SRI VENKATESWARA INTERNSHIP PROGRAM
FOR RESEARCH IN ACADEMICS
(SRI-VIPRA)

SRI-VIPRA

Project of 2023:

Report

SVP-2344

"Automation of Plant Watering System Using Arduino"

IQAC
Sri Venkateswara College
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SRIVIPRA PROJECT 2023

Title: Automation of Plant Watering System Using Arduino

Name of Mentor: Dr. Rakhi Narang **Name of Department: Electronics** **Designation: Assistant Professor**	**Photo** 

List of students under the SRIVIPRA Project

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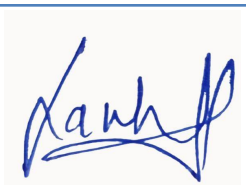
1		Janhavi	1621018	Electronics	
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Signature of Mentor

Certificate of Originality

This is to certify that the aforementioned students from Sri Venkateswara College have participated in the summer project SVP-2344 titled "**Automation of Plant Watering System"**.The participants have carried out the research project work under my guidance and supervision from 15 June, 2023 to 15thSeptember 2023. The work carried out is original and carried out in an online/offline/hybrid mode.

Signature of Mentor

Acknowledgements

On the great occasion of accomplishment of our project on "Automation of Plant Watering System Using Arduino", we would like to sincerely thank and express our gratitude to **Dr. Rakhi Narang,** who have been supporting us throughout the project. Without their valuable knowledge and motivation this project would never have been completed.

We would also like to thank our former principal **Prof. C. Sheela Reddy** and **Prof. K. C. Singh (Acting Principal)**, Sri Venkateswara College, for providing all the required facilities for completion of this project.

We would also like to thank IEEE EDS Delhi Chapter for providing all the financial support for this project work.

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ABSTRACT

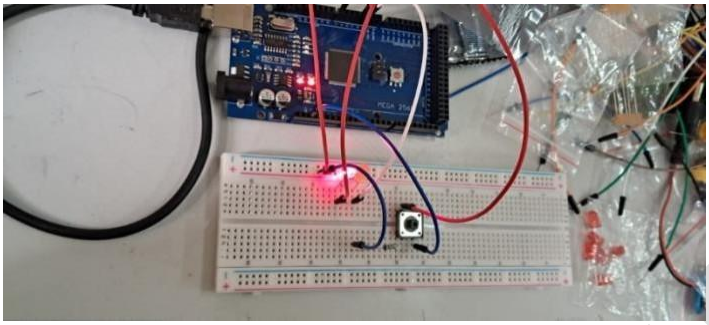
This report will be containing the Automation of Plant Watering Or Irrigation System using Arduino Microcontroller Board based on the ATmega328P. The first chapter of this report is based on introduction to Arduino which will brief us about it's design and how it is used. The second chapter of this report deals with nanoHUB part and then starting from third chapter onwards all the chapters in this report will be dealing with the main project "Automation Of Plant Watering System", in which third chapter is consist of components used in the project, fourth is dealing with the designing of the circuit digitally and fifth is based on the manual representation of the project.

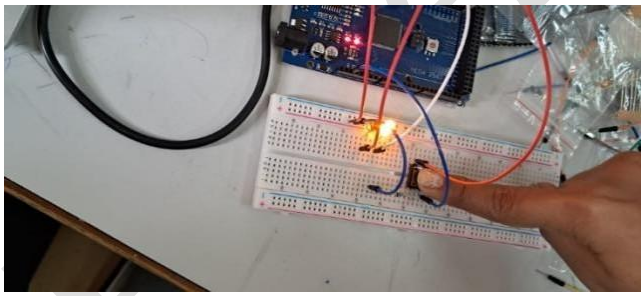
CHAPTER 1: Introduction to Arduino

Arduino is a combination of both, **Hardware and Software** System. Hardware system consist of micro-controller board, contains on board power supply, **USB port to communicate with PC and an Atmel micro-controller chip** whereas Software system consist of the open-source **Arduino Software (IDE)** makes it easy to write code and upload it to the board which enables the board to perform the action accordingly and this software can be used with any Arduino board.

