SHRI DNYANESHWAR MASKUJI BURUNGALE SCIENCE & ARTS COLLEGE, SHEGAON

DEPARTMENT OF ELECTRONICS

CERTIFICATE

This is certify that, the electronics project entitled "**AUTOMATIC PLANT WATERING** "has been submitted by B.sc III Semester-VI under my guidance in partial fulfillment of degree of Bachelor of Science of Sant Gadge Baba Amravati University, Amravati. During the academic year 2022-2023

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CHAPTER NO: 1 INTRODUCTION

An automatic plant watering system that incorporates a 5 volt relay, soil measuring sensor, and a 5 volt water pump is a practical and effective way to automate plant care. This type of system utilizes a microcontroller or a similar programmable device to activate the water pump based on readings from the soil measuring sensor. When the moisture level in the soil drops below a set threshold, the microcontroller triggers the relay to activate the water pump, which then supplies water to the plant until the moisture level reaches the optimal level.

The 5 volt relay serves as an electrical switch that enables the microcontroller to control the water pump. The soil measuring sensor provides accurate readings of the moisture level in the soil and communicates this information to the microcontroller. The 5 volt water pump delivers water to the plant as needed and can be customized to meet the specific needs of different types of plants.

An automatic plant watering system that incorporates these components can be used in various applications, such as indoor and outdoor gardens, hydroponic systems, and greenhouses. By automating the watering process, this type of system can help ensure that plants receive the right amount of water at the right time, leading to improved plant growth and reduced water waste.

CHAPTER NO: 2 DETAILS OF COMPONENT

List of component for electronic letter box.

Sr. No.	Components	Specification
1.	Soil Moisture Measuring Sensor	-
2.	5 volt relay	5 V
3.	5 volt Water pump	5 V
4.	Power Supply	5 V
5.	Solder gun	-
6.	Lead Solder	-
7.	Connecting Wires(Jumper Wires)	-

