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Portable rain water detecting alarm using ic 555 timer

T. Srikanth[a], B. Dhanalakshmi[a], D. Amuktha[a], J. Manikanta[a], T. Ramalokeswar[a], P. Nagaphanindhra[a]
[a]QIS college of engineering and technology Vengamukkapalem- 523272,Andhra pradesh,India.

Corresponding author.
Correspondence: T. Srikanth
Email: tummala.srikanth@qiscet.edu.in

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Abstract
Everyone wants to stay educated and productive in a world when everything is automated. Water harvesting may also be simply accomplished with the help of automation. In this article, we'll talk about the Rain Alarm project, which is quite important for rainwater gathering. The circuit detects rain by sounding an alert while you are inside the house, allowing us to take appropriate action.This project is a portable rain water detecting alarm designed to protect goods from rain while also conserving water. It uses a rain sensor and a versatile multifunctional IC 555 Timer Chip to detect rain water in rainy conditions. LED, 9V battery, rain sensor, buzzer, 1N4007 PN junction diode, NPN transistor, and other components make up the rain water detection alarm. When the rain starts falling, the rain sensor detects it and the buzzer starts blaring and the LED lights up, and it will automatically reset when the rain stops The ultimate purpose of this project is to use a rain sensor to detect rain falling, and this concept can be used in the home, irrigation field, and cottage industries.

1.INTRODUCTION

The Rain Alarm Project is a simple but extremely helpful project that detects rainwater and immediately sets off an alarm or buzzer. Water is an essential component of everyone's life. It is critical to conserve water and use it properly. Here is a simple project that will sound an alarm when it rains so that we may take steps to collect rainwater and conserve it for later use. We can use the underwater recharge technology to improve the levels of subsurface water by saving this rain water through rain water harvesting.

This Automatic Rain Sensing Alarm Control Circuit may be broken down into three sections. 555 is included in the first part The first part is an Astable Mode IC, the second half is a Comparator LM358, and the third part is a Rain Detector. We utilised a 555 Timer IC for the Astable MULTIVIBRATOR to generate pulses every 2-3 seconds (depending on capacitor value), which implies the 555 Timer IC is configured in Astable mode. The inverting pin of the Comparator LM358 is directly connected to the output of the Astable Multivibrator. The output voltage of the 555 timer IC is compared to the reference voltage across the comparator's non-inverting terminal, which is set using VoltageCircuit Divider (R3 and R4). One LED was utilised at the output of the 555 Astable circuit, while the other was used at the output of the comparator LM358. Water or rain is detected using a Water Detector or Rain Sensor. The BUZZER receives the output of the Astable Multivibrator and Comparator. Depending on the application, the entire circuit can be powered by a 5V-12V battery.

2.LITERATURE REVIEW

Rain water detection has been the subject of much work by electronic designers and engineers for many years. These projects range from using a rain detector circuit/device in irrigation to collecting rainwater for domestic and industrial usage using a rainwater harvesting method to employing a rain detector/Sensor in autos to operate the power windows and roof anytime it detects wetness. Automatic rain sensing windows are a type of design. Automatic Rain Sensing Windows developed a technology that allows car windows to automatically slide up when rain falls, protecting the inside from harm. [1] The design was primarily employed in autos. Campbell created a rain detector that could tell if it was raining or the output was used to

