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**Title of the Project : SMART PLANT WATERING SYSTEM**

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**ABSTRACT:**

Watering the plants with correct amount and at correct time is essential for the growth of the plant. Keeping this in mind, smart plant watering system is an IOT project which is used to water the plants without any man power. This project shows how plants can be watered with the help of moisture content in the soil. In this the sensor which we use to detect the moisture content is the Soil moisture sensor, on which the water is given to the plant.

— In daily operations related to farming or gardening watering is the most important practice and the most laborintensive task. No matter whichever weather it is, either too hot and dry or too cloudy and wet, you want to be able to control the amount of water that reaches your plants. Modern watering systems could be effectively used to water plants when they need it. But this manual process of watering requires two important aspects to be considered: when and how much to water. In order to replace manual activities and making gardener's work easier, we have created automatic plant watering system. By adding automated plant watering system to the garden or agricultural field, you will help all of the plants reach their fullest potential as well as conserving water. In this paper we have used ATmega328 microcontroller. It is programmed to 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 then desired amount of water is supplied till it reaches threshold. Generally, plants need to be watered twice a day, morning and evening. Thus, the microcontroller is programmed to water plants two times per day. System is designed in such

a way that it reports its current state as well as remind the user to add water to the tank. All this notifications are made through mobile application. We hope that through this prototype we all can enjoy having plants, without being worried about absent or forgetfulness.

KEYWORDS: Smart plant, soil moisture, Arduino

## INTRODUCTION:

Plants are the essential living beings on the planet. But for the wellbeing of plants, the most essential part is Water. Water is the one which allows the plant to perform the most essential process-Photosynthesis. It is the one which restore the moisture content in the plants. It provides growth to the plants. To make the gardener works easily, the automated plant watering system is made. This project aims at achieving automation for the purpose of plant monitoring and irrigation system.

## BACKGROUND:

We all know that plants are very beneficial to all human beings in many aspects. Plants helps in keeping the environment healthy by cleaning air naturally and producing oxygen. Many people love to have plants in their backyard. Watering these plants every day is a challenging task. Watering the plants just on top of the layer doesn't help the plant to grow. Knowing when and the way much to water is 2 important aspects of watering process. These plants are dependent on conventional breeding - watering, and provide the right amount of sun to sustain life and growth. In busy schedule of day-to-day life, many time people forget to water their plants and due to these plants suffers many disorders and ultimately die. Thus, a system is required, to handle this task automatically. Automated plant watering system estimate and measure the existing plant and then supplies desired amount of water needed by that plant. It is minimizing the excess water use as well as keeping plants healthy.

## PROBLEM STATEMENT:

- Gardens are an essential part of house, but watering these plants during the busy days can be challenging.

- In our project we came came up with a way where we developed a smart plant watering system using Arduino UNO.

- It will detect the soil moisture and the water will be automatically given to the plants.

## Procedure :

- First, connect the two pins of the soil moisture sensor to the central board.

- Next, take an Arduino Uno board.

- Connect the VCC pin of the central board and the relay module of 5V to the breadboard.

- Now connect this breadboard and the Arduino using a jumper wire.

- The ground pin of central board and relay module are connected to the breadboard and using the jumper wire connect this to the GND pin in Arduino.

- Digital output pin(DO) is connected to the pin number 6 of the arduino.

- Now let's connect the relay module and the water pump.

- The input pin(IN) of the relay module is connected to the pin number 3 of Arduino.

- Then on the other side of the relay module, one terminal of this 5V supply will be connected to the common pin of the relay module and the other pin will be connected to the N_O pin (normally open pin) of the relay module through the water pump.

- Connect the motor and the wire connected to the common pin of the relay module to the battery.

- With the help of Arduino IDE (1.8.18 Windows Software), process the code required for the project.

Now, Give connection between laptop and Arduino through a USB cable

## Proposed Idea :

There are two functional components in this paper. They are moisture sensor and motor / pump. Arduino board is programmed using the Arduino IDE software. Humidity sensor is used to detect the soil moisture content. Motor / pump is used to supply water to plants. Soil moisture and temperature predetermined range is set particularly for specific plants requirement, and according to that system is being operated. Microcontroller (ATmega328), is the brain of the system. Both humidity and temperature sensor is connected to the controller's input pin. Pump and servo motor coupled to the output pin. In case of soil_moisture value is less than threshold system automatically triggers water pump on till sensor meets threshold and then sets off automatically.

