# ARDUINO based Automatic Plant Watering System

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## Abstract

*This paper deals with the design and development of an automatic plant watering system which is being used to prevent plants because of the reason that it doesn't get enough water for their growth. In everyday operations related to gardening, watering is the most important and the most labor intensive task. System created automatic plant watering system to minimize manual activities and making gardener's work easier. This project uses the Arduino UNO and it is programmed to sense moisture level of plants, if the moisture level is less than specified value which is predefined in the programming then desired amount of water is supplied till it get sufficient moisture level. The water supply needed for watering can be from any source like tank, well etc. Here, solar energy is used for glowing the led at night. The main intention of this system is automatic, not time consuming and saving water.*

**Keywords:** *Arduino, Soil Moisture Sensor, pump, solar panels, GSM module. Irrigation , Soil ,Water conservation , Moisture , Water resources , Resistance*

## 1. INTRODUCTION

Nowadays human life is getting simpler and convenient so there is need of automated system to reduce human efforts in day to day activities due to advancement in the field of electronics and technology. One such system, automatic plant watering system, which actually controls watering facilities that uses sensor technology to sense soil moisture level to help people efforts. In addition to this, we are using the solar panel due to this the battery gets charged and provides supply to the light.

Plants are very beneficial to everyone in many aspects. Plants help us to keep the environment healthy by cleaning air natural way and produce oxygen. Many people love to have plants in their backyard but due to busy schedule of day to day life, many people are not able to water the plants. As a result, there is a chance of plants may not survive. Automated plant watering system estimates moisture and then gives sufficient amount of water needed by that plant. This keeps plants healthy always.

## 2. PROPOSED IDEA

The automatic plant watering system was designed to sense the moisture level of the soil continuously. Here, if moisture level is low then Arduino switches ON a water pump to provide water to the plant. When system finds enough moisture in the soil water pump gets automatically OFF. Whenever module is switched ON or OFF the pump, a message is sent to the user through GSM module, updating the status of water pump and soil moisture. This system is very useful in home garden. This system is automatic. So it is a Automatic Plant Watering System. Here, solar energy used to control the light intensity from morning to evening based on the brightness. A block diagram of arduino based automatic plant watering system is illustrated in Fig. (1).
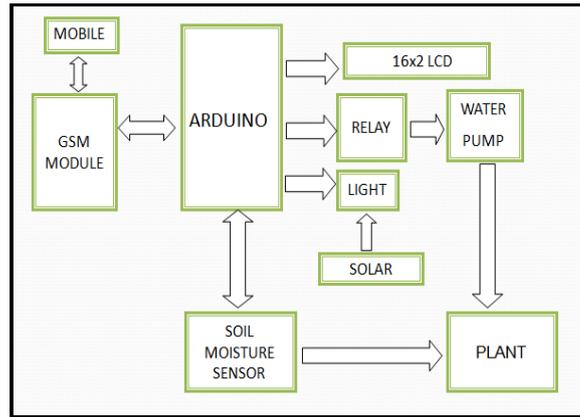
**Fig.1 Block diagram of Arduino based automatic plant watering system**

## 3.   COMPONENTS USED FOR IMPLEMENTATION OF SYSTEM

A.  Arduino Uno

Arduino Uno is a microcontroller board based o. It has 14 digital input / output pins in that  which 6 pins  can be used as PWM outputs), 6 analog inputs, 16 MHz ceramic resonator, USB connection, power jack, ICSP plug, and a reset button.  This is programmed using the Arduino Software (IDE), our Integrated Development Environment common to all our boards.



**Fig.2 Arduino uno**

B. Moisture Sensor

Soil moisture sensor measures the soil water content. Soil moisture probe consists of a plurality of soil moisture sensors. Soil moisture sensor technology, commonly used is Frequency domain sensor, such as a capacitive sensor. In this particular project, we will use the soil moisture sensors which can be inserted into soil to measure the soil moisture content.
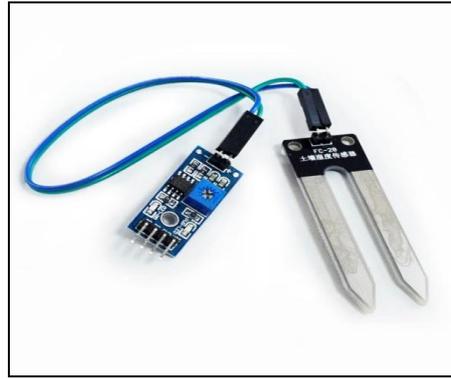
**Fig.3 Moisture Sensor**

C. The Relay Module

Relay is an electrically operated switch. Many relays for switching solenoid mechanism mechanically operated, but can also be used for other principles of operation. Relays are widely used in early computers to telephones and perform logical operations.][2]

D. PUMP

This is a small size Pump Motor which can be operated from a 2.5 ~ 6V power supply. It has very low current consumption of 220mA. Driving mode of this pump is DC.



**Fig.4 motor pump**

E.GSM

GSM  module is used for communication purpose in this project.sim 800L is miniature GSM modem which operates on 3.3v to 4.4v and it supports baudrate 1200bps to115200bps with auto-baud detection.This module uses external antena(helical)to connect to a network.