trigger another circuit when it wasn't snowing A [1]. Mohammed's invention included a rain detector, which automatically captured rainwater and stored it in a reservoir for residential use. Other electronic engineers have previously built a rain detector/sensor, but the major goal of this research, which is to employ the rain detector as a protective device, has never been explored [1]. The goal of this project was to create a rain-sensing automatic window mechanism for home use. This work has been modified for commercial use and has been tweaked for the introduction of automatic rain sensing windows in luxury cars. Both of them can benefit from the idea [2]A rain sensor is a gadget that is activated by rain. Rain sensors can be used in a variety of ways. For example, they might be connected to an autonomous watering system to cause the system to shut down when rain drops are detected. The second is a device that protects the interior of cars from rain while also allowing them to operate in autonomous mode. Antennas are also employed to trigger a rain blower on the aperture of the antenna feed to remove water droplets from the cover that keeps pressurized and dry air Mylar inside the wave -guides in professional satellite communications [3]. Rain sensors for irrigation systems are available in both wireless and hard-wired versions, with most using hygroscopic discs that swell in the presence of rain and shrink back down as they dry out, with the hygroscopic disc stack depressing or releasing an electrical switch, and the rate of drying being controlled by controlling the ventilation reaching the stack. However, various electrical sensors that use tipping bucket or conductance type probes to monitor rainfall are also available. Both the wireless and wired versions employ identical processes to temporarily stop the irrigation controller from watering— particularly, they are connected to the sensor on the irrigation controller. When rain is detected, the terminals or put in series with the solenoid valve common circuit prevent the valve from opening [5]. Some irrigation rain sensors include a freeze sensor to prevent the system from functioning in freezing temperatures when irrigation systems are still operated during the winter [5]. A water collecting basin performs the function of a rain gauge in one of the oldest types of rain sensors still in use today. The weight of the water triggers a switch, which turns off the irrigation system once the basin has collected a pre-determined volume of water. The issue with this type of rain sensor is that the basin does not distinguish between rain and debris, which might fill the container and cause it to overflow. and unnecessarily interrupt the watering cycle. Wind can push rain water out of the container in some of the larger basin types, delaying the shut-off [4]. The rain sensor's second generation operates on the basis of conductivity. Two electrodes are placed at a specific distance from the bottom of the tube basin A circuit is completed and the switch is actuated when the water level reaches the electrodes. The weight of the debris does not activate the switch, but it does displace water, causing the trip to be switched off prematurely during a brief shower [4]. With either of the first two rain senso r kinds, the open container is a liability.

The third, and most popular, sensor does away with the old catch basin. When wet, a hygroscopic disc constructed of a synthetic substance similar to cork expands. It expands in proportion to the amount of money it receives. After a certain amount of rain has fallen, the expanded disc activates the switch. As additional rain falls, the area continues to grow. The system will not restart schedule until the disc dries out and restores to normal size. As more rain falls, the sensor continues to block water [4]. Electronic experts have been working on rain water sensing for many years and continue to do so. Rain water harvesting, a procedure that collects rainwater for home and industrial usage, is one of these projects. rain detector circuit/device in irrigation to utilize rain detector/Sensor in autos to regulate power windows and roof anytime it detects moisture, a design known as automatic rain sensing windows Automatic Rain Sensing Windows were developed by P. Campbell [10] to build a system that allows car windows to roll up automatically when it rains, protecting the inside from being damaged. The design was primarily used to autos. Campbell Scientific developed a rain detector that can tell if it's raining or snowing, and [11] The output is utilised to turn on or off another circuit. Mohammed included a rain detector in his work [12] that automatically collects rainwater and stores it in a reservoir for residential usage. Sunil Nayak, Parashuram Alagundi, and Kiran M R Prabhakar Hegade, Sunil Nayak, Parashuram Alagundi, and Kiran M R

created a device [13] Trays that open and close dependent on sun rays is included in their project. The tray is mounted on the roof and is controlled by an 8-bit microprocessor that identifies the current weather conditions. Imran Ahmed Khan and Khushboo Gupta collaborated on a gadget with the goal of creating a mechanism that allows automobile windows to roll up automatically when it rains, preventing interior damage and making the device more user-friendly. The goal is to create a dependable automatic rain detection system that can be sold to a big market of car owners.

3. Objectives and research methodology

The following are the project's goals:

1) Investigate the current circuit for sensing variations in rainwater and humidity.

2) To come up with design specs for a rain water and humidity detecting alarm device.

3) To create a Rainwater and Humidity Detector-Alarm system.

4) Check that the Rainwater Detector-Alarm unit and the Humidity Detector-Alarm unit fulfil the design parameters.