By using this hardware and software system together, we can make many projects by using different sensors such as **Humidity Sensor, Water Level Sensor, Soil Humidity Sensor, RFID Sensor** and etc. Now-a-days, these things are mostly used in Industries, Hotels, Agriculture and many more places. Smart Homes, Smart City,

Vehicle and Transport, Agriculture, Medical Facilities and etc. Now if we come to a doubt of, **How it actually works? So,** Arduino works as an **interface** between the other components and PC. We connect the required components like Sensors, LEDs, Chips and other hardware components with the arduino board and write the corresponding code in the software in PC, then connect the arduino board with the PC using Data Cable and then run the code which will activate the board resulting in the desired output**.**





The images above shows how arduino gives the desired output when interfaced with Push Button/ Digital Sensor (IR/LDR) using the code written below in the Arduino IDE Software,

```
const int b_pin = 7; const int led_pin = 3; const int l2_pin = 2; void setup() {
// put your setup code here, to run once:

pinMode(b_pin,INPUT); pinMode(led_pin, OUTPUT); pinMode(l2_pin,OUTPUT);

}
void loop() {
  // put your main code here, to run repeatedly: if(digitalRead(b_pin) == LOW)
{digitalWrite(led_pin, HIGH); digitalWrite(l2_pin,LOW);}
else
{
digitalWrite(led_pin, LOW); digitalWrite(l2_pin,HIGH);}
}
```

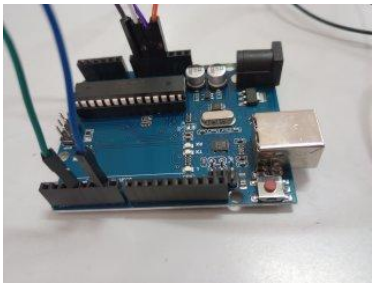
CHAPTER 2: nanoHUB

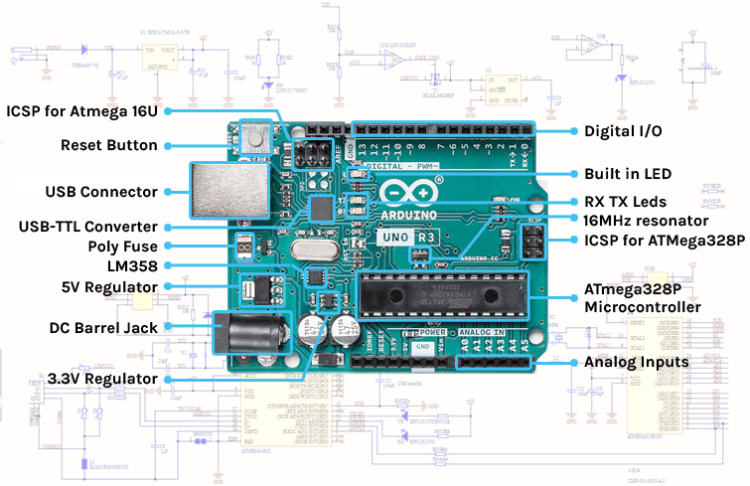
Founded in 2002, nanoHUB is an open and free online platform for computational education, research, and collaboration in nanotechnology, materials science, and related fields. We host a growing collection of simulation tools that run in the cloud and are freely accessible through a web browser. In addition to these tools, nanoHUB is home to thousands of resources including teaching materials, courses, presentations, workshops, and more. These resources instruct users about their simulation tools as well as general nanoelectronics, materials science, photonics, data science, and other topics.

CHAPTER 3: Components Used In The Project

In this, **Automatic Plant Watering System**, project we have different components which can be used for automation of various other things also. And the main and most important from all is, **Arduino Uno Board**, which is the main micro-controller board we will use in this project. Other components are**, Soil Moisture Sensor, 5V Relay Module, 5V DC Water Pump and Tube, Jumper Wires and A Plant**. Let's put some light on each and every component in brief.

