

Development and Fabrication of Automated Rain Sensing Wiper for Auto-Rickshaw

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Abstract— Today's auto-rickshaw wipers are operated manually, so here we propose an automated wiper system that automatically turns on and off detecting rain start and stop. Our paper brings forward this system to automate the manual wiper system used presently.

The rain sensing wiper works on principle of using rain water to complete its circuit so when the water falls on sensor microcontroller sends out signal to motor which drives the wiper.

Keywords—Rain; automated; wiper; autorickshaw; motor

I. INTRODUCTION

Over the past 2 decades, the automobile industry has made electronic advances in development of reliability, entertainment and safety technologies for vehicles like rear view camera, touch display panel with gps and Bluetooth music player. Due to this distraction is caused because of interaction of driver with these electronic devices.

So automatic rain sensing wiper becomes a appealing function as they work to minimize the time driver takes to take his hand off the wheel. These systems detect droplets of rain on the windshield and automatically turn on wiper system. Presently rain sensing wiper uses optical sensor.

II. BACKGROUND OF PROJECT

A lot of efforts have been made for developing and researching of reliable and cost-effective automatic rain sensing wiper. A seamless system can reduce a effort from driver's workload and give them a ease to keep their eye on road in rainy season. Rain sensing wiper are not used in auto rickshaw for no. of reasons mainly because they are expensive and unappealing.

The most common method of rain detection and one presently used by Hyundai and Chevrolet is by optical sensor. They work on principle of transmission of an infrared ray at an specific angle through the windshield and calculating the reflection and determining water presence.

This is a difficult complex task which require precision and accuracy in manufacturing. Optical sensors are expensive and can produce inadequate readings when dirt or other particles on the windshield cause a reflection impersonating that of rain.

III. METHODS OF RAIN DETECTION

A. Optical method:

Optical sensors uses light and total internal refraction effect. Optical sensor is made up of light source, optical

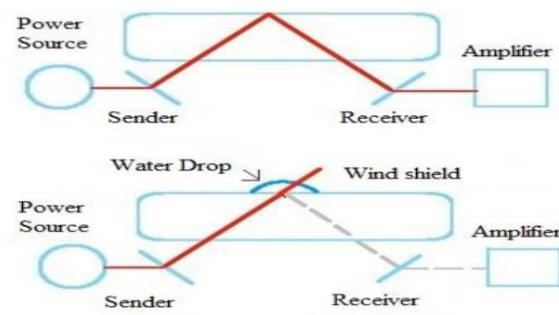
assembly (containing 2 lenses and light guides) and light detector. A ray of light is focused to the wind shield through optical assembly. Beam of light gets trapped within glass due to effect of total internal refraction. The light continues to reflect from outer surface of glass to inside surface till it is picked by other optical assembly.

B. Conductive method:

Conductive method uses a sensing element which contains two sets of contacts parted by an insulator. When water falls on the sensor, the water conducts the signal and completes the circuit. After that it sends the signals to the next element to operate the motor of the wiper. Conductive system has some basic problems; the sensing element used here is prone to corrosion and become unusable. Also the dirt can reduce life of the sensors. So it is not viable to design such sensors.

C. Piezo electric method:

Piezoelectric method contains a piezo crystal element. While Rain water falls on the windshield it generates the sound waves at a specific frequency. The piezo crystal senses the sound waves, and differentiates it with the additional sound created by wind, dust, etc. this crystal replies only to the sound



IV. PROBLEM DEFINITION

A. Manual handling

The manual handling of presently used wiper systems cause trouble to the driver while driving in situations like heavy rainfall or through foggy situations. In these conditions it becomes uncomfortable or troublesome for the driver to switch the wiper ON and OFF again and again

B. Switching of wiper

The switching of wiper can cause disruption while driving which can lead to accidents on sharp turns if safety measures are not taken. Present systems require the rickshaw driver to change the wiper according to need.

C. Speed control

During rainfall with heavy raining conditions, there is need to set the speed of wiper according to the condition. Existing systems require manual speed control which can cause distress during driving.

V. GOALS AND OBJECTIVE

This project intent to develop an Automated Rain sensing wiper System for Auto rickshaw taking the following objectives:

- a. To rid with troublesome wiper action needed when rainfall state change or driving state change, including the rickshaw speed.
- b. To operate the wiper with response to fluctuating rain or driving conditions, to keep the driver's windscreen clear.
- c. To implement a control system which reduces human efforts and to upsurge automation in vehicle driving system.
- d. To accomplish safety by reducing the driver's work load and to minimize no. of accidents triggered by disruption in driving.
- e. To make the system easy to install.
- f. To make a cheaper automated system that can be integrated easily in Rickshaw

VI. SYSTEM DESCRIPTION AND COMPONENTS

A. Npn no proximity sensor

NPN NO sensor is a three wired proximity sensor. It works on a principle when object (in our case water) comes in front of sensor the third wire gets activated and sends signal to relay which ahead sends signal to the motor which therefore cleans the rain on the windshield. It is an effective sensor.

B. Battery

C. Bridge rectifier

Bridge Rectifiers are broadly used in power supplies that deliver needed DC voltage for the electronic devices.