Table: 2 List of Components for in Automatic plant watering system

2.1 Details of Automatic plant watering components

1. Soil Moisture Measuring Sensor

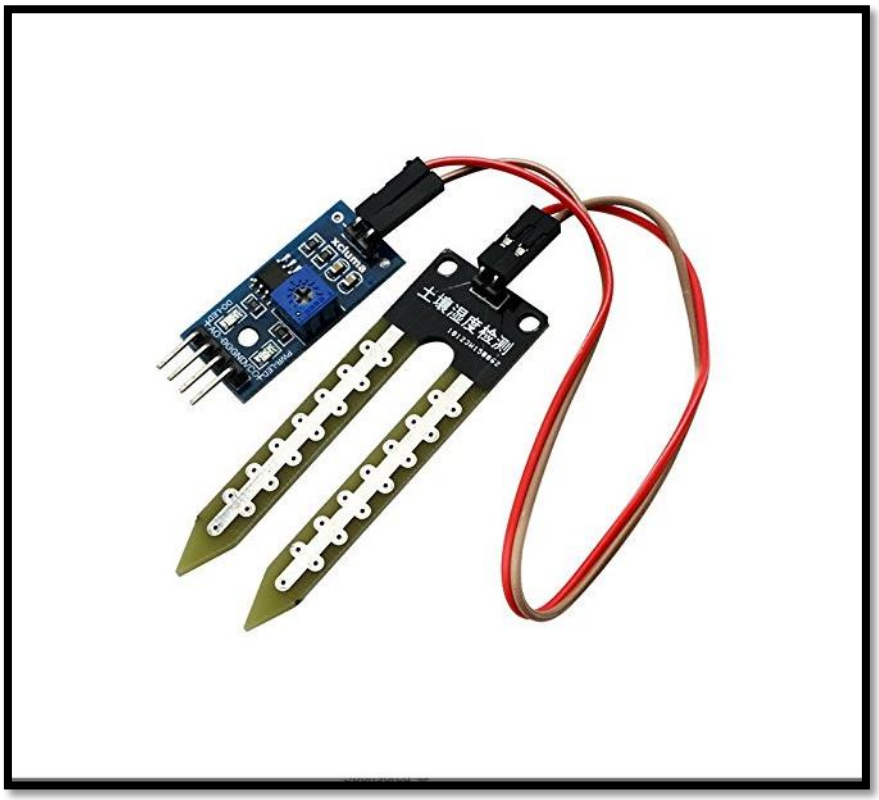

Fig: 2.1 Moisture Sensor

A soil moisture measuring sensor is an electronic device that measures the moisture level in the soil. It typically consists of two metal probes that are inserted into the soil, and a circuit board that measures the electrical resistance between the probes. When the soil is dry, the resistance is high, but when the soil is moist, the resistance is low. By measuring the resistance between the probes, the sensor can determine the moisture level in the soil and provide this information to a microcontroller or similar device.

Soil moisture sensors can be used in various applications, such as gardening, agriculture, and environmental monitoring. They can help optimize irrigation schedules, prevent over-watering and under-watering, and promote efficient

water use. They can also be used in combination with other sensors, such as temperature and humidity sensors, to provide a more comprehensive understanding of soil conditions.

There are various types of soil moisture sensors available, including capacitance sensors, tensiometers, and gypsum blocks. Capacitance sensors are among the most common and are often used in automated plant watering systems. They are relatively inexpensive, easy to use, and provide accurate readings of soil moisture levels.

The pin specification of a soil moisture sensor in an automatic plant watering system may vary depending on the specific sensor model and the microcontroller being used. However, generally, most soil moisture sensors have two probes that are inserted into the soil, and they are connected to the microcontroller through two wires.

Pin 1: VCC pin: This pin is connected to a 5V power supply to provide power to the sensor.

Pin 2: GND pin: This pin is connected to the ground of the microcontroller.

Pin 3: Analog output pin: This pin provides an analog output signal that is proportional to the moisture level in the soil. This signal is typically connected to an analog input pin of the microcontroller.

It is important to note that different sensors may have different pin configurations, and it is important to consult the datasheet or user manual of the specific sensor being used to determine the correct pin configuration. Additionally, it is essential to ensure that the microcontroller being used is compatible with the voltage and signal levels of the soil moisture sensor to ensure accurate and reliable readings.

