Automatic Rain Operated Wiper System in Automobile: A Review

Kadakia Nishant A[1] Kothari Mohit A[2] Shah Amit V[3] Patel Vipul R[4]
[1,2]B.E. Research Student [3,4]Assistant Professor
[1,2,3,4]Department of Mechanical Engineering
[1,2,3]SVMIT Bharuch, India [4]GEC Bharuch, India

Abstract— In the world, now a day's use of transportation vehicles is drastically increased. So it is very important to improve the safety facility in automobile vehicles. For achieving and fulfill above concept it is very important to do the survey and analysis to detail the automatic operated wiper. Windshield Wipers plays an important role in assuring the drivers safety during travelling. So the aim is to develop a system which control the automatic operated Wiper which is based on electronic sensor is called Automatic Operated Wiper. From the research paper we study about different types of sensor use in automation for the wiper. By adopting this technique we can achieve the high safety of driver as well as passengers. From this system the driver can get better focus on road without any distraction while driving.

Key words: Windshield Wiper, Automation, Rain Sensor, Safety

I. INTRODUCTION

Windshield wiper is an important component in vehicles. It plays an important role in auto vehicle. It provides a good visibility in rainy season to the driver. Wiper helps to clean the windshield and provide good visibility through it. It helps to reduce the accident in fog and rainy season. During the period of 1910-1920 the Vacuum wipers are used in the vehicles after that electric wiper was invented and it is used in the period of 1920-1930. And after 1940 the intermittent wiper was invented and it is used till 1980. A manual wiper needs driver attention to On/Off the knob and also set the speed of the wiper because of this driver gets off his attention from the road and the chances of the accident will increase. So to reduce the accident or to prevent the accident the automation is required in auto vehicles. So that driver can focus on the road. Therefore Automation is most needed in auto vehicle for the safety purpose it will reduce the work of the driver so he can get better focus on the road while driving. Therefore Automatic operated wiper needs in the vehicles it will increase the safety of driver as well as passengers. And it will also give the better visibility on road and reduce the effort of driver. [1]

Fig. 1: Windshield Wiper

II. WORKING OF WINDSHIELD WIPER

The mechanism behind wipers is the windshield wiper motor, which provides the power to the wipers. A linkage converts the rotational output of the windshield wiper motor into the back-and-forth motion of the wipers. With the help of worm gear the force can be control windshield wiper motor which delivers to the drive arm by slowing down the speed of the electric motor. The wipers are secured by pivots, which are mounted on brackets at both ends of a connecting link. The pressure from the motor on the driver's side of connecting link moves the other windshield wiper. The connecting link is attached to the drive link near the windshield wiper motor. An electronic control circuit settles the wiper if it's an intermittent setting and also provides consistent power to the wiper; a spring linkage ties the pivot to the drive link to return the wiper to its original position and keeps the wipers close to the windshield. Inside the windshield motor, the electronic circuit maintains the power until the windshield wiper is in the down position and then cuts the power to the wiper motor. Wipers have small arms that distribute pressure from the wiper along the rubber blade. These pressure points keep the rubber blade fixed against the windshield glass to clean the windshield properly. [2]

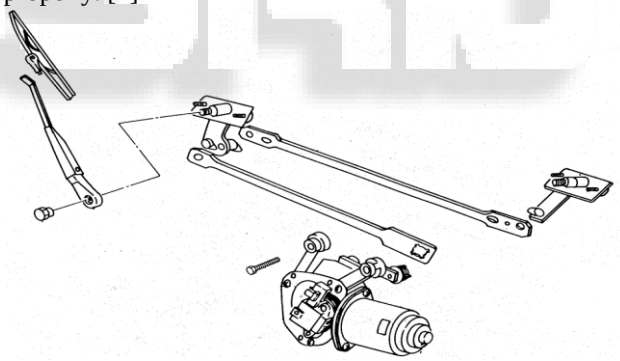

Fig. 2: Component of Windshield Wiper

III. NEED OF AUTOMATION

All the car accidents are caused by distraction due to talking on cell phones, eating while driving, and other similar distraction that take a driver focus off the road. Now a day's the entire automobile vehicle is having automation for the safety purpose.

In Semi automation the combination of manual effort and mechanical power is requires while in full automation the human participation is negligible.

So that automation of windshield wiper is necessary to reduce the accident due to poor visibility. It eliminates the driver attention to on/off or adjusts the speed of the wiper. Due to automatic operated wiper the driver can concentrate on road without any distraction. Therefore we have pleasure in introducing our project "Automatic Operated Wiper". It is a genuine project which is fully

equipped and designed for Automobile vehicles. This operation can be carried out with the help of sensor for automatic operated wiper.

