

RAIN SENSOR WORKING

Nowadays, conserving water as well as its proper usage is essential in everyone's life. Here is a sensor namely rain sensor which is used to detect the rain and generate an alarm. So, we can conserve water to use it later for different purposes. There are several methods available for conserving water like harvesting, etc. Using this method, we can increase the level of underground water. These sensors are mainly used in the field like automation, irrigation, automobiles, communication, etc. This article discusses a simple as well as reliable sensor module which can be available at low cost in the market.

What is a Rain Sensor?

A rain sensor is one kind of switching device which is used to detect the rainfall. It works like a switch and the working principle of this sensor is, whenever there is rain, the switch will be normally closed.

Rain Sensor Module

The rain sensor module/board is shown below. Basically, this board includes nickel coated lines and it works on the resistance principle. This sensor module permits to gauge moisture through analog output pins & it gives a digital output while moisture threshold surpasses.



PRINCIPLE OF OPERATION

The rain sensor works on the principle of total internal reflection. An infrared light shone at a 45-degree angle on a clear area of the windshield is reflected and is sensed by the sensor inside the car. When it rains, the wet glass causes the light to scatter and a lesser amount of light gets reflected back to the sensor.

An additional application in professional satellite communications antennas is to trigger a rain blower on the aperture of the antenna feed, to remove water droplets from the mylar cover that keeps pressurized and dry air inside the wave-guides.

AUTOMOTIVE SENSORS

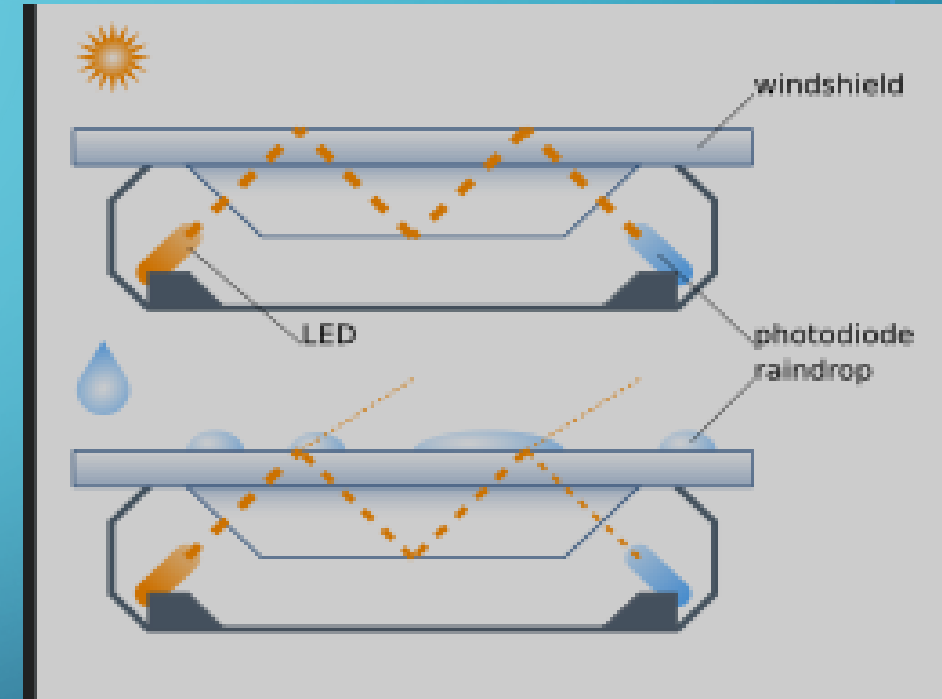
- In 1958, the Cadillac Motor Car Division of General Motors experimented with a water-sensitive switch that triggered various electric motors to close the convertible top and raise the open windows of a specially-built Eldorado Biarritz model, in case of rain. The first such device appears to have been used for that same purpose in a concept vehicle designated Le Sabre and built around 1950–51.
- General Motors' automatic rain sensor for convertible tops was available as a dealer-installed option during the 1950s for vehicles such as the Chevrolet Bel Air.
- For the 1996 model year, Cadillac once again equipped cars with an automatic rain sensor; this time to automatically trigger the windshield wipers and adjust their speed to conditions as necessary. In December 2017 Tesla started rolling out an OTA update



General Motors automatic rain sensor installed on a 1955 Chevrolet Bel Air convertible.