B. Approved Research Methodology

Methodology for Objective-1:

A literature review will be conducted in order to better understand the designs and advances in the Rainwater and Humidity Sensors Alarm Unit.

Methodology for Objective-2:

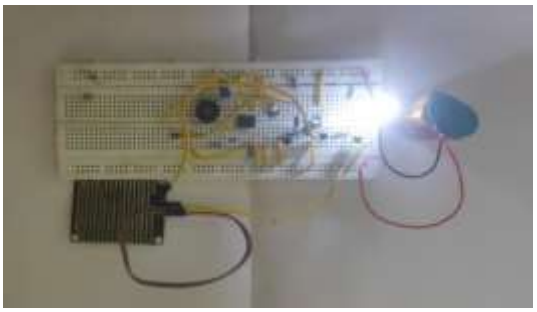
- Pre-requisite data for the Rainwater and Humidity Detector-Alarm unit design standards is gathered from existing reference journal publications that meet the needed specifications.
- Each of the hardware components needed to create a Detector-Alarm device would be examined separately.
- The design will be fine-tuned to produce an appropriate Detector-Alarm device for precise water and humidity detection.

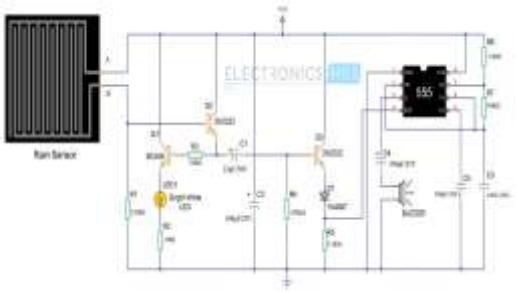
Methodology for Objective-3:

- The Rainwater and Humidity Detector is built using all hardware components (IC 555 Timer, NPN Transistor, LED, Rain sensor, Buzzer, resistors, capacitors, and so on) that are connected on a bread board according to our circuit schematic.

Methodology for Objective-4:

- The hardware sensing alarm is accomplished by attaching all of the components to a 555 timer and a rain sensor.
- The Rain Water and Humidity Detector units are used to set off the alarm system, and its operation is monitored.
- By pouring a small amount of water onto a sensor circuit, the output is observed, and conclusions are taken based on the results.
- The benefits of the new Rainwater Alarm unit design will be compared to the performance of the current Detector – Alarm unit.





4.FINDING AND SOLUTIONS

This automatic rain sensing alarm project is very easy to understand and discuss. The circuit's points A and B are connected to the rain sensor's points A and B, respectively. When it rains, the rain water falls on the metal wires that make up the rain sensor. Because of the battery connector, the sensor, and the circuit, the aluminium wire 'w' conducts water on the sensor. Then Q1 will turn on, causing the LED to glow, and Q2 will

switch on as well. The capacitor C1 will be shorted when the Q2 is saturated, causing the transistor Q3 to switch on. The resistor R4 will charge the capacitor C1. When Q3 hits saturation state, the 555 timer's reset pin, which is coupled to the emitter, becomes positive. Because of the saturation mode of Q3, when the 555 timer's reset pin is made positive, it generates a pulse at pin 3 and causes the speaker to sound an alarm. We shall obtain an alarm buzzer in this manner when it rains.

In this technique, we may receive precise rainfall and humidity sensor outputs using simple electronic hardware components at a low cost.

5. CONCLUSION AND FURTHER RESEARCH

This project, titled "Rain water detection alarm," is critical for the fertiliser and cottage sectors. The project's main goal is to reduce mental stress and protect the materials from rain. This project is simple to build, and it will save 45 percent of electrical energy and water in an efficient manner.

- The goal of this project's future research is to expand the use of circuits that employ the IC 555 for easy lifestyle.
- These rain detecting circuits have a wide range of applications in the future, including rainwater harvesting, farming, communication autos, and a variety of other industries.
- We can construct this project using Arduino in a similar way. It will assist us in adding more features to the alarm circuit and automating everything.

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