# RV Institute of Technology and Management

## Department of ECE

COURSE NAME: BASIC ELECTRONICS

COURSE CODE: BBEE203

II Semester

ASSIGNMENT – II

# TOPIC: RAINWATER SENSOR


Project report by:

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**CONTENT:**

## INTRODUCTION

A rainwater sensor using a TIMER 555 and a BEL 548A transistor is a simple electronic circuit designed to detect rain or moisture and trigger a specific action or alarm. This circuit can be useful in various applications such as automated irrigation systems, weather monitoring, or triggering alerts in case of rain.

This electronic circuit is designed to detect the presence of rain or moisture in the environment. This project leverages the 555 timer IC in an astable multivibrator configuration along with the BEL 548A transistor to create a responsive rain detection system.

Water is one of our most precious resources, and efficient management and monitoring of water levels are crucial in various applications such as agriculture, industrial processes, and environmental conservation. To address this need, the "Water Sensor Project" has been developed, utilizing the BEL 548 A transistor and a 555-timer integrated circuit (IC) to create an effective and affordable water level monitoring system.

This project aims to provide a cost-effective solution for detecting water levels in tanks, reservoirs, or other containers. By combining the unique characteristics of the BEL 548 A transistor and the versatile 555 timer, this sensor system can accurately measure water levels, trigger alerts, and even control external devices based on the water level readings.

## AIM

To design and construct a water level monitoring system utilizing the BEL 548 A transistor and a 555 timer IC to detect and indicate water levels accurately, with potential applications in water tanks, reservoirs, or other liquid level monitoring scenarios.

This project aims to create a functional water sensor system that can reliably sense and indicate different water levels. Such a system could be valuable for various purposes, including preventing water overflow, ensuring adequate water supply, or triggering alarms when water levels reach critical points.

When the rain sensor detects rain, it triggers the alarm. Rain detector alarm is an efficient way to stop irrigation whenever rain occurs. It is also used in home automation by users to reclaim their belongings, cover windows. In some situations, we can collect some rainwater water.

## OBJECTIVES

- Low-Cost Design: Design the water sensor using cost-effective components like the BEL 548 A transistor and 555 timers to ensure affordability and accessibility.

- Versatility: Design the system to be adaptable to different types of scenarios, making it suitable for various applications.

- Low Power Consumption: Optimize the power consumption of the system to prolong battery life or reduce energy costs when used in remote or off-grid locations.

- User-Friendly Interface: Implement an easy-to-use interface or indicator system to provide clear feedback to users about the water status.

- Alarm or Alert Mechanism: Incorporate an alarm or alert mechanism that notifies users when the water is detected.

- Integration: Explore opportunities for integrating the water sensor system with other devices or systems, such as IoT platforms or remote monitoring systems.

- Safety: Ensure that the design and installation of the system meet safety standards and guidelines, particularly if it is used in industrial or critical applications.

- Environmental Impact: Consider the environmental impact of the project and aim to minimize waste and energy consumption during the manufacturing and usage of the system.

- Scalability: Determine if the system can be easily scaled up for larger water monitoring applications, such as in agricultural irrigation or industrial processes.

- Maintenance and Durability: We have designed the system to be durable and require minimal maintenance over its lifespan.

- Education and Outreach: If applicable, develop educational materials or outreach programs to raise awareness about water conservation and the importance of water monitoring.

## PRINCIPLE

- Water Conductivity: The project relies on the electrical conductivity of water. Pure water is a poor conductor of electricity, but when impurities or ions are present in the water, it becomes a better conductor. This property is used to detect the presence of water.

- Transistor (BEL 548 A): The BEL 548 A transistor is likely used as a switching element in the circuit. Transistors can be configured as switches or amplifiers. In this project, it may act as a switch to control the 555-timer circuit based on the water's conductivity.

- 555 Timer IC: The 555 timer IC is a versatile integrated circuit that can be used in various timing and pulse generation applications. It can be configured as an astable multivibrator or monostable multivibrator. In this project, it may be used as an astable oscillator to generate a continuous square wave output.

- Oscillation Frequency: The frequency of the square wave generated by the 555 timers can be controlled by external resistors and capacitors. The conductivity of water may be used to change the resistance or capacitance in the circuit, thereby affecting the oscillator's frequency.