### 1. Detecting Moisture Content:

This will be achieved by soil moisture sensor. They are connected to an Arduino microcontroller board. Arduino board is programmed using the IDE software. Humidity sensor senses to indicate that the plant needs watering humidity levels in the soil, and sends the signal to the Arduino.

## 2. Automatic Watering To The Plant:

In this work we have used an Arduino microcontroller in combination with relay control switch to control the motor and overall functioning. Motor may be driven by external 9V battery with interfacing to microcontroller.

## Components used for implementation of system :

**1. Arduino Uno :** Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input / output pins (of which 6 can be used as PWM outputs), 6 analog inputs, 16 MHz ceramic resonator, USB connection, power jack, ICSP plug, and a reset button. It contains everything needed to support the microcontroller; simply use the USB cable or power it with a AC-to-DC adapter or battery is connected to a computer begins.
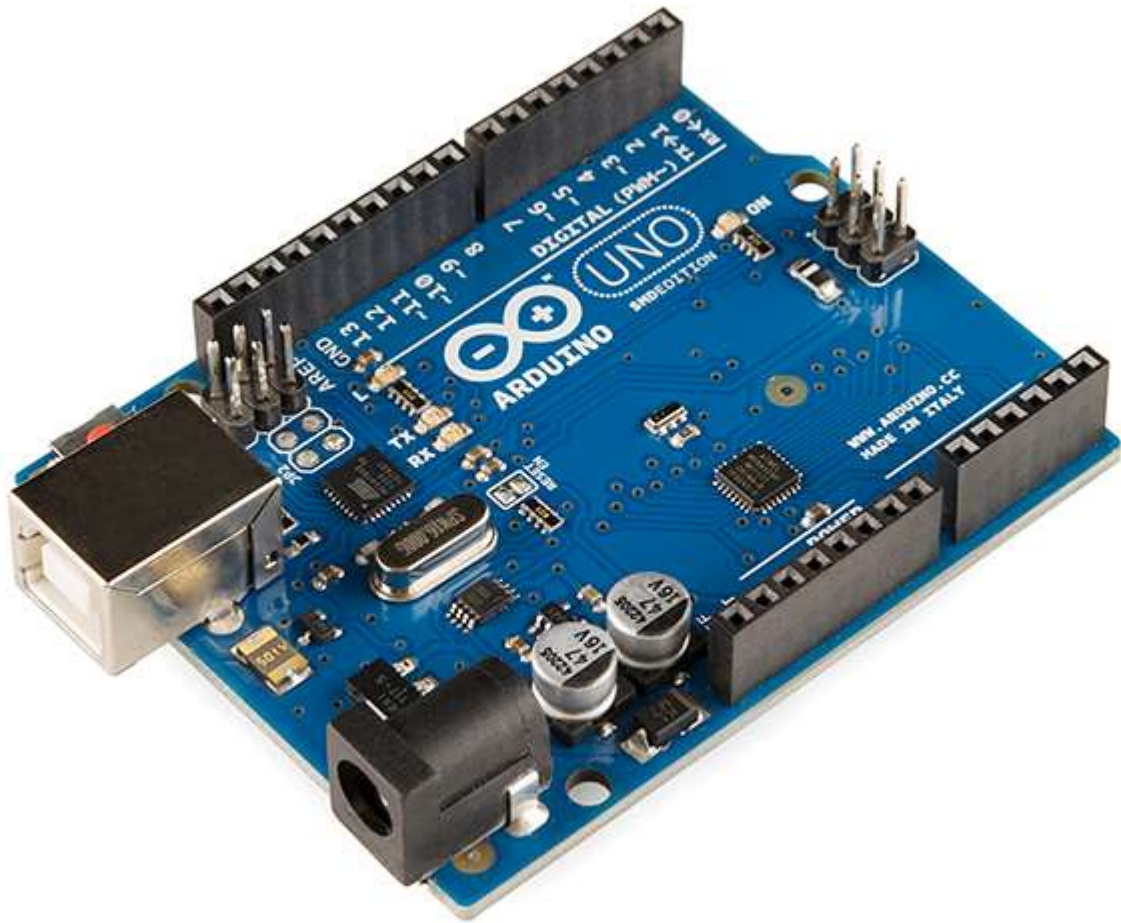
**2. Moisture sensor :** Soil moisture sensor  measures the soil water content. Soil moisture probe consists of a plurality of soil moisture sensors. Soil moisture sensor technology, commonly used are: •Frequency domain sensor, such as a capacitive sensor. • Neutron moisture meter, characteristic of the use of water in the neutron moderator. • Soil resistivity. In this particular project, we will use the soil moisture sensors which can be inserted into soil to measure the soil moisture content.
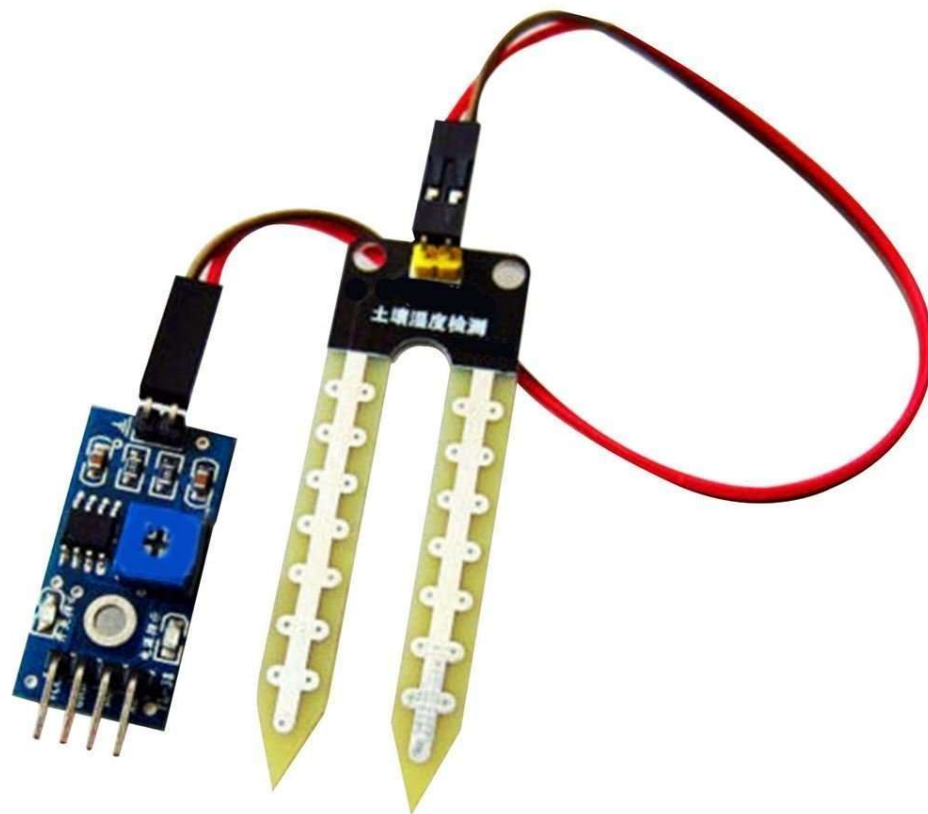
**3.Water Pump :** Water is used to perform a specific task of artificially pumping. It can be controlled by an electronic microcontroller. It can be on 1 triggered by sending the signal and turned off as needed. Artificial process is called Water Pumping Station. There are many varieties of pumps. This project uses a small pump connected to the H-bridge.

