

# Development of Automatic Rain Sensing Window

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**Abstract:-** With the help of this project, we hope to create an autonomous rain-sensing window that can open and close by itself when it starts to rain. Rain sensors, microcontrollers, and actuators will be used by the system to monitor and react to changes in the weather. High sensitivity rain sensors and an effective control algorithm will be incorporated into the design to guarantee the prompt and dependable operation of the window. Users will benefit from increased convenience, comfort, and safety thanks to the resulting automatic rain sensing window, especially in places where it rains a lot.

**Keywords:-** automatic rain sensing window, rain sensors, microcontrollers, actuators, weather conditions, control algorithm, convenience, comfort, safety.

## INTRODUCTION

An interesting and promising advancement in the realm of home automation and smart home technologies is automatic rain sensing windows. Rain sensors, microcontrollers, and actuators are used in these windows to recognise and react to changes in the weather, enhancing homeowners' comfort, convenience, and safety. Automatic rain-sensing windows not only have practical advantages but also have the ability to save energy and promote sustainable architecture. There is still a need for thorough research on the technology involved, including the kinds of sensors and actuators utilised, the control algorithms used, and the effects on user experience and energy efficiency, despite their increasing popularity. This journal article presents a critical evaluation of the current level of research on automatic rain sensing windows, stressing their potential advantages and disadvantages, pointing out areas in need of additional study and improvement, and examining the possible effects for environmentally friendly architecture. It aims to provide a useful resource for researchers, practitioners, and homeowners interested in this emerging technology.[6]

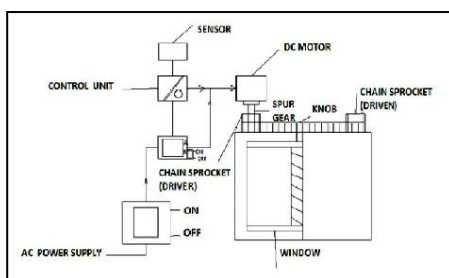


Fig.1 : Block Diagram of automatic rain sensing window

## ANALYSIS OF THE PROBLEM

Automatic rain-sensing windows may have certain advantages, but there are also some problems and restrictions with the technology. The accuracy and dependability of rain sensors, which might differ based on the type of sensor employed and the ambient circumstances, is one of the key problems. Additionally, the automatic rain sensing windows' control algorithms may be intricate and need precise calibration to ensure prompt and dependable operation. Additionally, especially in retrofit applications, installing and maintaining automatic rain sensing windows can be expensive and time-consuming. Finally, while automatic rain sensing windows have the potential to aid in energy conservation and sustainable building practises, little is known about how they will affect the overall performance of the building and energy usage.

Further study is required to develop more precise and dependable rain sensors, improve control algorithms, and examine the long-term effectiveness and energy efficiency of automatic rain sensing windows in practical applications. Additionally, in order to promote wider adoption of this technology, cost-efficient and user-friendly installation and maintenance techniques are required. This report seeks to better understand the status of research on automatic rain sensing windows by identifying and examining these obstacles as well as to lay the groundwork for more investigation and advancement in this area.[1]

## WORKING OPERATION

The microcontroller will decide whether to open or close the window after receiving inputs from the sensor. This pulse signal is received by the sensor circuit whenever it is raining. When RL1 is turned on, it is set to the "OFF" state, which instructs the window's DC motor to open and close. Through a high pass filter and an inverter IC, this signal is delivered to pin number 10 of the microcontroller IC if it is raining. This high pass filter is employed to remove high frequency signal caused by undesirable external signal. Our circuit employs a straightforward R-C high pass filter circuit. The 5.6-volt zener diode is also used to separate the input signal from the high voltage signal. When an object is present, the sensors generate a low signal, which is converted to a high signal by an inverter (NOT gate) IC. When that window of time comes to an end, the microcontroller (using a microcontroller programme) will "ON" the relay -1 for 3 seconds. The switch is used to manually open the window once the rain has

stopped. For manual painting of the material, a reset switch is linked to pin number 9 of the microcontroller unit.[5]

### SCOPE

The scope of the development of automatic rain sensing windows is to create an innovative technology that can detect and respond to changes in weather conditions, providing enhanced convenience, comfort, and safety for homeowners. Specifically, the development of automatic rain sensing windows will involve:

- Selecting appropriate microcontrollers, actuators, and sensors for rain that are capable of correctly detecting and reacting to changes in weather.
- Creating control algorithms that can optimise the window's reaction to changing rain duration and intensity.
- Creating a window design that is simple to install and maintain while including the rain sensor, microcontroller, and actuator.
- Evaluating the user experience, including convenience, comfort, and safety; testing the effectiveness and dependability of the automatic rain sensing window under a variety of weather circumstances.
- Examining how automatic rain-sensing windows might affect energy efficiency and environmentally friendly building practises, including the potential to lower energy use and greenhouse gas emissions.

### SOFTWARE DESCRIPTION

These programmes are used to carry out this project: PROTEUS and KEIL compiler

### KIEL

Machine language code is created and compiled using the Keil compiler. The machine source code is first compiled, and then it is transformed into hex code that is then loaded into the microcontroller for further processing. Code written in C is also supported by Keil compiler.[3]

### PROTEUS

Software called Proteus is used to simulate microcontrollers, capture schematics, and design printed circuit boards. "Lab centre Electronics" is the company developing it. Proteus is a Virtual System Modelling that integrates animated component models, circuit simulation, and circuit simulation to co-simulate the entire microcontroller-based designs. Before building a physical prototype, this is the ideal tool for engineers to test their microcontroller designs in real time.[3]

### RESULT

The "Rain detection with automatic closing of window" project's objective was to have windows close on their own when a rain sensor detects it. The rain powered motor was built using a stepper motor, control unit, and conduction sensor (Tough sensor) circuit. The sensor was used to monitor the rain or water flow. As a result, when a window is identified, it immediately closes and then, when there is no rain or water flow, it automatically opens.



Fig.2 : Completed automatic rain sensing window

### CONCLUSSION

It was designed with features that integrate with all of the hardware components used. The placement and arrangement of each module has been carefully thought out, allowing the unit to operate as efficiently as possible. Second, the project has been successfully completed with the aid of evolving technology and cutting-edge ICs. The project's design and testing were successful as a result.

### FUTURE SCOPE

The main goal of our project, "Rain detection with automatic closing of windows," is to create an automatic wiper that starts up as soon as a rain sensor sends a signal.

The development of automatic rain sensing windows is an area of active research and development, with several opportunities for future advancements. Some potential future scope for automatic rain sensing windows include:

- Integration with other smart home technologies: To develop a complete and practical home automation system, automatic rain sensing windows might be integrated with other smart home technologies like automated lighting and HVAC systems.
- Sensor technology developments: New developments in sensor technology, such as the creation of sensors that can identify other types of precipitation in addition to rain, may enhance the precision and dependability of automatic rain sensing windows.
- Energy-efficient design: Automatic rain detecting windows' design might be improved for energy efficiency and overall building performance, which could result in greater energy savings and a smaller environmental effect.
- Cost-effectiveness: By creating affordable installation and upkeep procedures for automatic rain detecting windows, a larger range of people may have access to the technology.

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