2. 5 Volt Relay

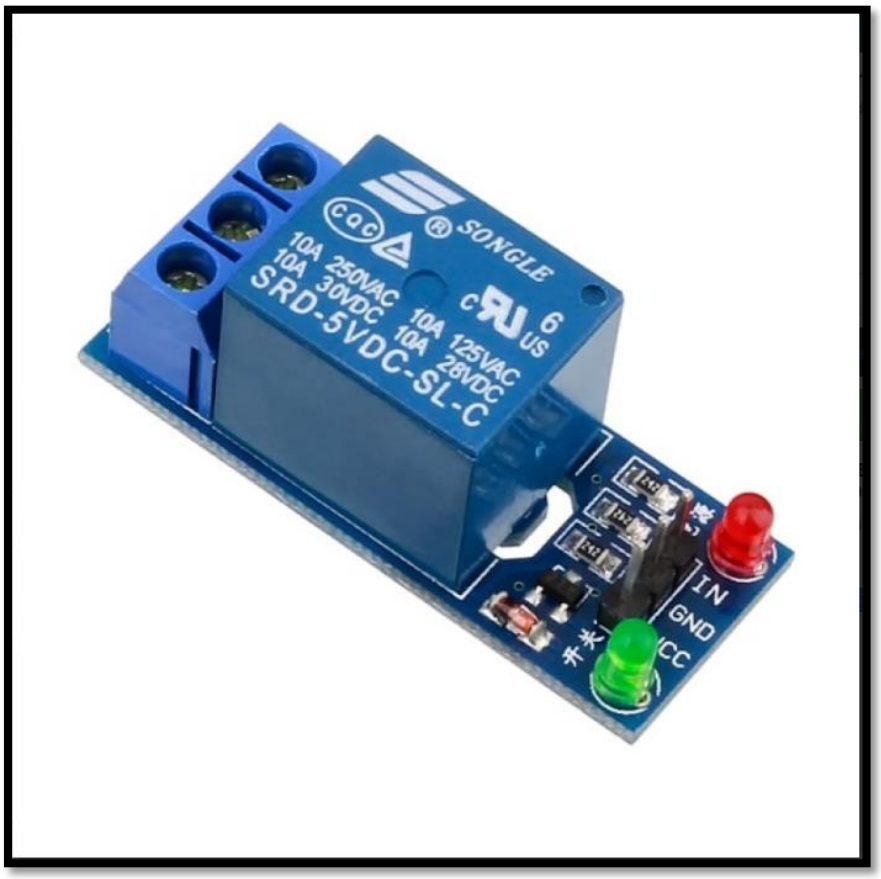

Fig: 2.2 5 Volt Relay

A 5 volt relay is an electrical switch that can be used in an automatic plant watering system to control the flow of current to a water pump. It is a type of electromechanical switch that uses an electromagnetic coil to control the position of one or more switch contacts.

In an automatic plant watering system, the relay is typically controlled by a microcontroller or similar device that monitors the moisture level in the soil using a soil moisture sensor. When the moisture level drops below a set threshold, the microcontroller triggers the relay, which then activates the water pump to supply water to the plants.

The specific pin configuration of the 5 volt relay in an automatic plant watering system may vary depending on the specific relay model and the microcontroller being used. However, most relays have two coils pins and two switch contact pins. The coil pins are typically connected to the microcontroller or a power source, and the switch contact pins are connected to the water pump to control the flow of current.

In an automatic plant watering system, a 5V relay can be used to control the water pump. The specific pin configuration of the relay may vary depending on the specific relay model and the microcontroller being used. However, here is a general description of the pin configuration of a 5V relay used in an automatic plant watering system:

Pin 1: Coil pins: The relay has two coil pins that are used to control the position of the switch contacts. These pins are usually labeled as "coil +" and "coil -". The "coil +" pin is connected to a 5V power source, and the "coil -" pin is connected to a control signal, which is typically provided by a microcontroller or other control circuit.

Normally open (NO) contact: The NO contact is a switch that is open when the relay is not activated. When the relay is activated by applying a voltage to the coil, the switch contacts close, allowing current to flow through the contact. This pin is typically labeled as "NO" or "NC" and is connected to the water pump's positive terminal.

Normally closed (NC) contact: The NC contact is a switch that is closed when the relay is not activated. When the relay is activated by applying a voltage to the coil, the switch contacts open, interrupting the flow of current through the contact. This pin is typically labeled as "NC" or "COM" and is not used in an automatic plant watering system.

It is essential to refer to the datasheet or user manual of the specific 5V relay being used to confirm the correct pin configuration.

3. 5 Volt Water Pump

Fig: 2.3 5 volt Water Pump

In an automatic plant watering system, a 5V water pump can be used to supply water to the plants. Here is some information about the 5V water pump that can be used in an automatic plant watering system:

Voltage: The 5V water pump requires a 5V power supply to operate.

Flow rate: The flow rate of the water pump determines how much water is delivered to the plants. Different models of water pumps have different flow

rates, so it is important to choose a water pump with a flow rate that is appropriate for the size of the plants and the amount of water they require.

Head height: The head height of the water pump is the maximum height at which the pump can deliver water. If the plants are located at a higher level than the water source, a water pump with a higher head height may be required.

Power consumption: The power consumption of the water pump determines how much power is required to operate the pump. Lower power consumption is desirable to ensure that the system can be powered by a small power source such as a battery or a low power supply.

Pump type: There are different types of water pumps available for use in an automatic plant watering system, including centrifugal pumps and diaphragm pumps. Centrifugal pumps are typically used for larger plants, while diaphragm pumps are more suitable for smaller plants.