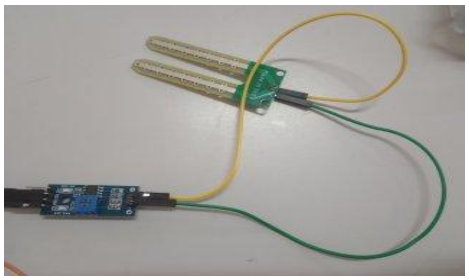
1. Arduino Uno Board

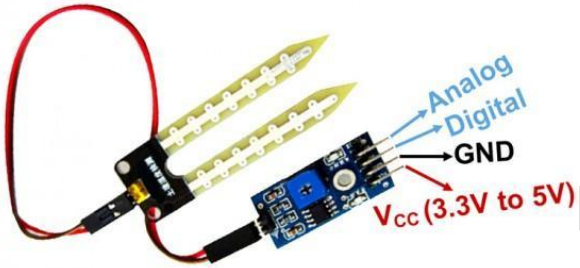




Arduino UNO is a microcontroller board based on the **ATmega328P**. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

2. Soil Moisture Sensor





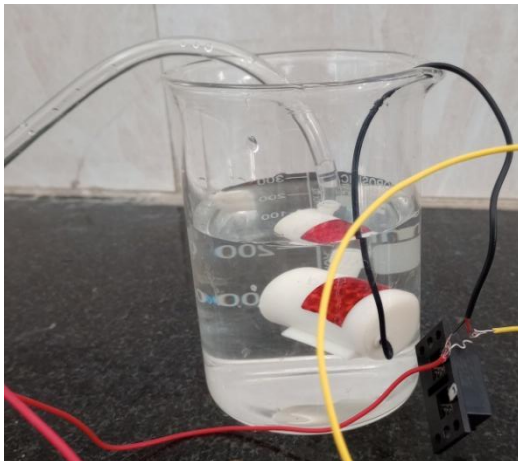
The soil moisture sensor is one kind of sensor used to gauge the volumetric content of water within the soil. As the straight gravimetric dimension of soil moisture needs eliminating, drying, as well as sample weighting. These sensors measure the volumetric water content not directly with the help of some other rules of soil like dielectric constant, electrical resistance, otherwise interaction with neutrons, and replacement of the moisture content. This sensor mainly utilizes capacitance to gauge the water content of the soil (dielectric permittivity). The working of this sensor can be done by inserting this sensor into the earth and the status of the water content in the soil can be reported in the form of a percent.

3. 5V Relay Module

A 5v relay is an automatic switch that is commonly used in an automatic control circuit and to control a high-current using a

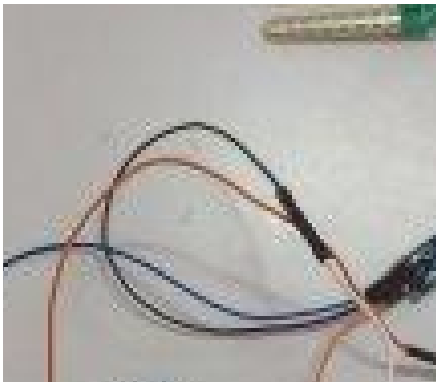
low-current signal. The input voltage of the relay signal ranges from 0 to 5V. The relay module with a single channel board is used to manage high voltage, current loads like solenoid valves, motor, AC load & lamps. This module is mainly designed to interface through different microcontrollers like PIC, Arduino, etc.

4. 5V DC Water Pump and Tube



DC water pumps are small pumps powered by a battery, dc power supply, or solar panel. Their primary use is to circulate, pressurize, and emulsify liquids. They are particularly useful in environments where water is in short supply. The water pump works using water suction method which drain the water through its inlet and released it through the outlet. You can use the water pump as exhaust system for your aqurium and controlled water flow fountain.

