IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 8.066 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 11, Issue 6, June 2024

DOI: 10.17148/IARJSET.2024.11604

AUTOMATIC CAR WIPER SENSOR USING IOT

Dr.A.R Jayasudha[1], Shirin Fathima M[2]

Professor, Master of Computer Applications, Hindusthan College of Engineering and Technology, Coimbatore, India[1]

II MCA Students, Master of Computer Applications, Hindusthan College of Engineering and Technology, Coimbatore, India[2]

Abstract: The automatic wiper system is used to detect rain and activate the car's automatic wipers without requiring driver interaction. This system was developed to reduce distractions while driving and allow drivers to focus on their primary task: driving. The distraction eliminated when developing this product was adjusting the windshield wipers manually when driving in peak weather. Just a few seconds of a driver not paying attention to the road surface to adjust the gear lever while driving in bad weather conditions can lead to a car accident. The system uses a combination of impedance and rain sensors to detect rain and its intensity. The system contains a controller that takes input signals from the sensors and controls the operation of the wipers based on these input signals. The purpose of this project is to help reduce accidents caused by drivers attempting to clean their windshields. When it rains, distracting the driver from the road when turning the windshield wipers on and off. On rainy days, we have to endure water splashing onto the car's front windshield. While driving a car, the driver cannot see road traffic. So he tries to operate the window wipers, because of this he has to frequently turn the wipers on and as a result this can cause a vehicle accident. If we apply any kind of sensor on the glass to detect watering activity, the wipers will automatically work through automation. When water touches the sensor, it sends a signal to the system, thereby causing the wiper motor to move. When the sensor detects there is no water, the wipers will stop. This will reduce the weaknesses mentioned in the beginning. An additional plan of this invention is to make the windshield wipers automatically rise from the windshield when the engine is stopped.

Keywords: Automatic Rain Wiper Sensor, IOT.

I. INTRODUCTION

Safety: By preventing the driver's vision from being impaired in inclement weather, such rain or snow, automatic automobile wipers are intended to improve safety. It is essential to have clear visibility when driving. Convenience: By removing the need for manual adjustment, automatic wipers provide drivers convenience. Efficiency: Compared to manual wipers, these technologies are intended to function more efficiently.

They can react instantly to changes in weather conditions by changing the frequency and speed of the wipers in response to sensor readings. Preventing Distractions: When it's raining heavily, drivers may become distracted by their wipers' manual adjustments. As the wipers operate on their own, automatic wipers reduce distractions. Extended Wiper Blade Life: Depending on the amount of precipitation, automated systems frequently modify the wiper pressure and speed. This may result in longerlasting wiper blades because

II. RELATED WORK

Automatic wipers are designed to improve safety on the roads by ensuring clear visibility for drivers during adverse weather conditions. This is particularly crucial in situations like heavy rain or snow, where manual adjustments may not be timely or effective The goal was to develop a windshield wiper system that could instantly adapt to changing weather conditions. Automatic windshield wipers can change speed and frequency depending on the intensity of rain by using sensors to detect it. This versatility ensures optimal performance in a variety of situations.

Automation eliminates the need for drivers to manually change windshield wiper settings, reducing distracted driving. This helps with increased road focus, which is necessary for safe driving, particularly in inclement weather. Drivers can enjoy a more convenient solution with automated wipers since they do not require ongoing monitoring or adjustment. By allowing drivers to focus on other important aspects of driving, this hands-free approach improves and streamlines the overall driving experience.

IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 8.066 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 11, Issue 6, June 2024

DOI: 10.17148/IARJSET.2024.11604

III. METHODOLOGY

Proposed System:

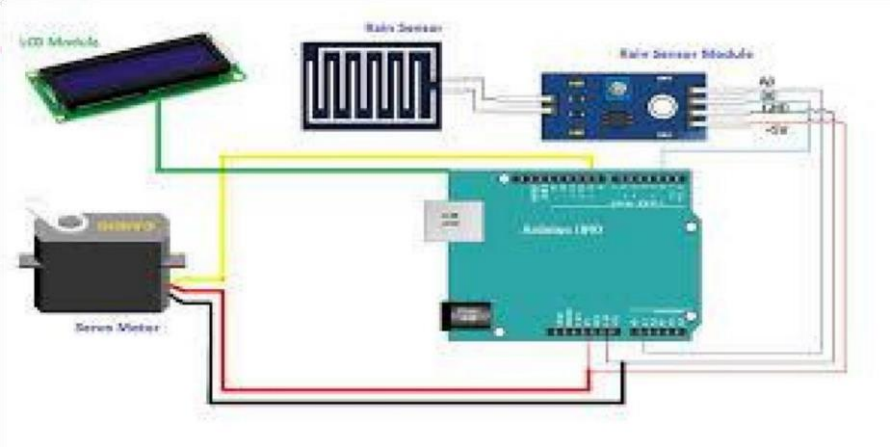
Sensitivity to Rain:

To identify droplets on the windshield, use an optical rain sensor that makes use of infrared or laser technology. The sensor should be installed on the windshield in a location that is easily accessible for maintenance and has a clear view of the sky. Utilize a microcontroller to process the rain sensor's signals and regulate the wiper system (such as an Arduino, Raspberry Pi, or a specialized automotive microcontroller).The microcontroller needs to have enough I/O pins and computing capability to integrate sensors and control the wipers.

Motor Control for Wipers: To regulate the speed and frequency of the wipers, interface the microcontroller with the vehicle's Wipe motor system. Use algorithms to modify the wiper speed in accordance with the sensor's detected intensity of rain.

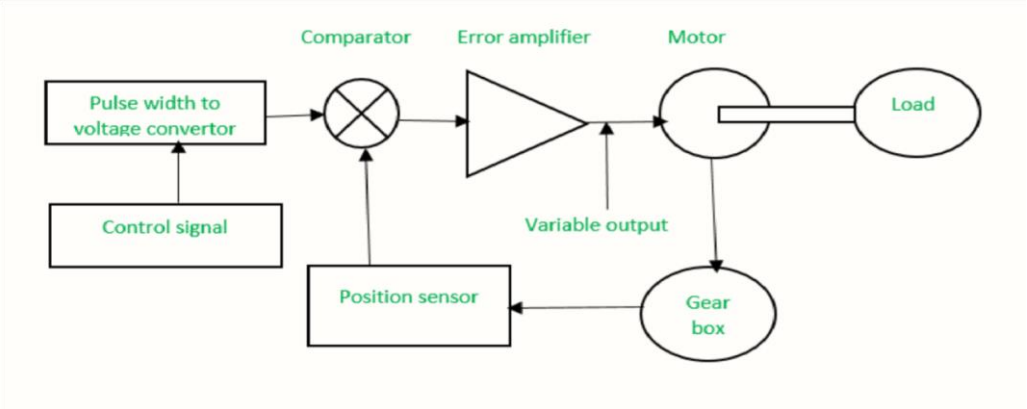
The system also monitors energy consumption, saving money on electricity bills by optimizing lighting usage. Remote control of lights enhances home security, creating the illusion of occupancy when away. This friendly and accessible experience is aimed at everyone, regardless of their physical limitations. The benefits of this system go beyond convenience and aesthetics. By optimizing light usage, users can significantly reduce energy consumption and save on electricity bills. Additionally, the security features provide peace of mind and deter potential intruders. The system's functionalities include app-based control, smart bulb compatibility, voice control, scene creation, scheduling, energy monitoring, remote control, and easy installation and setup. This smart lighting system represents the future of home lighting, offering a perfect blend of convenience, flexibility, efficiency, accessibility, and security, transforming your home into a truly intelligent and personalized environment

Circuit Diagram



Circuit Diagram of Automation Car wiper sensor

Block Diagram



IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 8.066 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 11, Issue 6, June 2024