PHYSICS OF RAIN SENSOR

The most common modern rain sensors are based on the principle of total internal reflection. At all times, an infrared light is beamed at a 45-degree angle into the windshield from the interior. If the glass is dry, the critical angle for total internal reflection is around 42° . This value is obtained with the total internal refraction formula.



A diagram showing the operation of an optical rain sensor

PIN CONFIGURATION

- Pin1 (VCC): It is a 5V DC pin
- Pin2 (GND): it is a GND (ground) pin
- Pin3 (DO): It is a low/ high output pin
- Pin4 (AO): It is an analog output pin

SPECIFICATIONS

- This sensor module uses good quality of double-sided material.
- Anti-conductivity & oxidation with long time use
- The area of this sensor includes 5cm x 4cm and can be built with a nickel plate on the side
- The sensitivity can be adjusted by a potentiometer
- The required voltage is 5V
- The size of the small PCB is 3.2cm x 1.4cm



REFERENCE

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Blood Pressure Sensor

Blood Pressure (BP) is one of the important vital signs. It is the pressure exerted by the circulating blood on the walls of blood vessels. Blood Pressure is expressed as the ratio of the systolic pressure over diastolic pressure. Mercury sphygmomanometer is being used for measuring blood pressure. In this, the height of the column of mercury is considered for measuring the blood pressure. The Oscillo metric method is used for automated blood pressure measurements since 1981. With the advance in technology devices for measuring blood pressure through the non-invasive Oscillo metric method are being developed. One such device is the Blood Pressure Sensor.

What is a Blood Pressure Sensor?

Blood Pressure can be measured both by invasive and non-invasive methods. In the non-invasive method, no piercing is required and is easy to use. Blood Pressure Sensor is used to measure the blood pressure using the non-invasive method. It is similar to sphygmomanometer but instead of the mercury column, a pressure sensor is used to detect the blood pressure.

Working Principle

Usually, pressure cuff linked to a mercury column is used to measure the blood pressure. Here, the doctor manually pumps the cuff to increase the pressure on the artery. Then using stethoscope the noise of the blood rushing through the artery.

In automatic Blood Pressure measurement system, instead of mercury a pressure sensor is used to detect the pressure in the artery and give output. This digital output is displayed on the monitor. This monitor has an onboard processor to process the output given by pressure sensor, record results and display them on the digital read-out screen.



1620 pressure sensor

Applications of Blood Pressure Sensor

This sensor is very important for High Blood Pressure patients, as it is also available as 'at-home' solid-state Blood Pressure Monitor. This system is portable. It is easy to carry and operate and highly useful in remote areas where medical facilities are not available.

The main sensing element of this system is the pressure sensor present in the cuff. For an accurate and reliable measurement, this pressure sensor should be carefully selected.

Honeywell's 26 PC SMT pressure sensor is one of the examples of pressure sensors used in this system. This sensor is small, low-cost and can measure higher values of pressure. This sensor is used directly with the printed circuit board and can measure pressure faster and more accurately. As the sensor provides true surface mount capability, true installation cost of this sensor is very low.

Advantages

1. Early Detection of Health Issues

- Continuous or regular monitoring helps detect **hypertension (high blood pressure)** or **hypotension (low blood pressure)** early.
- Enables **timely medical intervention**, reducing the risk of stroke, heart attack, and other cardiovascular diseases.

2. Real-Time and Continuous Monitoring

- Especially with **invasive** and **wearable** sensors, you can track blood pressure **in real time**.
- Useful in **intensive care**, **surgery**, or **remote health monitoring** situations.

3. Accurate and Reliable Readings

- Modern sensors use **advanced pressure transducers** and **digital processing algorithms** for improved precision.
- **Invasive sensors** provide **highly accurate, continuous data**, essential for critical care.



Blood-Pressure-Sensor

Reference

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