Capacitor

A capacitor is a two terminal electrical element that stores electrical energy in an electric field. The result of a capacitor is recognized as capacitance. While some capacitance exists between any two electrical conductors in proximity in a circuit, a capacitor is an element designed to enhance capacitance to a circuit.

D. Relay

Relay is a device which is used to separate two circuits electrically and join them magnetically. They are very useful devices and allow one circuit to switch another one while they are completely isolated. They are often used to interface an electrical circuit working at a low voltage to an electric circuit which performs at very high voltage. For instance, a relay can make a 5V battery circuit to change a 230V AC mains circuit.

E. Wiper blade

The wiper blade is motorized devices consisting of rubber element which are used to clean the rain water or dust from the windscreen of the vehicles (in our case auto-rickshaw)

F. Motor

The motor used in our case is of Varroc Company WIPR-AUTO24-AA52 wiper motor. It takes a lot of energy to speed the wiper blades back and forth across the windshield rapidly.

VII. METHODOLOGY

- a. At first, we analyzed the sensor i.e., which sensor is perfect for the project.
- b. We have used npn no three wired sensors.
- c. We made a circuit consisting of
 - Npn no 3 wired water detector sensor
 - Battery 12V 9A
 - Capacitor 12V 35A
 - Bridge rectifier 12V 9A
 - Relay 12V 9A
 - 12V DC step down motor
- d. We made an internal circuit in a box out of three components
 - Capacitor
 - Bridge rectifier
 - Relay
- e. We connected motor to wiper
- f. When water on windshield comes in contact to sensor. The third wire of sensor gets activated and it sends signal to the circuit and therefore motor gets activated and results in cleaning of windshield using wiper

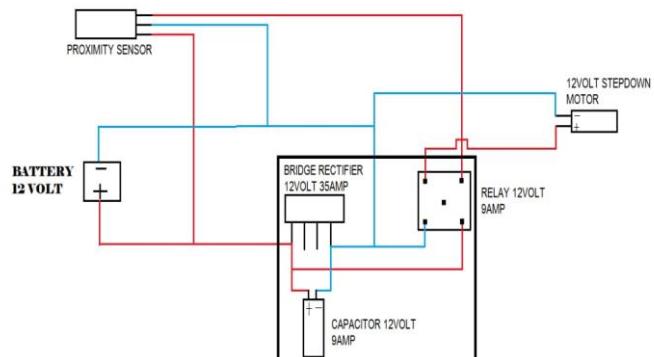


Figure 1 Design of Project

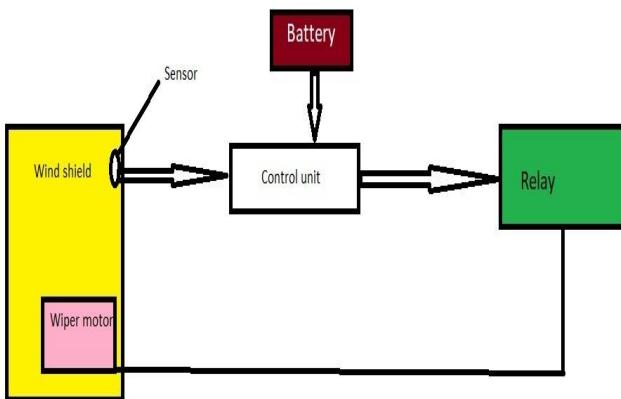


Figure 2 Block diagram



Figure 5 Real Time testing

IX. COST ESTIMATION

Table 1 Cost Estimation

Components	Cost
Motor	2000
Battery	1500
Capacitor	20
Bridge rectifier	20
Relay	50
Wiper	200
Sensor	2000
Total	5800

X. CONCLUSION

An automatic rain sensing wiper for Auto-Rickshaw has been developed and Designed to detect rain fall and start the wiper system and an effort has been made to make the Rain sensing wiper For auto-rickshaw cheap and affordable.

The wiper system will reduce the work load and pressure on auto-rickshaw drivers so they can concentrate on road without worrying about and hassles and distraction.

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Figure 3 Practical design

VIII. TESTING OF PROJECT

Testing of the automated rain sensing wiper has been carried out several times we checked the sensor working a lot of times to check whether its sensing water every time and if the circuit is operating properly Without any lag or disturbance in the system. After several tests we found the Rain sensing wiper working remarkably

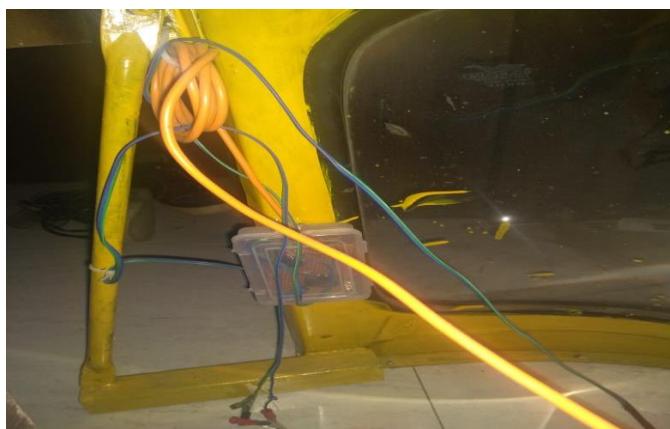


Figure 4 Circuit testing