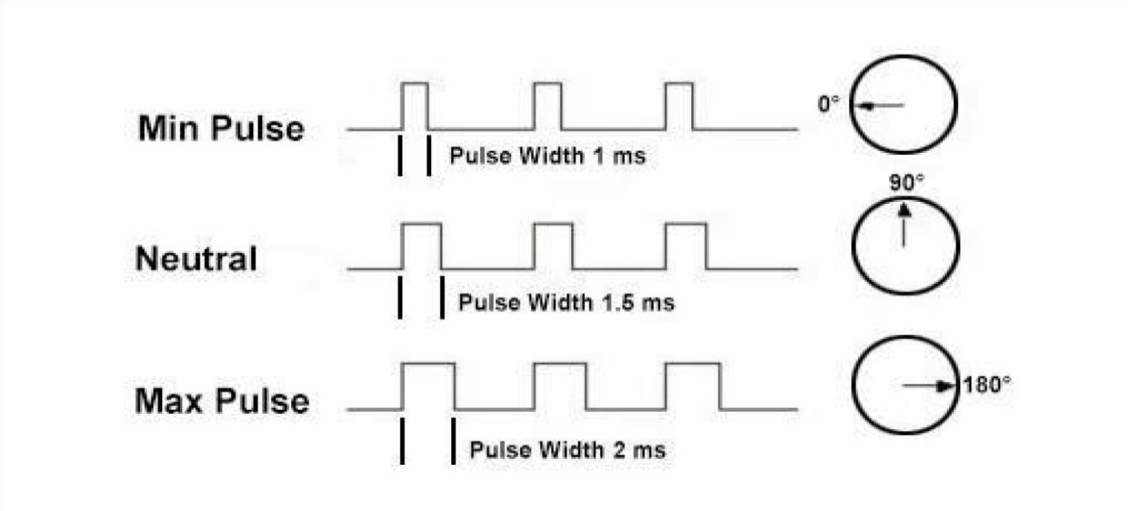
DOI: 10.17148/IARJSET.2024.11604

- Rain Drop Sensor
- Servo Motor
- Breadboard

How to control servo:

The below figure shows the parts that consisting in RC servo motors in which small DC motor employees for driving the loads at precise speed and position. The pulse width determines the angular position of the servo motor. In some circuits, a control pulse uses to produce DC reference voltage corresponding to desired position or speed of the motor. And it applies to a pulse width to voltage converter.

In this converter, the capacitor starts charging at a constant rate when the pulse is high. when the pulse is low, the charge on the capacitor fed to the buffer amplifier. So the length of the 24 pulse decides the voltage applied at the error amplifier as a desired voltage to produce the desired speed or position. For example, a 1.5ms pulse will make the motor turn to the 90° position. Shorter than 1.5ms moves it in the counter clockwise direction toward the 0° position. Any longer than 1.5ms will turn the servo in a clockwise direction toward the 180° position.



The servos are controlled by sending an electrical pulse of varying width. There are minimum pulses, maximum pulses and repetition rates. Servo motors can typically only rotate 90° in either direction for a total movement of 180°.

The neutral position of the motor is defined as the position where the servo with the same voltage level rotates clockwise or counter clockwise. As per the command, servo will move to the position and hold that position. The maximum amount of force the servo can exert is called the torque rating of the servo. Servos will not hold their position forever. Though, the position pulse must be repeated to instruct the servo to stay in position.

Hardware Description
ARDUINO UNO

One of the standard Arduino boards is the UNO. The Italian word UNO here means “one”. To identify the first version of the Arduino software, it was nicknamed UNO. This is also the first USB board released by Arduino. He is considered a strong leader and has been recruited into many projects. Arduino UNO board created by Arduino.cc.

The ATmega328P microprocessor is the basis of the Arduino UNO. Compared to other boards, like Arduino Mega board etc., it is very simple to use. The circuit board is made up of shields, various circuits, and digital and analog input/output (I/O) pins. The Arduino UNO has 14 digital pins, a USB port, a power jack, and an ICSP (In-Circuit Serial Programming) header along with 6 analog pin inputs.

IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 8.066 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 11, Issue 6, June 2024

DOI: 10.17148/IARJSET.2024.11604

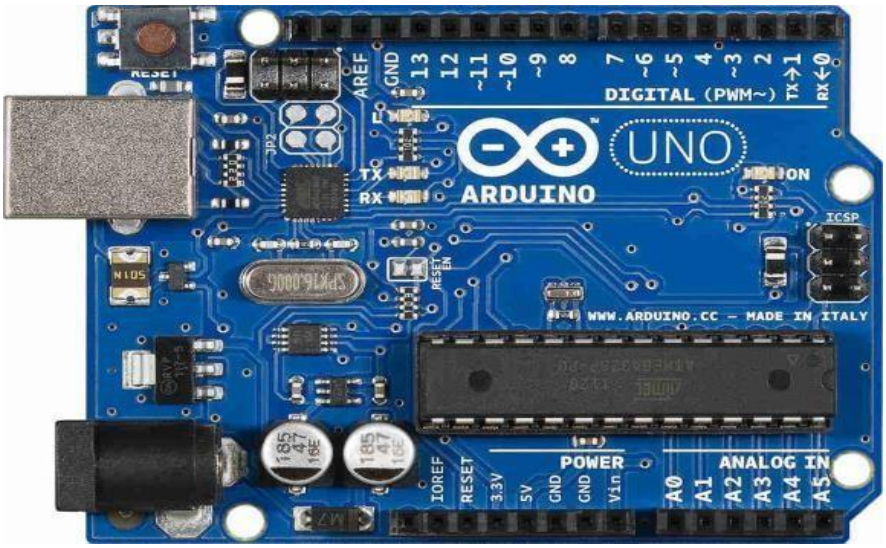
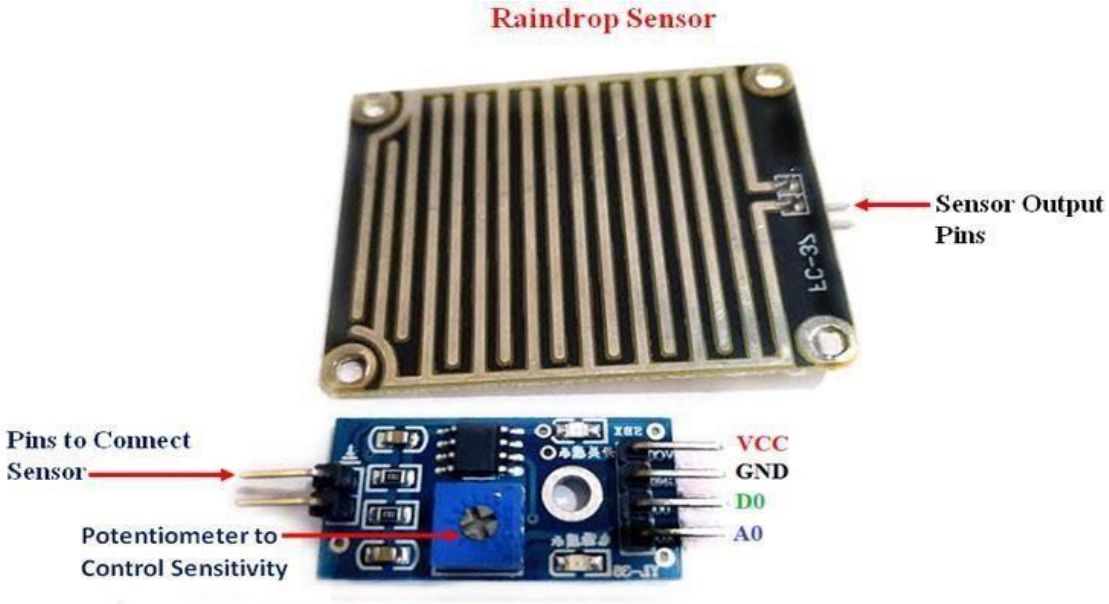


Figure 1 Arduino UNO Board

The programming language used is called IDE, or integrated development environment. It is compatible with offline and online platforms. The breadboard version of the module can be constructed by even relatively inexperienced users in order to comprehend its operation and save money. Beginners may use the Arduino programme with ease, while skilled users can customise it to their own.

