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AUTOMATIC RAIN SENSING WIPERS USING ARDUINO

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Abstract – *Driver safety issues are of great importance in today's automotive industry. Lack of visibility is often the cause of heavy rain accidents. In many cases, manual errors such as the driver not increasing the wiper speed can lead to an accident. Today's car wipers work on the principle of manual switching. In this article, we have proposed an automated wiper system with a rain sensor that detects rain and automatically starts and stops when it stops. The automatic wiper system with rain sensor is not only automatic but also intelligent. The wiper system automatically detects and activates precipitation. The wiper system is also intelligent. When a raindrop hits the sensor, the sensor detects the intensity and the wiper speed is automated accordingly. The higher the rotation speed, the higher the rainfall. No manual intervention is required to control the wiper. This project uses an Arduino with a rain sensor, LCD 16x2 module and servomotor. Humidity is measured via the analog output pin on the rain sensor and the wiper begins to rotate when the humidity threshold is exceeded. The module used here is entirely based on the LM393 op amp. The information captured by the rain sensor is sent to the Arduino. Arduino is a microcontroller board based on Atemga8. Interactive electronic devices can be designed and created using Arduino, a platform for developing the behavior of electronic devices. It consists of an onboard power supply unit and a USB port for communicating with a PC. The information collected by the rain sensor is processed and analyzed by Arduino and controls the servomotor based on the processed information. The driver receives information about precipitation intensity and wiper speed via a 4-bit LCD module near the driver's seat. The rain sensor is on the side of the windshield, outside the car. The rain sensor is connected to the servo motor. The wiper blade is connected to the servo motor. All devices are connected to an Arduino that is connected to the car's power supply.*

1. INTRODUCTION

A car wiper is a device used to remove raindrops from the windshield. Today, all vehicles are equipped with wipers to prevent accidents and reduce human intervention in controlling wipers for luxury. Wipers usually consist of a metal arm and a long rubber blade. Pneumatic energy is used in some vehicles. Here, the metal arm is driven by an electric motor. The blade moves clockwise and counterclockwise on the glass, pushing water out of the glass surface. Velocity changes occur automatically based on the intensity of precipitation. Most cars use two radial types

Sync arms, while commercial vehicles use pantograph arms. Wipers are automated in many ways. Today's automobiles consist of a series of mechanical parts automated by electric motors. Here, we propose an unmanned wiper that detects rain and starts automatically, and turns off automatically when the rain stops. This eliminates the need for human physical intervention to control the speed of the wiper. For this purpose, a rain sensor is used to detect rain and the signal is managed by Arduino to take the necessary actions. Over the last decade, the automotive industry has made progress to find the latest technologies for increasing safety. There are many reasons for vehicles that are not equipped with automatic wipers. For many reasons, windshield wipers are too expensive to fit in an economical car and too unreliable for a new car. Many car companies have tried to cheaply design car wipers that are both economical and efficient. In today's situation, only luxury cars are equipped with automatic rain sensor car wipers. Our paper was created to emphasize the need to use an automated wiper system that starts automatically when it starts to rain. The wiper speed is automatically adjusted according to the intensity of the rain. Such a system guarantees the safety of the trip. There are many causes of accidents, but the main reason for accidents during the rainy season is poor visibility. The purpose is to design an auto-start wiper system that will start automatically when it rains. The wiper speed is automatically adjusted according to the intensity of precipitation. The project consists of an Arduino, a rain sensor, a servomotor, and an LCD module that displays precipitation. The wiper speed is adjusted according to the amount of precipitation, which improves safety. This project is a small step towards convenience and time savings.