It is important to choose a water pump that is compatible with the 5V relay and other components of the automatic plant watering system. It is also important to ensure that the water pump is durable and reliable to ensure long-term operation of the system.

2.6 Soldering Iron

A soldering iron is a hand tool used in soldering. It supplies heat to melt solder so that it can flow into the joint between work pieces. A soldering iron is composed of a heated metal tip and an insulted handle. Heating is often achieving electrically, by passing an electric current through resistive heating element.

Fig: 2.4 Soldering Iron

Soldering irons are most often used for installation, repairs and limited production work in electronics assembly. High volume production line use other soldering g methods.

3.7 Lead Solder

Lead solder is commonly used in electronic applications, including building an automatic plant watering system. However, the use of lead solder is becoming increasingly restricted due to environmental and health concerns.

Lead is a toxic metal that can cause harm to human health and the environment. When lead solder is used in electronic applications, it can release lead particles into the environment through the process of soldering or during disposal of the electronic equipment.

Fig: 2.5 Lead Solder

In recent years, lead-free solder has become more widely available and is recommended as a safer alternative to lead solder. Lead-free solder contains a combination of tin, silver, and copper, which have lower environmental and health risks compared to lead.

It is important to consider the potential health and environmental impacts when selecting solder for an automatic plant watering system. If using lead solder, it is important to handle it with care and dispose of it appropriately to prevent harm to human health and the environment. Alternatively, using lead-free solder can be a safer option for building an automatic plant watering system.

3.8 Connecting wires

Cable in electrical and electronic systems a conductor or group of conductors for transmitting electric power or telecommunication signals from one place to another.

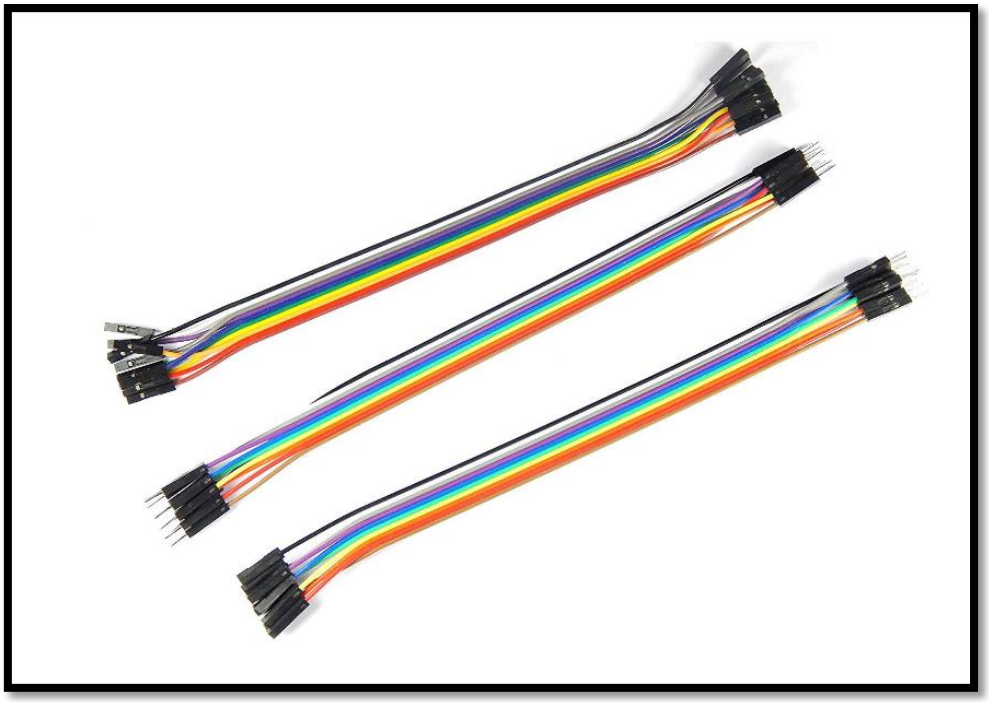

Fig: 2.6 Connecting Wires

Connecting wires are an essential component in building an automatic plant watering system. They are used to connect different components of the system, such as the moisture sensor, water pump, and 5V relay, to the microcontroller or other control circuit.