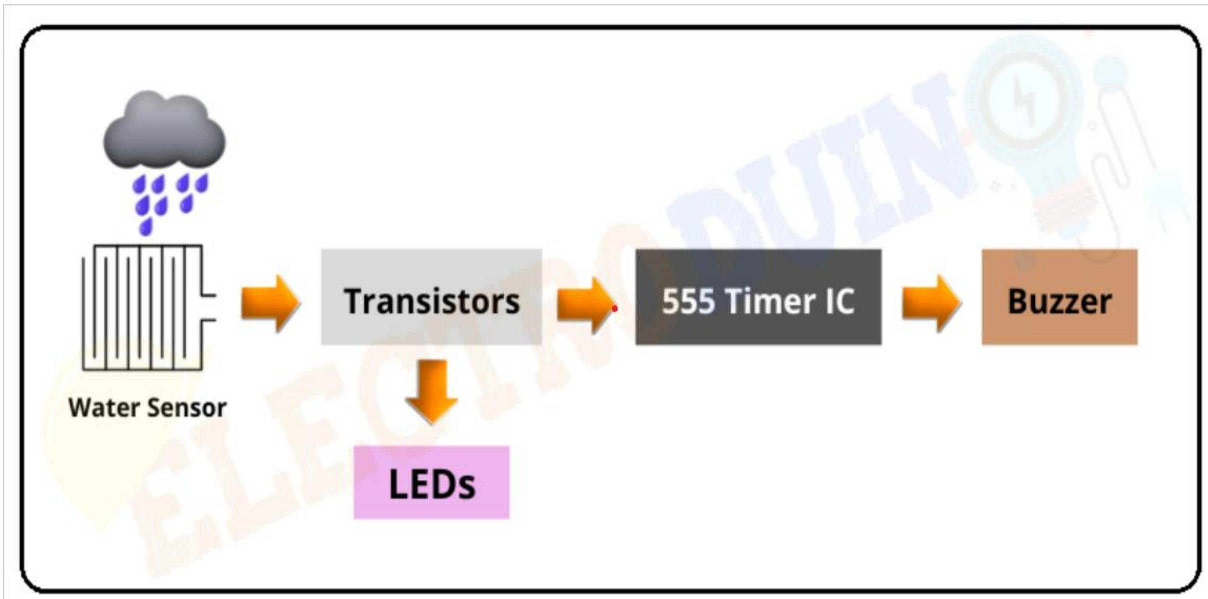
- Sensing Mechanism: The water sensor likely uses two or more electrodes placed in or near the water. When water meets these electrodes, it completes an electrical circuit. The resistance or capacitance between the electrode's changes, affecting the 555 timer's frequency.

- Power Supply: The circuit needs a stable power supply to operate, typically in the range of 5-12 volts, depending on the specific components used. A power supply voltage regulation mechanism may also be included.

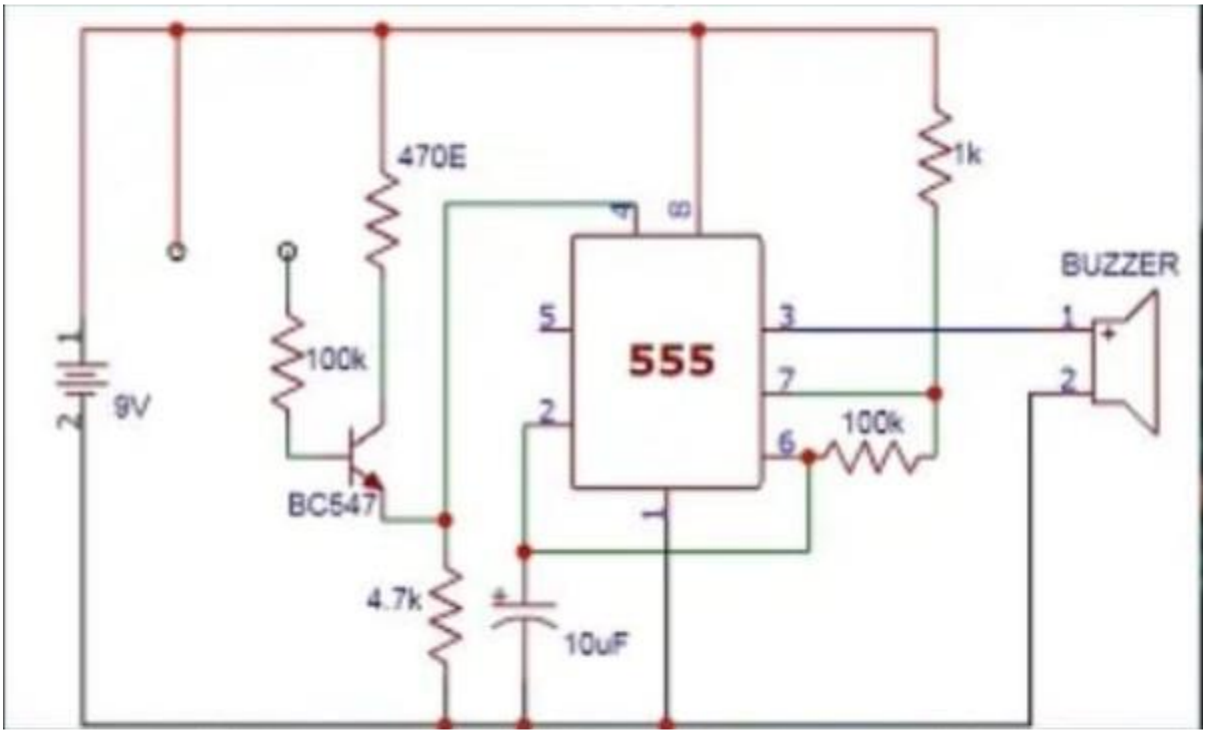
- Output Indicator: There should be a means to indicate the water's presence or absence, such as an LED, buzzer, or relay to control external devices like a pump.