2. EXISTING SYSTEM

According to the World Health Organization, more than 2 million people die in accidents each year during the rainy season. People die because of small mistakes. Today's car wipers require human intervention to start the wiper and control its speed. This type of manual switching requires the driver to turn on the wiper as needed and adjust the wiper speed as needed. This causes inconvenience to the driver when it rains. He can't concentrate on driving or setting the wiper speed. This type of scenario leads to an accident. In the current scenario, only luxury cars use an

intelligent wiper system with a rain sensor. Many attempts have been made to address the defined issues. These models have their own limitations. Some of these systems are shown below

3. PROPOSED SYSTEM

This article proposes an automatic wiper system that turns on automatically when it rains and stops when it stops raining. This paper does not require physical human intervention to control the wipers of the car. In this post, we will use a servomotor, rain sensor Arduino, and LCD module to control the wiper system. Whenever it rains, the rain sensor detects the intensity of the rain and sends that information to the Arduino. The information collected by the rain sensor is processed by Arduino and the processed information is sent to the servo motor to perform the desired action. The rain sensor consists of digital-to-analog output pins that calculate the intensity of the rain. The information sent to the microcontroller controls the speed of the wiper and is based on the intensity of the rain. The LCD shows the intensity of precipitation.

3.1 BLOCK DIAGRAM

The system consists of an Arduino Uno board, a rain sensor, a servomotor and an LCD module. Block diagram of the proposed system in Figure 3.1. The proposed system aims to remedy the shortcomings of existing systems. The wiper system consists of four stages. The first stage is a reading stage in which data is read from the rain sensor module. The second stage is the processing stage where the information from the sensor is processed. The third stage is the analysis stage, where the processed information is compared / analyzed. The fourth stage is the control stage, which controls the servo motor and LCD display. It uses Arduino Uno and the language used is the Arduino programming language.

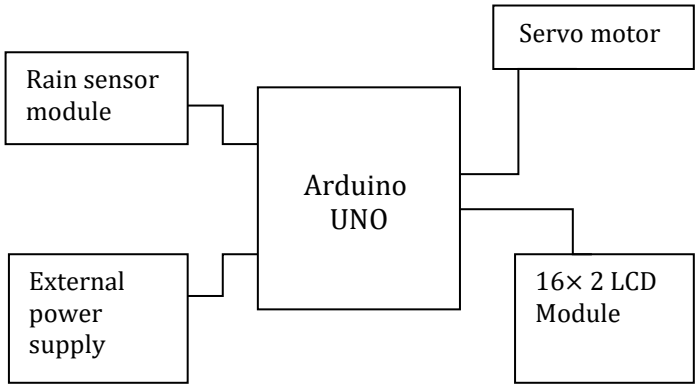

Fig: Block diagram

3.2 ARDUINO

Arduino is an easy-to-use type of software that you can use to write code to control hardware and electronic devices. The Arduino board can recognize inputs such as finger detection on sensors, light control in patterns, and finger placement on buttons. The light goes out. The Arduino Uno microcontroller board can be controlled by sending instructions in code format. The code used here is based on Arduino programming. Use Arduino software for processing.

Fig: Arduino

3.3 RAIN SENSOR

A rain sensor is a device used to detect raindrops. These are electrically separated and can be used as printed circuit boards. The function of the rain sensor can be properly compared with the function of the switch. When it rains, the switch switches to off mode. When it rains the circuit closes and the resistance changes. They usually have zigzag track patterns to guide rain and waterfalls. This rain sensor unit consists of a rain board and a control board. It rains on a rainbow with two LED lights. One shows the power supply and the other shows the rain. The second LED light on the control board only flashes when a raindrop hits the rainbow. The rainbow is set to rain. Rain sensors are commonly used to detect precipitation droplets. Thresholds are defined for each rain sensor. When the droplet or moisture reaches the threshold limit, the rain sensor sends information to the person performing the desired action. The rain sensor is equipped with a digital-to-analog pin that can be used to record humidity. When the detected humidity exceeds the threshold, the desired action is taken. When the rain sensor is wet, it changes from 100000 to 2 M ohms and acts as a variable resistor. Therefore, if the board is wet, there will be more power lines. A0, D0, GND, and VCC are analog, digital, ground, and positive voltages, respectively. The rain sensor is equipped with two loop pins, + and sensor board connectors A and B.

Fig: Rain sensor

3.4 SERVO MOTOR

Servo motors typically consist of output shafts that can be used to position the shaft at a particular angle using the coded signal transmitted by the servo. Servo motors are very useful in everyday life and are used in many devices. Servo motors are very efficient and economical. Servo motors are small and can be placed on the device to perform the desired action more effectively. Servo motors are very efficient and energy saving motors. These servo motors are controlled by pulse width modulation. Pulse width modulation uses a control wire to send an electrical pulse. The minimum, maximum pulse and repetition rate are three types of pulse width modulation. The total amount of movement of the servo motor is 180 °, and it rotates 90 ° in each direction. Servo motors rotate both clockwise and counterclockwise.