**Fig. 5GSM Module**

## 4. PROPOSED METHODOLOGY

The working principle is very simple. Arduino is an open-source platform used for making electronics projects. Arduino consists of a microcontroller which is physical programmable circuit as a hardware part and on the software part there is IDE (integrated development environment) that is used to write and upload computer code to the arduino board. In this project Arduino board is used, which has atmega328 microcontroller. It is programmed in such a way that it will sense the moisture level of the soil and if required supply the water.
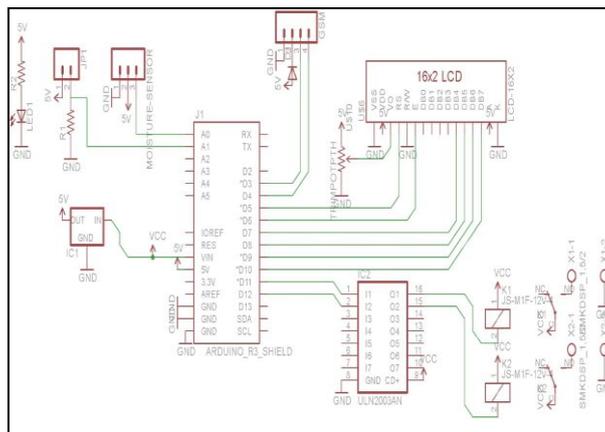


**Fig.6 PCB layout for proposed design**

Arduino UNO microcontroller is programmed such that it gives the interrupt signals to the motor via the motor driver module. Soil sensor is connected to the A0 pin to the Arduino board which gets the input of values of moisture level present in the soil. We will need to use the analog output of the sensor as to connect the sensor in

the analog mode. When taking the analog output from the soil moisture sensor, the sensor gives us the value. So we will map these values and show them on the serial monitor. Regarding the moisture in the plant, the real time information is given by analog output and this output is used in the system.
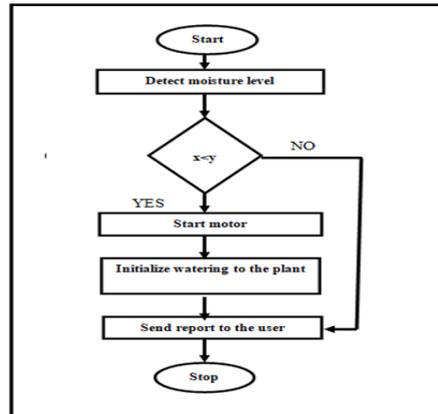


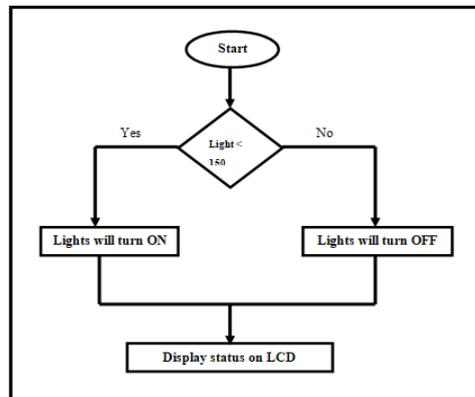**Fig.7 Flow chart for processing of system operation**



**Fig.8 Flow chart for User Interface**

Arduino UNO is also connected to other electronic components such as soil moisture sensor, GSM, LCD. Components are placed in PCB to form a circuit. After connecting components to each other it will give the output.



**Fig.9 Implemented System Design**

The code is written in such a way that, it will sense moisture level of plants at particular instance of time. If the moisture content is less than specified threshold which is predefined according to particular plant's water need and then desired amount of water is supplied till it reaches to threshold. The excess water use as well as taking care of the plant is minimized by this.

● Hardware Implementation:

    soil moisture sensor,LCD ,GSM,arduino uno

    The whole setup is controlled by arduino.

● Software Implementation:

    Arduino IDE for coding and for layout eagle software is used

## 5. RESULT:

Thus "AUTOMATIC PLANT WATERING SYSTEM" works successfully. In this LCD display shows the output. Eg: Motor ON, Motor OFF etc. Using Moisture sensor, in different types of soil moisture level is measured.
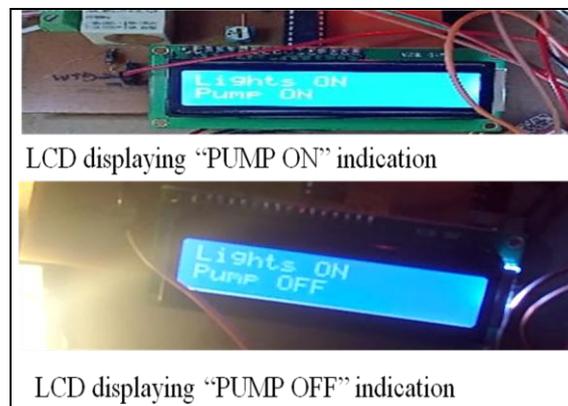


**Fig.10 Output displayed on LCD screen**

## 6. CONCLUSION:

The automated plant watering system implemented was found to be feasible and cost effective for optimizing water resources for household purposes. This system allows cultivation in places with water scarcity thereby improving sustainability.

The automated system developed proves that the use of water can be diminished for a given amount of fresh plants watering. The use of solar power in this system is pertinent and significantly important for organic crops and other plants where the investment in electric power supply would be expensive.

The system can be adjusted to a variety of specific plants needs and requires minimum maintenance. The modular configuration of the automated system allows it to be scaled up for larger greenhouses or open fields. In addition, other applications such as temperature monitoring in compost production can be easily implemented. The Internet controlled duplex communication system provides a powerful decision making device concept for adaptation to several gardening scenarios. Furthermore, the Internet link allows the supervision through mobile telecommunication devices, such as a smartphone.

Besides the monetary savings in water use, the importance of the preservation of this natural resource justify the use of this kind of irrigation systems.

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