Automatic Rain Sensing Car Wiper

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Abstract- *Generally, working of a car wiper is based on the manual switching. In this mechanism, the driver has to switch ON the power button to energize the wiper. It is difficult for the driver to concentrate simultaneously on the driving and on the wiper. Though it is not much difficulty in normal conditions but it is very difficult in raining conditions and snowing conditions. To eliminate this difficulty an automatic wiper system with rain sensing technology is implemented. In this automatic wiper system, a rain sensor, a arduino,wiper motor is used to convert the manual operation into automatic operation. When water falls on the rain board of the rain sensor, the sensor sends the signal to the arduino regarding the data and then the arduino processes the data and energizes the motor to make the required motion. By taking the signal from the arduino the driver wiper motor of the wiperblade to clean the car glass. With these modifications, automatic cleaning of the car glass can be done without the involvement of the driver..*

Keywords- Arduino, Rainsensor, wipermotor, wiperblades.

I. INTRODUCTION

A car wiper is a device which is used to remove droplets of rainwater from a windscreen. Nowadays, each and every vehicle is provisioned with the wiper to avoid the accidents and to decrease the human intervention in controlling the wiper to ensure luxury.A wiper generally consists of a metal arm and a long rubber blade. In some vehicles, pneumatic power is used. Here, the metal arm gets powered by an electric motor. The blade moves in clock-wise and counter clock-wise direction on the glass, pushing the waterfrom the surface of the glass. Modification of speed is automatically done based on the intensity of the rainfall. Two synchronized radial type arms are used in most of the automobiles, whereas pantograph arms are used in commercial automobiles. Wipers are automated in many ways. These days' automobiles consist of a series of mechanical parts which are automated by an electric motor.In this, we propose an unmanned wiper which senses rain and starts automatically and switches off automatically when the rainstops. By using this, there will be no need for physical intervention of human to control the speed of the wiper. For this purpose, we use a rain sensor to detect the rain and then the signal is managed by Arduino and takes the required action.

Over the last ten years, the advancement in the automobile industry has been increased to find modern techniques to increase safety.There are many reasons behind the vehicles which are not equipped with automatic car wipers. Many reasons in the sense, the car wipers are too expensive to fit in economical automobiles and they are too unreliable for new automobiles. Many automobile companies made an attempt to construct the automatic car wiper at low cost which is not only economical but also efficient. This paper is all about the attempt they tried to construct.In the present day situation, only luxury vehicles are equipped with automatic rain sensing car wipers. Our work is created to show the need to use an automatic car wiper system which starts automatically when the rain starts. The speed of the wiper is also adjusted automatically based on the intensity of the rainfall. Such a system ensures the safety of a ride. A lot of reasons are responsible for accidents but the major reason for the occurrence of accidents during the rainy season is due to a lack of proper vision. The objective is to construct a self-starting car wiper system which starts automatically on sensing the rainfall. Automatic adjustments to the wiper speed are made based on the intensity of rainfall. The project is constructed using Arduino, Rain sensor, wiper motor,wiper blades and Module which displays the intensity of the rainfall. Adjustment to the speed of the wiper is made according to the intensity of rainfall which improves and ensures the safety. This project is a small step towards the comfortability and to save our time.

II. BLOCK DIAGRAM
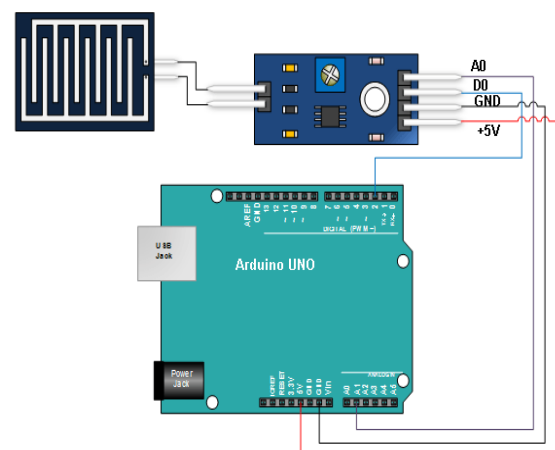
STAGES INVOLVED:

There are four stages involved in the car wiper system. The first stage is the reading stage where reading data from rain sensor module takes place. The second stage is the processing stage where processing of the information from sensor takes place. The third stage is the analysis stage where comparison/analysis of the processed information takes place. The fourth stage is the controlling stage where controlling output for wiper motor takes place. Arduino Uno is used and the language used is Arduino programming language

III. LITERATURE SURVEY

In this work, they proposed an automatic wiper control system which is economical, efficient and has a good output. This paper uses a resistive rain sensor. They developed a wiper which is practically verified and a sensor is developed which is an equivalent mathematical model. The rain sensor generally has a predetermined rotational geometry. When the droplets of the rainfall on the sensor, the droplets form a layer on the surface of the sensor causing non-linearity to its resistance. To decrease the non-linearity and to increase the efficiency of the system, the response from the sensor is to be linearized. The response can be linearized by using the linearization circuit with the equivalent electrical model of the sensor. To achieve the changes in the speed based on the output provided by the rain sensor, customized PIC micro-controller is used in the paper named " A novel and cost-effective resistive rain sensor for automatic wiper control: circuit modeling and implementation" by Mukul Joshi, M. A Joshi, Vinayak Sagare, D. N.Sonawane.

In this paper, fuzzy logic was used to operate the collected analog data from the rain sensor. The program was programmed to use fuzzy logic in collecting data. The wiper motor is controlled by the microcontroller which uses pulse width modulation. The reasonfor using the fuzzy logic in this project is only because it can be easily rearrangeable. They are used to redesign things. It can be used to construct different wipers for different vehicles without changing any hardware configuration. After a successful configuration, it can be placed in a vehicle and used. This is based on the paper named "Design and implementation of a reconfigurable automatic rain sensitive windshield wiper" by Lubna Alazzawi, Avik Chakravarty.