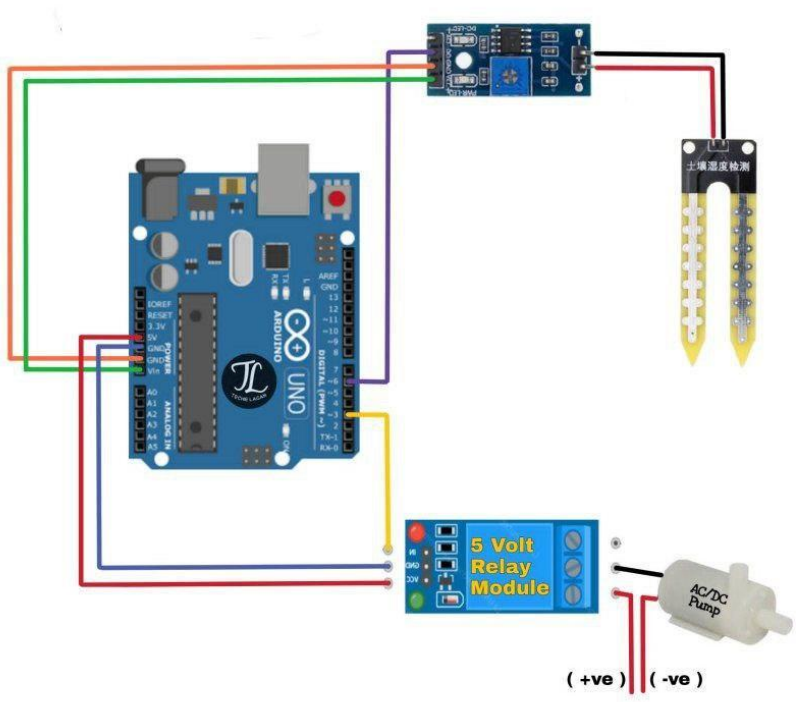
5. Jumper Wires



20 cm

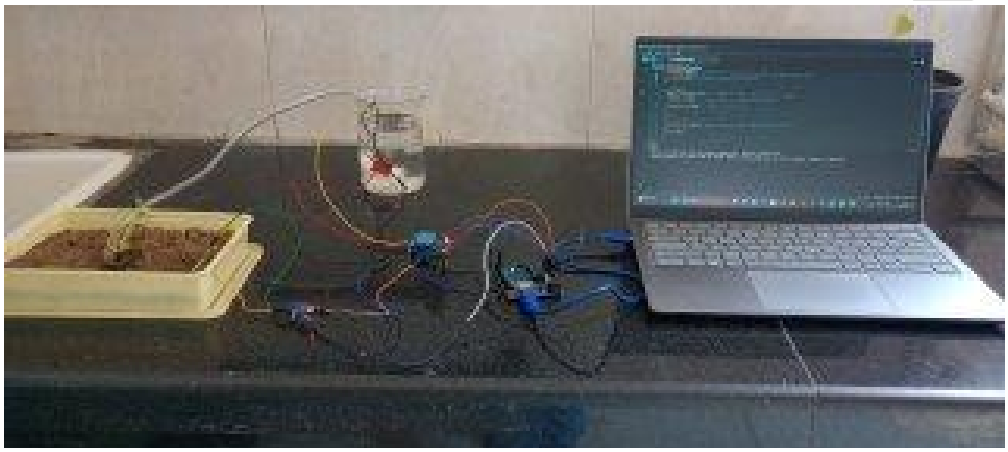
Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed. Fairly simple. In fact, it doesn't get much more basic than jumper wires. Jumper wires typically come in three versions: male-to-male, male-to-female and female-to-female. The difference between each is in the end point of the wire. Male ends have a pin protruding and can plug into things, while female ends do not and are used to plug things into. Male-to-male jumper wires are the most common and what you likely will use most often. When connecting two ports on a breadboard, a male-to-male wire is what you'll need.