## 4. 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.
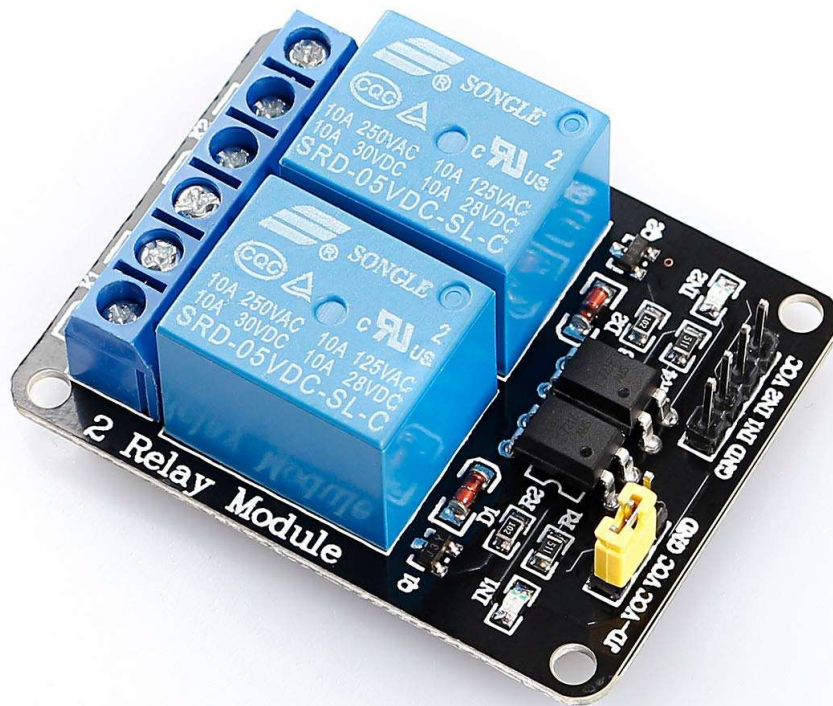
## 5. Arduino IDE Tool :