In this paper, the Bluetooth car wiper system is proposed. The wiper starts to wipe when it captures any wireless Bluetooth signal from any mobile. They introduced an innovative way to wipe the windshield. Although it is a Bluetooth based car wiper, there is a need for human intervention. For the wiper to start, it needs to detect Bluetooth signals and those should be sent by the driver in order to start the wiper. The Bluetooth car wiper is constructed using HC05 Bluetooth, Arduino and servo motor. We can control the movement of the car wiper by sending low range Bluetooth signals. This work is done in the paper named "Arduino based Bluetooth operated car wiping technique using android mobile phone" by Sourish Mitra, Soham Biswas, Mrinmoy Aus.

IV. EXISTING SYSTEM

Every year during the rainy season, more than 2 million people die worldwide because of accidents in the rainy season according to world health organization. People end up dying because of small mistakes. Today's car wipers need human intervention to start the wiper and to control its speed. In this type of manual switching, the driver needs to switch on the wiper when needed and need to adjust the speed of the wiper as required. This causes inconvenience to the driver during rainfall. He can neither concentrate on driving nor focus on the adjustment of the speed of the wiper. This type of scenario leads to accidents. In the current scenario, only luxury vehicles employ intelligent rain-sensing windshield wiper systems.

V. COMPONENTS AND DESCRIPTION

V.a. RAIN SENSOR

Rain sensors are electrically isolated and are available as printed circuit boards. These have zigzag pattern of conductive path for conducting the rain fall or water fall. This rain sensor module can be used as switch for detecting the rain fall and the usage is very simple. With this module finding of the rain fall intensity is also easy. This rain sensor unit contains rain board and control board. Rain board is set in order to fall rain on it and control board is equipped with two LED lights. In which one is for indicating the power supply and another one is for indicating the rain fall. The second LED light on the control board will blink only when the rain drops collided with the rain board. Rain board is adjusted to make fall the rain drops on it. Whenever the rain drops fall on the rain board, the LED indicator will blink and sends the signal to the microcontroller regarding the intensity of the rain fall.

V.b. WIPER MOTOR

TECHNICAL SPECIFICATION

Rated torque: 53 in-lb
Stall torque: 177 in-lb
Unload high speed: 50rpm, 1.5A (12VDC)

Unload low speed: 35rpm, 1.0A (12VDC)
Maximum wattage: 50W/12VDC
Motor noise: <45dB
Spindle rotates 360 degrees
Motor weight: 2.7 lbs
Approx size: 7.25"x4"x3.5"

Basic connections:

Starting from left side of terminal connectorThe first terminal is ground terminal.This connection goes to the main body of wiper motor.You will be connecting one of your (+) or (-) wires from your power source to this ground terminal. This will not affect the motor.Depending on if you connect the (+) or (-) wire from your power source will determine the motor will rotate in clockwise or anticlockwise.The next terminal is LOW speed connector.If your motor ants to turn slowly you would connect your other (+) or (-) wire to the connection.If you are connecting to this LOW-SPEED terminal make sure your connectors for ground.Make sure the low speed terminal are not touching each other if they are touching it will affect motor The terminal second from right is the HIGH SPEED cnnectors.If you want your motor to turn at HIGH SPEED you would connect your other (+) or (-) wire to this connection.
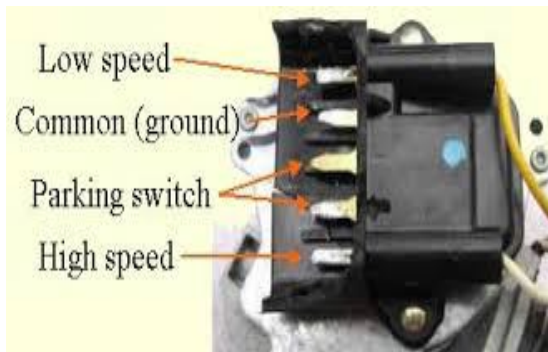
V.c. ARDUINO

The Arduino UNO is nothing but the microcontroller based on the ATmega328. 14 digital input/output pins, 6 analog inputs, 16MHz ceramic resonator, a USB connection, a Power jack, an ICSP header and a reset button is contained by the Arduino uno. It is fabricated with requirements to support the microcontroller. It can be connected with the computer with a USB or to the power with AC-to –DC adapter. A battery may be used for starting this. This is equipped with Atmega16U2 programmed as a USB to serial converters. This serial converter differ the Arduino from preceding boards which are equipped with FTDI USB-to-driver chip.

VI. EXPERIMENTAL SETUP

All the components which are explained above are arranged on the plank board. These components are fixed with plastic glue on the plank board. The connections are made with at most care. The setup is tested by dropping water drops on the rain board. When the water drop fell on the rain board the LED light blinked in the LED indicator and then microcontroller give signal to the wiper actuator. The wiper actuated and rotated according to the signal given by the microcontroller.

VII. CONCLUSION

The automatic car wiper system was developed to sense the rain and wipe the glass by moving the windshield wipers. By using automatic car wiper system, the purpose of driver's response to control the wiper is automated. It is demonstrated and proved that the rain sensors response to the rain for moving the windshield wipers is less than 400 milliseconds. Though the automatic car wiper is designed using rain sensor and Arduino, it can be advanced by replacing the rain sensors with IR sensors for accurately. determining and detecting the rainfall. If you opt for using a wiper which is not only economical but also efficient, using a rain sensor is the best. To advance the movement and to change the system different sensors which are useful for this purpose can be selected.

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