Rain Drop Sensor:

The raindrop sensor is a tool used to detect rain. It consists of two modules, a rain control board that detects rain and a control module that compares the analog value and converts it to a digital value. Raindrop sensors can be used in the automotive sector to automatically control windshield wipers, in the agricultural sector to detect rain, and also used in home automation systems.



Operating voltage 5V

- Output format: digital switching output (0 and 1) and AO analog voltage output Potentiometer adjustment sensitivity
- Using set wide voltage LM393 comparator
- The comparator's output signal is a good clean waveform, driving power, over 15mA
- Anti-oxidation, anti-conduction, long service life

IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

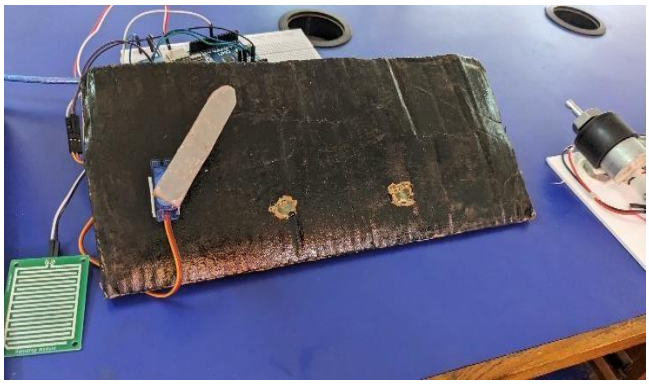
Impact Factor 8.066 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 11, Issue 6, June 2024

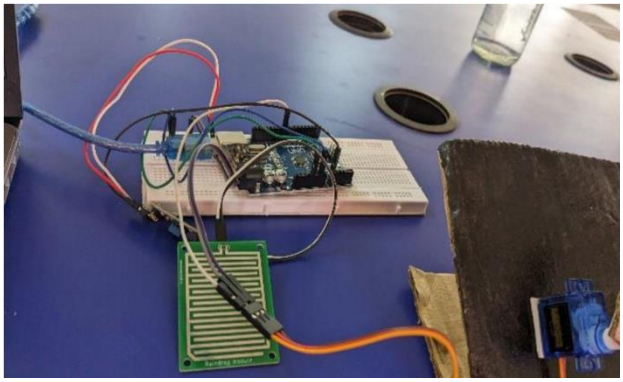
DOI: 10.17148/IARJSET.2024.11604

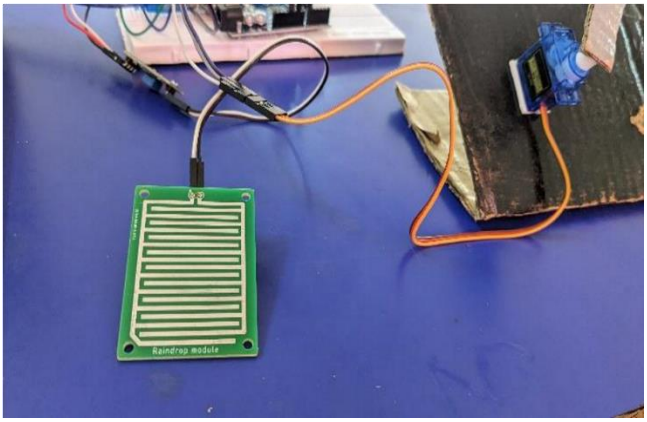
Has bolt holes for easy installation. The raindrop sensor control module has 4 outputs. VCC is connected to the 5V power supply. The module's GND pin is grounded. Pin D0 is connected to the digital pin of the microcontroller for digital output or an analogy pin can be used. To use the analogy output, pin A0 can be connected to the ADC pin of the microcontroller.