Fig: Servo motor

3.5 WORKING PRINCIPLE

When it rains, the rain sensor has a water column or a water column, and the resistance changes. Therefore, the sensor acts as a variable resistance board. The relationship between rain intensity and resistance has been found to be inversely proportional to each other. As the number of raindrops increases, the resistance of the sensor decreases. The sensor then sends a signal and the signal is received by the microcontroller. The microcontroller determines the intensity and transfers the signal to the servomotor in the form of pulse width modulation. After that, the wiper operation mode is turned on according to the rain Strength. The sensor is designed so that its size does not obstruct the driver's view. The sensor is completely resistant to particles and elements from the environment that may come into contact with the sensor. Therefore, when such an event occurs, the sensor does not send a false alarm. I'm trying to explain how a rain sensor works by using an example. Let's assume that the resistance of the remaining sensors is 1000KΩ. In the case of light rain, the height of the water column of the rain sensor will be low because the intensity of the rain is weak. The resistance of the sensor drops, for example in the range of 900400KΩ. As precipitation increases, the buildup and buildup of raindrops in the sensor increases, reducing resistance to 300100 KΩ. Resistance decreases with increasing rainfall. The drop in resistance is recorded as a signal that the Arduino Uno microcontroller uses to determine the intensity of the rain. The signal is sent to the servo motor, which operates and moves the wiper blades. The speed of the wiper increases as the strength increases.

4. RESULT AND DISCUSSION

When it rains, the rain sensor has a water column or a water column, and the resistance changes. Therefore, the sensor acts as a variable resistance board. The relationship between rain intensity and resistance has been found to be inversely proportional to each other. As the number of raindrops increases, the resistance of the sensor decreases. The sensor then sends a signal and the signal is received by the microcontroller. The microcontroller determines the intensity and transfers the signal to the servomotor in the form of pulse width modulation. After that, the wiper operation mode is turned on according to the rain Strength. The sensor is designed so that its size does not obstruct the driver's view. The sensor is completely resistant to particles and elements from the environment that may come into contact with the sensor. Therefore, when such an event occurs, the sensor does not send a false alarm. I'm trying to explain how a rain sensor works by using an example. Let's assume that the resistance of the remaining sensors is 1000KΩ. In the case of light rain, the height of the water column of the rain sensor will be low because the intensity of the rain is weak. The resistance of the sensor drops, for example in the range of 900400KΩ. As precipitation increases, the buildup and buildup of raindrops in the sensor increases, reducing resistance to 300100 KΩ. Resistance decreases with increasing rainfall. The drop in resistance is recorded as a signal that the Arduino Uno microcontroller uses to determine the intensity of the rain. The signal is sent to the servo motor, which operates and moves the wiper blades. The speed of the wiper increases as the strength increases.

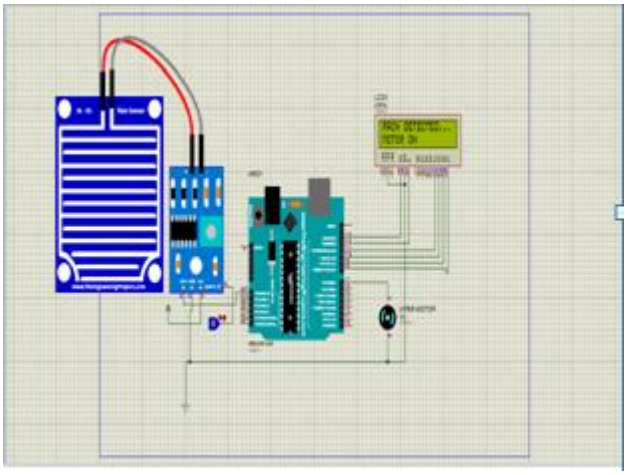

Fig: Schematic Diagram

4.1 HARDWARE RESULT

The LCD module displays precipitation intensity from NIL to low, medium and high. If there is no precipitation, the LCD display will show the precipitation intensity as NIL. When it starts to rain, the rain sensor will automatically detect the rain and send a signal to the LCD to show the intensity of the rain from low to high. When the precipitation intensity changes, the rain sensor detect the intensity and send a signal to the servo motor, this increases the rotation speed.