- Calibration: The circuit may need to be calibrated to ensure it responds accurately to changes in water conductivity and provides reliable detection.

## BLOCK DIAGRAM




## EXPERIMENTAL SETUP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555
BC547
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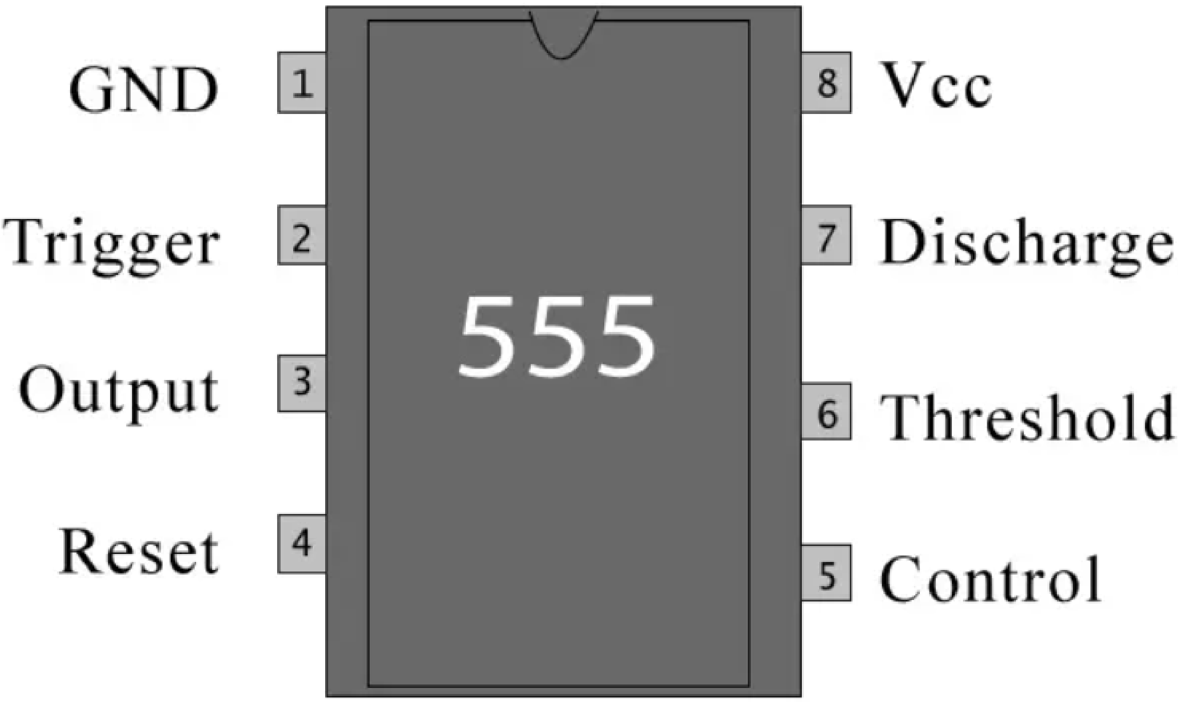
10uF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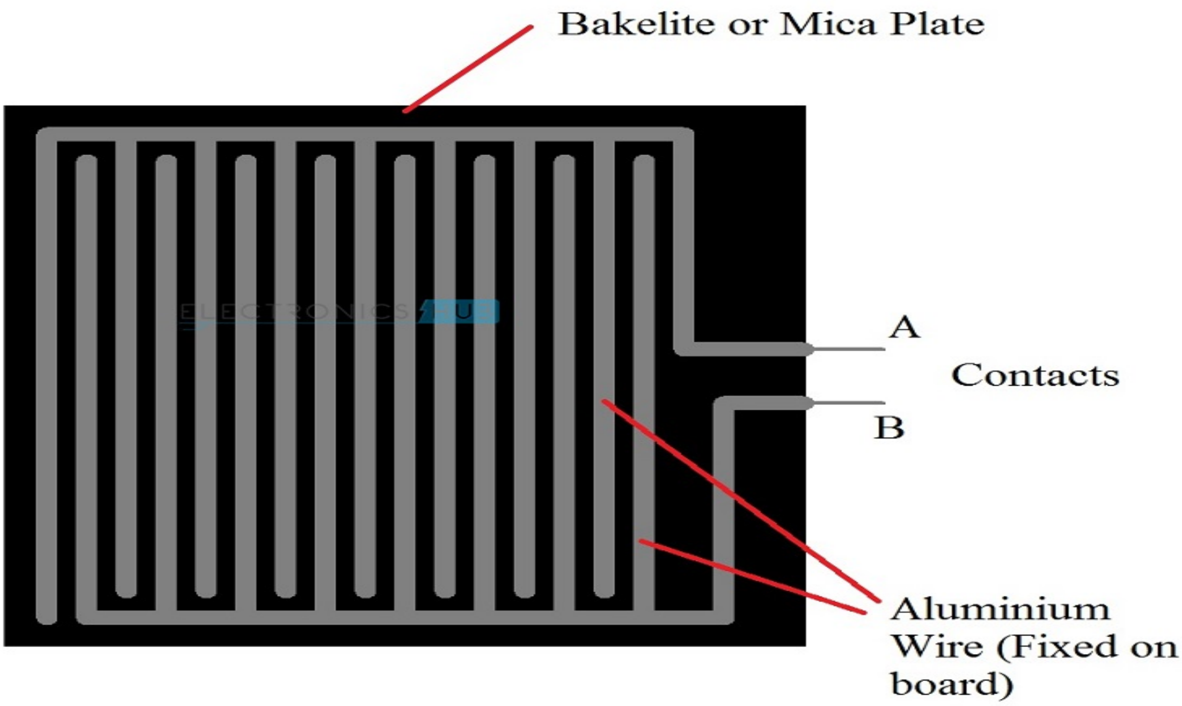
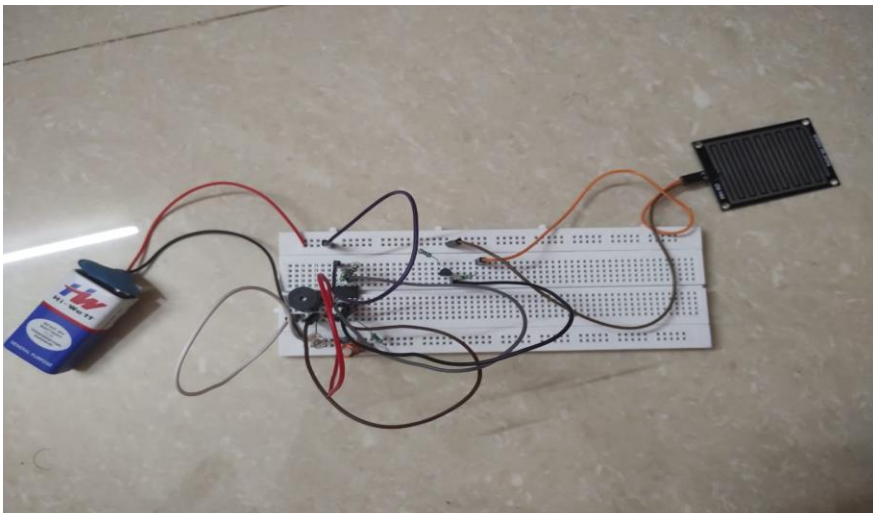
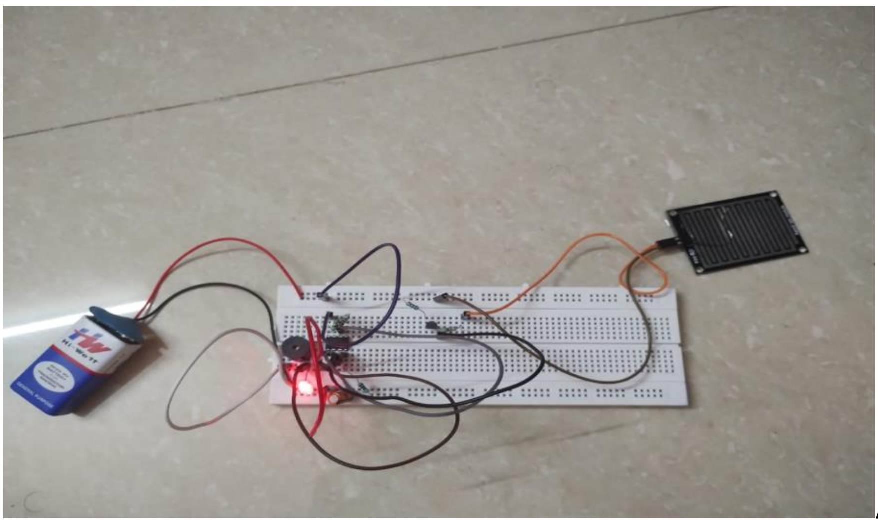
Output
Reset
555
Vcc
Discharge
Threshold
Control





