a particular crop.

Precautions required to use this sensor is that: -

- Clean the sensor part properly thus the value may not vary.
- The two probes of sensor part must be properly dug inside the Soil for more accurate results.

#### 2) Arduino UNO R3

Arduino is just an open-source platform in which is easy to use. Simply program get written on Arduino IDE and attach the Arduino board to computer to execute the command. The Arduino Microcontroller work as a mini computer in the Project. It takes data from soil moisture sensor then deliver the data to the user via using GSM module. then takes the command from user and gives command to water pump to get on if

required. Arduino UNO R3 is the best board to start with for the beginners. It's based on AT Mega 328 (4-256 KB programming memory). It has flash memory (Electrically erasable and reprogrammable). Arduino UNO R3 has 20 pins in which 14 Digital I/O pins and 6 Analog I/O pins. In Digital pins 3, 5, 6, 9, 10, 11 are PWM embedded pins. It runs on mac as well as windows. To use simply connect with computer using USB cable or give power by connecting to the batteries.



#### 3) GSM Module

GSM is a mobile communication system which stands for Global System for Mobile Communication. GSM Module is connected to either computer or to the micro-controller. This works as the mediator & help to establish connection between user and the irrigation system. GSM Module require a sim card and good network to work properly. GSM Module indicate user that soil require water or to turn of the pump via message, by taking command from arduino micro-controller. GSM Module consist of 68 pins. GSM Module uses 900 to 1800 KHz frequency band to send messages. GSM Module makes the whole system IOT Based. To check the working of this connect it with a power source and turn it ON. Try to call on the number of sim card inserted in the GSM Module. If Bell rings then Module is working properly.

#### 4) Connection with Arduino

GSM Module Tx (Transmitter) to Arduino Rx (Receiver) , GSM's Rx to Arduino Tx and GSM's GND(ground) to Arduino GND (in digital part PWM embedded part).



#### 5) LCD Display

LCD means Liquid Crystal Display which is used as the

indicator showing the current ongoing process like “motor is on”, “motor is off” etc. It consists of 16 I/O pin from which two are grounded. It displays output in human reading language. It is effective because it is simply programmable, less expensive, no displaying limitations. LCD basically convert the analog signal into digital signal. LCD includes two rows each row can display 16 characters. The LCD Display has two registers like data register and command register. Uses of display varying by the depending upon the purpose.



#### 6) Relay

A Relay is an electrically operated switch. It is consisting of two parts relay coil and relay switch. It works on magnetic phenomenon, when user gives command to microcontroller to switch on the water pump then microcontroller release small amount of current which passes through coil in relay creates a magnetic field which turn “ON” the switch till switch remain “OFF”. Basic parts of relay: - Frame, Coil, Armature, Contacts. Relay get operated automatically thus prohibit any physical involvement of user. Circuit symbols used in relay are NO (Normally Open), NC (Normally Closed) and COM (Common which is connected to power source).



#### 4. Future Scope

As per the future scope of this project, the system can be the

more intelligent system because we can use AI (Artificial Intelligent) which will foresee the action which is needed like, nutrient of the plants, harvest of the crops etc. With using ML algo and more improvement needed to be done in the coming future which will help the farmer and lot of water can be save because of the algorithm and there will be less error.

#### 5. Conclusion

This project GSM Based Auto Irrigation system based on IOT is found to be less costly, time saving and enhancing the techniques to save the water for the upcoming generation. This system will help the farmer to work smartly and automatically. This system allows plowing in the areas with water shortage thereby improve stainability. As we have use multiple sensors in this project the water can be provided to the required land. This system needs minimum maintenances and it consume less electricity. And this project can be run on solar energy as it required less electricity. The crops have maximum nutrients and crops will be healthy because of this system. The wastage of the crop will be minimum and in some there will be no wastage of the crops.

#### 6. Acknowledgement

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