When choosing connecting wires for an automatic plant watering system, it is important to consider the following factors:

CHAPTER NO: 3 DESIGNING OF CIRCUIT

3 Design of Automatic Plant Watering

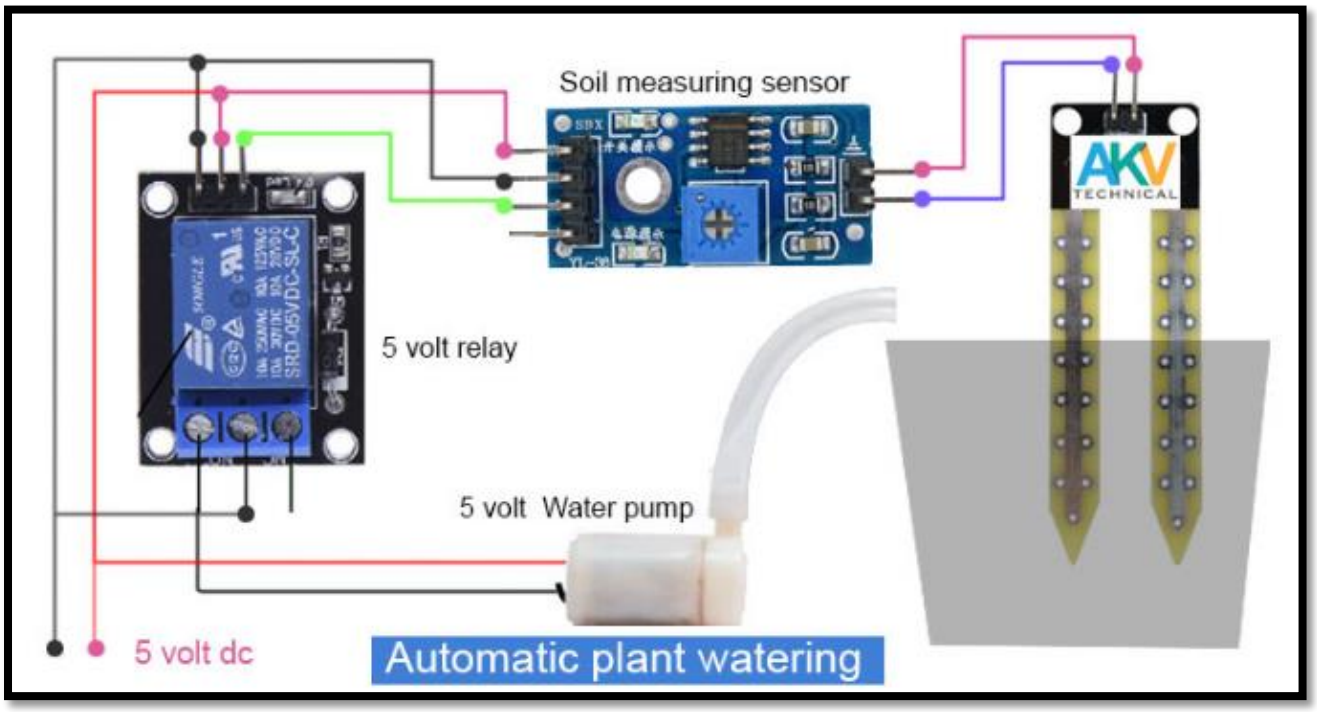

Fig: 3 Automatic Plant Watering

Materials:-

1. 5V relay module
2. 5V water pump
3. Moisture sensor module
4. Jumper wires
5. 5V power supply (such as a USB power bank)

- Step-by-step instructions:

- Connect the VCC and GND pins of the moisture sensor module to the 5V and GND rails on the breadboard.
- Connect the analog output pin of the moisture sensor module to the base pin of a transistor.
- Connect the emitter pin of the transistor to GND on the breadboard.
- Connect the collector pin of the transistor to the IN pin of the relay module.
- Connect the VCC and GND pins of the water pump to the 5V and GND rails on the breadboard.
- Connect the positive (+) wire of the water pump to the NO (normally open) pin of the relay module.
- Connect the negative (-) wire of the water pump to the GND rail on the breadboard.
- Connect the VCC and GND pins of the relay module to the 5V and GND rails on the breadboard.
- Adjust the threshold of the moisture sensor using the potentiometer on the module to suit your needs.
- Test the system by placing the moisture sensor in a pot of dry soil and observing whether the water pump turns on. Adjust the threshold value using the potentiometer as needed.
- That's it! You now have an automatic plant watering system using a 5V relay, 5V water pump, 5V power supply, and a moisture sensor without using Adriano.

CHAPTER NO: 4 WORKING

4. Working of Automatic Plant Watering

An automatic plant watering system without Arduino typically consists of a moisture sensor, a relay, and a water pump. The moisture sensor detects the moisture level in the soil and sends a signal to the relay when the moisture level falls below a certain threshold. The relay then switches on the water pump, which pumps water from a reservoir to the plant.

When the moisture level in the soil rises above the set threshold, the sensor sends a signal to the relay to turn off the water pump. This prevents overwatering and ensures that the plant gets just the right amount of water.

The moisture sensor typically has two probes that are inserted into the soil. The probes are connected to an amplifier that amplifies the small voltage difference between the probes. The amplified signal is then sent to a comparator circuit that compares the signal with a reference voltage set by a potentiometer. If the signal falls below the reference voltage, the comparator sends a signal to the relay to turn on the water pump.

The relay is an electronic switch that is used to turn on or off a high-current load such as a water pump. When the relay receives a signal from the comparator, it switches on and allows current to flow through its contacts, which in turn switches on the water pump.

The water pump is typically a small DC pump that is powered by a low voltage power supply such as a 5V USB power bank. The pump is connected to the NO (normally open) contact of the relay so that it only turns on when the relay is activated.

Overall, an automatic plant watering system without Adriano is a simple and effective way to ensure that your plants receive the right amount of water, without the need for complex programming or microcontrollers.

CHAPTER 5: RESULT AND CONCLUSION

5.1 Result

1. Consistent watering: With an automatic plant watering system in place, you can ensure that your plants receive a consistent amount of water, even when you are away from home or too busy to water them manually. This can help promote healthy growth and prevent over or under-watering, which can damage the plants.
2. Time-saving: An automatic plant watering system can save you time and effort, as you no longer need to water your plants manually. This can be especially beneficial if you have a large garden or a busy schedule.
3. Water conservation: By using a moisture sensor to detect when the soil is dry, an automatic plant watering system can help conserve water by only watering the plants when necessary. This can be particularly important in areas with limited water resources or during droughts.
4. Customization: You can customize your automatic plant watering system to suit your specific needs and the needs of your plants. For example, you can adjust the watering schedule or the amount of water delivered to each plant.
5. Improved plant health: By providing your plants with consistent and appropriate amounts of water, an automatic plant watering system can help promote healthy growth and prevent plant stress. This can lead to healthier, more vibrant plants.

5.2 Conclusion

In conclusion, an automatic plant watering system can be a valuable tool for plant care, especially for those who have busy schedules or large plant collections. By using sensors and a microcontroller to automate the watering process, this type of system can help ensure that plants receive the right amount of water at the right time. The benefits of an automatic plant watering system include increased efficiency, improved plant health, and reduced water waste. When designing and implementing an automatic plant watering system, it is important to consider factors such as the type of plants being grown, the size of the growing area, and the local climate conditions. With careful planning and attention to detail, an automatic plant watering system can be a reliable and effective way to take care of plants and reduce the workload associated with plant care.

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