CHAPTER 4: Digital Diagram Of The Circuit



To make it easier to understand and perform we first designed the desired circuit using simulation software. This helped us in understanding the actual structure and connections for the manual designing.

CHAPTER 5: Design and Implementation Of the Cicuit



In this circuit, we manually connected all the required connection to their corresponding pins of the arduino.

- **The VCC pin of Soil Moisture Sensor is connected with the 3.3V pin of Arduino.**
- **The Ground pin of Soil Moisture Sensor is connected with the Ground pin of Arduino.**
- **The DO pin Soil Moisture Sensor is connected with the digital pin no. 6 of Arduino.**
- **The two pins on the other side od Soil Moisture Sensor are connected with the 2nd part of the sensor.**
- **The VCC pin of 5V Relay Module is connected with the 5V pin of Arduino.**
- **The Ground pin of 5V Relay Module is connected with the Ground pin of Arduino.**
- **The Signal pin of 5V Relay Module is connected with the digital pin no. 3 of Arduino.**

- **The two common pins at the other side of 5V Relay Module are connected with the 5V DC Water Pump which is already joined to a transparent tube pipe.**
- **The Arduino Uno Board is connected to the Laptop through a USB Cable.**

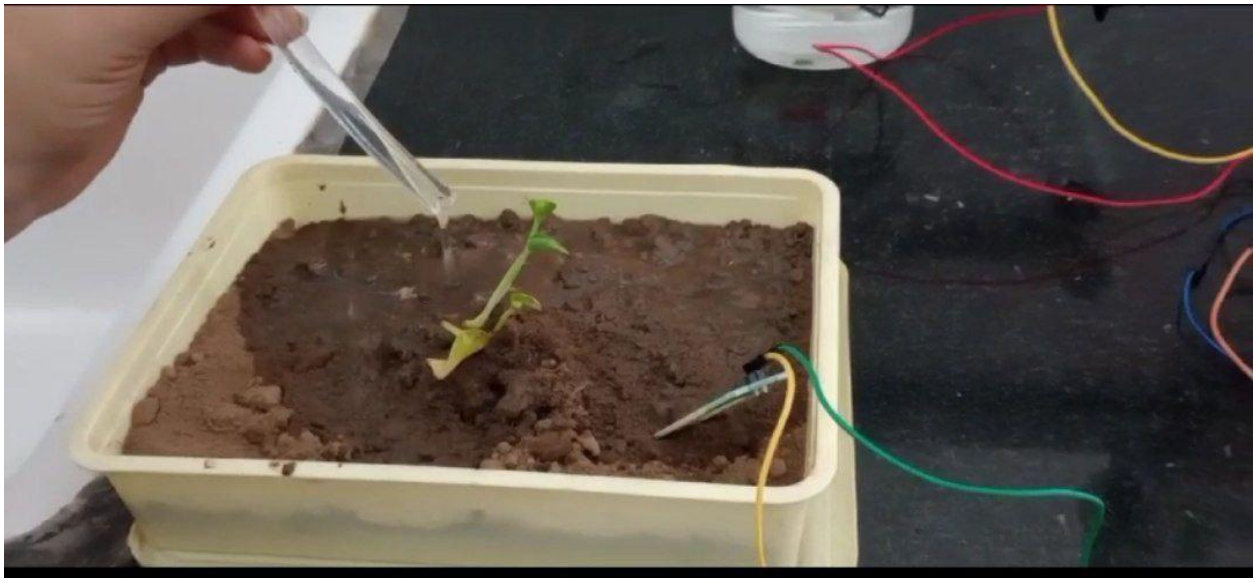
Note: All the Other Connection except 5V DC Water pump to Relay Module are done using Jumper Wires.