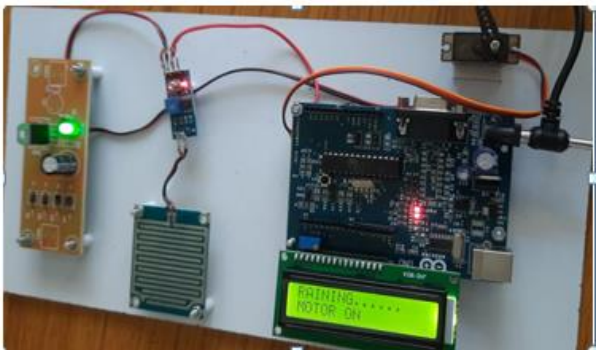

Fig: Hardware

5. CONCLUSION

The automatic wiper system is designed to detect rain and wipe the windows by moving the wiper. The automatic wiper system automates the purpose of the driver's response to control the wiper. The response of the rain sensor to rain to move the windshield wiper has been shown and proven to be less than 400 ms. The automatic car wiper was developed using a rain sensor and Arduino, but it can be expanded by replacing the rain sensor with an IR sensor to accurately identify and detect precipitation. When choosing an economical yet efficient wiper, the best way is to use a rain sensor. You can choose from a variety of sensors to serve this purpose as you move forward and change your system.

REFERENCES

[1] Automatic Rain Operated Wiper System in Automobile: A Review by Kothari Mohit, Shah Amit, Patel Vipul and Kadakia Nishant in International Journal for Scientific Research & Development| Vol. 3, Issue 02, 2015| ISSN:2321-0613

[2] Automatic control of vehicles: An Analysis by Kushal Sarin, Jatin Sethi, Anshuman Gupta, Usha Tiwari and Ishan Mathur inInternational Journal of Advanced Research in Computer and Communication Engineering April 2013

[3] Review report on soc on various platforms for vehicles by Sheeja S. Suresh and Anuradha S. Joshi1 in International ResearchJournal of Engineering and Technology

[4] Rainy Weather Recognition from in-vehicle Camera Images for Driver Assistance by I. Ide, Y. Mekada, H. Murase, Y. Tamatsu, H. Kurihara, T. Takahashi, and T. Miyahara, in IEEE Intelligent Vehicles Symposium, 2005.

[5] KadakiaNishant, A Kothari, Mohit A Shah, Amit V Patel Vipul R: Automatic Rain Operated Wiper System in Automobile, International Journal for Scientific Research & Development Vol. 3, Issue 02, 2015

[6] AHM FazleElah and Mohammad ShafiurRehman in Intelligent Windshield for Automotive Vehicles 17th InternationalConference on Computer and Info. Technology 22-23 December 2014. International University, Dhaka Bangladesh

[7] H. Kurihara, T. Takahashi, I. Ide, Y. Mekada, H. Murase, Y. Tamatsu, and T. Miyahara, "Rainy Weather Recognition from in-vehicle Camera Images for Driver Assistance," In IEEE Intelligent Vehicles Symposium, 2005, pp. 205-210

[8] Anuradha S. Joshi1, Sheeja S. Suresh, "review report on soc on various platforms for vehicles", International Research Journalof Engineering and Technology (IRJET)

[9] Tapan S. Kulkarni, Harsh S. Holalad, July 2012, "Semi-Automatic Rain Wiper 25 System," International Journal of Emerging Technology and Advanced Engineering, ISSN 2250-2459, Volume 2, Issue 7.

[10] N. M. Z. Hashim, July 2013. "Smart Wiper Control System," International Journal of Application or Innovation in Engineering& Management (IJAIEM), ISSN 2319 – 4847, Volume 2, Issue 7.

[11] K. V. Viswanadh, January-2015, "Design & Fabrication of Rain Operated Wiper Mechanism using Conductive Sensor Circuit," International Journal of Engineering Research & Technology (IJERT), ISSN: 2278-0181, Vol. 4, Issue 01.