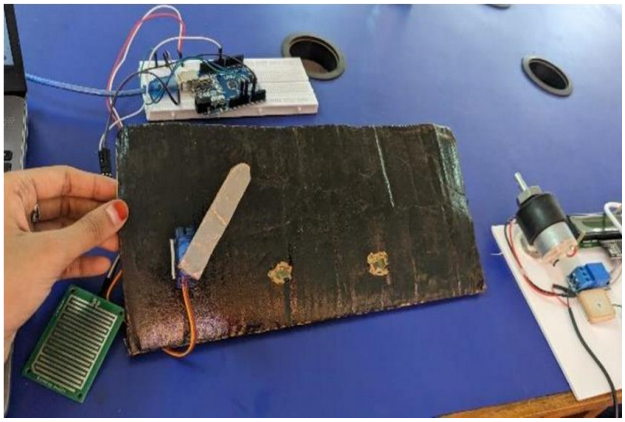
In case of Arduino, it has 6 ADC pins, so we can use any of these 6 pins directly without using an ADC converter. The sensor module consists of a potentiometer, LN393 comparator, LED, capacitor and resistor. The pin out image above shows the components of the control module. The rain shield module is made of copper tracks that act as a variable resistor. Its resistance changes depending on the humidity of the waterproofing sheet.

SCREENSHOTS









IV. CONCLUSION

The automatic wiper sensor detects rain or moisture on the windshield and activates the wipers accordingly. They improve safety by ensuring optimal visibility in adverse weather conditions. They improve the driving experience by eliminating the need for manual controls.

Automatic wipers are more energy-efficient than manual systems, reducing unnecessary energy consumption. They can distinguish mist, drizzle, and heavy rain, adjusting the wiper speed accordingly. They are often integrated with other safety features, enhancing overall vehicle safety. Ultimately, automatic car wiper sensors contribute to a more comfortable and safer driving experience.

REFERENCES

[1]. +1P.Naresh Et Al. Automatic Rain-Sensing Wiper System for 4-Wheeler Vehicles. J.of Advancement in Engineering and Technology V3i4.Doi: 10.15297/Jaet.V3i4.05.
[2]. Basic Electrical Engineering‖ by V.N.Mittle 1990 Tata Mcgraw-Hill Publishing Company Limited Company Ltd.
[3]. Engineering Circuit Analysis by William H. Hayt, Jr., Jack E.Kemmerly, Steven M.Durbin in 2002 by Tata Mcgraw-Hill Publishing Company Limited.

DOI: 10.17148/IARJSET.2024.11604

[4]. Tanaka, S., Koyama, T., and Tsunetomo, K.: Wiper Control Apparatus', us Patent 5,917,603, Jun. 29 1999.
[5]. Stam, J. S., Bechtel, J. H., and Roberts, J. K.: Moisture Sensor and Windshield Fog Detector Using an Image Sensor', us Patent 5,923,027, Jul. 13 1999. 432
[6]. Choi, K. N.: Omni-Directional Rain Sensor Utilizing Scattered Light Reflection by 1728– 1731.
[7]. Gormer, S., Kummert, A., Park, S.-B., And Egbert, P.: Vision-Based Rain Sensing with an inVehicle Camera' in Intelligent Vehicles Symposium, 2009 Ieee. Ieee, 2009, Pp. 279– 284.
[8]. Sugimoto, M., Kakiuchi, N., Ozaki, N., and Sugawara, R.: A Novel Technique for Raindrop Detection on a Car Windshield Using Geometric-Photometric Model' in Intelligent Transportation Systems (Itsc), 2012 15th International Ieee Conference on. Ieee, 2012, Pp. 740–745.
[9]. Park, J.-H., Kim, M.-H., Im, H.-J., Lee, K.-C., and Lee, S.: Development of Vision Based Control Smart Windshield Wiper System for Intelligent Vehicle' in Sice-Icase, 2006.International Joint Conference. Ieee, 2006, Pp. 4398–4403.
[10]. Nashashibi, F., De Charrette, R., and Lia, A.: Detection of Unfocused Raindrops on a Windscreen Using Low Level Image Processing' in Control Automation Robotics & Vision (Icarcv), 2010 11th International Conference on. Ieee, 2010, Pp. 1410–1415.
[11]. Kurihata, H., Takahashi, T., Mekada, Y., Ide, I., Murase, H., Tamatsu, Y. And Miyahara, Innovative Computing, Information and Control, 2006. Icicic'06.First International Conference on, Vol. 2.Ieee, 2006, Pp. 544–547.