BEFORE Adding water


AFTER Adding water

# METHODOLOGY

Components:

- BEL 548 A transistor
- 555 timer IC
- Resistors
- Capacitor
- Rain sensor module
- LED and a buzzer for indicating rain detection
- Power supply
- Breadboard
- Connecting wires

Methodology:

- Understand the Rain Sensor Module:

Ensure you understand the rain sensor module you have. These modules typically have conductive traces that change resistance when exposed to water. The resistance can be used to detect rain.

- Design the Transistor Switch:

The BEL 548 A transistor can be used as a switch to detect changes in the resistance of the rain sensor module. It should be connected in common emitter configuration. Connect the collector of the transistor to the positive supply voltage Connect the emitter of the transistor to one end of the rain sensor module. Connect the other end of the rain sensor module to the ground Add a pull-up resistor from the base of the transistor to the positive supply voltage. This resistor is essential for biasing the transistor.

- Configure the 555 Timer:

Use the 555 timer IC in a stable mode to create a continuous pulse signal. Calculate the values of resistors and a capacitor to set the desired output frequency. You can use online calculators for this purpose. Connect the 555 timers as per the astable mode configuration, with its output driving the base of the BEL 548 A transistor.

- Rain Detection Logic:

When the rain sensor module is dry, its resistance will be high, and the transistor will be in the off state. When rain is detected, the resistance of the rain sensor module will decrease, allowing current to flow through the base of the transistor and turning it on. The transistor, when turned on, will pull the trigger pin of the 555-timer low, causing the timer to reset and stop generating pulses.

- Output Indication:

You can connect an LED or a buzzer to the output of the 555 timers to indicate rain detection. When rain is detected, the LED will turn on and the buzzer will sound.

- Power Supply and Testing:

Power the circuit with the appropriate voltage and test it. Adjust the sensitivity of the rain sensor module and the timing components of the 555 timers as needed to suit your application.

## RESULT

- In the irrigation, it will detect the rain and immediately alert the farmer.

- In automobiles, when the rain detector detects the rain, it will immediately active the wipers and inform the driver.

- In communications, it will boost the power of the antenna and increase the signal strength to send or receive the signals.

- In normal household, with the help of rainwater detector we can automatically save the rainwater. (This can be done only when home automation is done and there is proper equipment to save the rainwater. In this, rainwater detector will detect the rain and helps to switch ON the equipment which will automatically save rainwater for different purposes).

- This can also be used if there is a chemical rain also. This is very common in industrial areas