Arduino open-source environment, you can easily write code and upload it to the 110 board. It runs on Windows, Mac OS X and Linux. Environment is written in Java, and according to the processing, AVC-GCC, as well as other open source software.

## 6. Code :

Automated plant watering system is programmed using Arduino IDE software. Arduino microcontroller checks soil moisture level, if low, triggering a water pump on until sensor reaches threshold. After this, the system will re-check the soil moisture between periodic intervals to see if you need more water. If the water in the initial inspection, no water or comment, the system waits 24 hours, and repeat the process.

## The code is :

int WATERPUMP = 13; //motor pump connected to pin 13

```
int sensor = 8; //sensor digital pin vonnected to pin 8

int val; //This variable stores the value received from Soil moisture sensor.


void setup() {


  pinMode(13,OUTPUT); //Set pin 13 as OUTPUT pin

  pinMode(8,INPUT); //Set pin 8 as input pin, to receive data from Soil moisture sensor.

  //Initialize serial and wait for port to open:

  Serial.begin(9600); // opens serial port, sets data rate to 9600 bps

  while (! Serial);// wait for serial port to connect. Needed for native USB

  Serial.println("Speed 0 to 255");

}


void loop()

  {

  if (Serial.available()) //loop to operate motor

  {

    int speed = Serial.parseInt(); // to read the number entered as text in the Serial Monitor

    if (speed >= 0 && speed <= 255)

    {

      analogWrite(WATERPUMP, speed);// tuns on the motor at specified speed

    }

  }

  val = digitalRead(8);  //Read data from soil moisture sensor

  if(val == LOW)

  {

  digitalWrite(13,LOW); //if soil moisture sensor provides LOW value send LOW value to
motor pump and motor pump goes off

  }

  else

  {
```

```
   digitalWrite(13,HIGH); //if soil moisture sensor provides HIGH value send HIGH value to
motor pump and motor pump get on

  }

  delay(400); //Wait for few second and then continue the loop.

}
```

## Objectives :

1. Watering the plant to make it survive.

2. Maintaining the soil with a suitable moisture for the roots .

3. This automatic system will help to live the plants in the absence of humans

## Results and Discussion :

From this work, we can control the moisture content of the soil of cultivated land. According to soil moisture, water pumping motor turned on or off via the relay automatically. This saves water, while the water level can be obtained in a preferred aspect of the plant, thereby increasing productivity of crops. Servo motor from vegetation water uniformly dispersed in water, in order to ensure the maximum utilization of absorption through. Thus, there is minimal waste of water. The system also allows the delivery to the plant when needed based on the type of plant, soil moisture, and observed temperature. The proposed work minimize the efforts of major agricultural regions. Many aspects of the system can be customized and used software to fine-tune the requirements of the plant. The result is a scalable, supporting technology. Using this sensor, we can see that the soil is wet or dry. If it is dry, the motor will automatically start pumping water.

## Conclusion :

Automatic system using a microcontroller, moisture sensor and other electronic tools were been developed. It was observed that the proposed methodology controls the moisture content of the soil of cultivated land. The motor automatically start pumping water if the soil is dry and need water and stops when the moisture content of the soil is maintained as required.

## References :

1. S. V. Devika, SK. Khamuruddeen et aI., "Arduino based automated plant watering system" in International Journal of Advanced Research in Computer Science and Software Engineering, Volume 4, Issue 10, October 2014.

2. Jonathan Gana Kolo, "Design and Construction of an Automatic Power Changeover Switch" in AU Journal of Technology, 11(2): (Oct. 2007).

3. S. Darshna et aI., "Smart Irrigation System" in IOSR Journal of Electronics and Communication Engineering (IOSR JECE), Volume 10, Issue 3, Ver. II (May -Jun.2015).

4. Jesper Sandberg and Thomas Kockholm, "iPlant: Inteligent Plant System", in SPCL-2012 – Report.