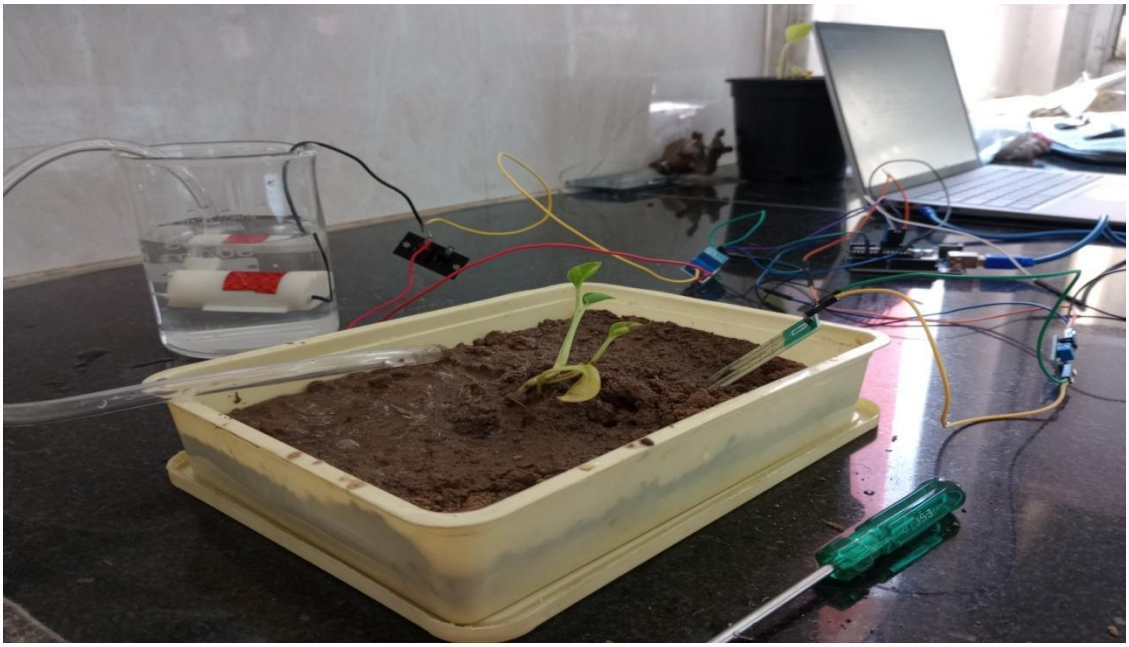
The Corresponding Code, we wrote in the Arduino IDE Software was:

```
int water; //random variable
void setup() {
pinMode(3,OUTPUT); //output pin for relay board, this will sent signal to the relay
pinMode(6,INPUT); //input pin coming from soil sensor
}

void loop() {
water = digitalRead(6);  // reading the coming signal from the soil sensor
if(water == HIGH) // if water level is full then cut the relay
{
digitalWrite(3,LOW); // low is to cut the relay
}
else
{
digitalWrite(3,HIGH); //high to continue proving signal and water supply
}
delay(400);
}
```

Through all these connections and the code above we got the desired output of our project, which was to make the flow of water run according to the need of the plant.





The pictures above shows, first picture shows the water flowing through the pipe for the time needed to reach the equal moisture level whereas second picture shows us that the water has stopped flowing due to completely reach the required moisture level.

CHAPTER 6: Conclusion

To conclude our report, we have divided it in the **Five Chapters**. In the **First Chapter**, we have discussed about the Arduino and its Application in our daily lives and how it's becoming a necessity for us. In the **Second Chapter**, we have discussed about nanoHUB and its uses. In the **Third Chapter**, we have discussed about all the Components we used in the making of this project. In the **Fourth Chapter**, we have discussed about the digitally designing the circuit whereas in the **Fifth Chapter**, we have discussed about Manually Making, Checking its Working and Finding its Applications in the future.

By this project, we can conclude that **"Automation of the Plant Watering System"** is a very useful technique and discovery for our upcoming generation. It can be used in **Houses, Vegetations, and most importantly for Agricultural purposes**.

CHAPTER 7: Reference

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