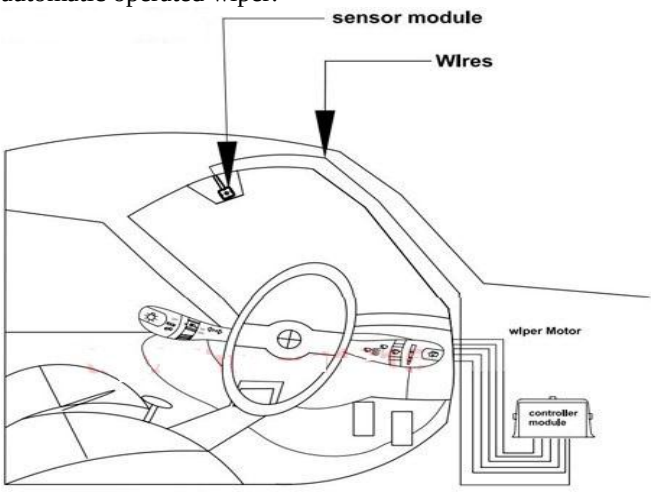

Fig. 3: Setup of Automatic Rain Operated Wiper

IV. SENSOR

A sensor is a device which transducer whose purpose is to sense and responds to some type of input from the physical environment. The specific input could be light, heat, motion, moisture, pressure, or any one of a great number of other environment phenomenon. The output is generally a signal that is converted to human-readable display at the sensor location or transmitted electronically over a network for reading or further processing.

Types of sensors:

- Temperature Sensor
- Pressure sensor
- Ultrasonic sensor
- The acceleration sensor
- Displacement sensor
- Holzer switch sensor

V. LITERATURE SURVEY

A. Semi-Automatic Rain Wiper System:

Tapan S Kulkarni, This research paper deals with the simple and ease design of semi-automatic rain wiper system. It is semi because it is implemented 1st time in auto vehicles. This system is developed by using 8051 microprocessor. In this paper it was found that they are using cup sensor which is reasonable in price. Here sensing device is used basically a conical shape cup with a tray on the top of the cup to collect the maximum possible amount of water. This table top model of semi-automatic rain wiper system has worked successfully at three different stages of rain intensity and it is very cheap in cost which can be implemented in economic class vehicles. [3]

B. Automatic Wiper System:

Shantanu Dharmadhikari: In this paper they present automatic rain wiper system used to remove raindrops and activate automobile windshield wipers without driver interactions. This system was developed to reduce the driver efforts so he/she can give focus on main task of driving. The project aims to develop an automatic windshield wiper system that automates the process of the driver's manual response to rain on the windshield. By reducing the need for drivers to adjust wiper speed while driving, the number of accidents caused by distraction can be slightly reduced. The demonstration is able to simulate the operation of the system as if installed in an automobile. [4]

C. Automatic Wiper Controller Using Optical Rain Sensor:

Hidedki Kajioka, An automatic wiper which sense raindrops with an optical rain sensor and controls the wiper interval. This automatic wiper is implemented by combining an existing wiper system with a rain sensor and controller. A power control circuit is attached so that the sensitivity of the sensor will not deteriorate when the intensity of incident light is lowered due to contamination. The controller is a four-bit microprocessor which processes signals from the sensor and controls the wipers to a driver's linking. The Rain Sensor detects raindrops by sensing the little change in light intensity. They developed an optical automatic wind shield wiper control which is an improved version of intermittent wiper system. The automatic wiper system reduces wiper operations and increases the driver's level of comfort. [5]

D. Design and Development of Smart Automatic Windshield Wiper System FUZZY Logic Approach:

Mr. Anil. G. Bansode , Automatic windshield Wipers play a key role in assuring the driver's safety during precipitation. The manually wiper system, requires driver's constant concentration in adjusting the wiper speed. This manual adjustment of the wiper distracts driver's attention. The proposed system has ability to change the wiper speed automatically with change in the rain sensitivity, but it is not able to measure rain intensity. Hence to solve the problem Mat lab 7.0FUZZY logic toolbox is used. Fuzzy clustering is used to analyze the system behavior after taking the sensor output voltage readings at different rainy position. [6]

E. Intelligent Rain Sensing Using Automatic Wiper System:

Sonali B. Madanka, From the last two decades, the automobile industry has aggressively researched ways to increase modern computing and electronic advances in the development of safety, reliability, and entertainment technologies for vehicles. With drivers exposed to an ever increasing number of distractions, automatic rain-sensing wiper systems become an even more appealing feature, as they work to minimize the time the driver must take his/her hands off the wheel. Most manual systems offer intermittent as well as variable speed operation. The manual wiper system however requires driver constant concentration in adjusting the wiper speed .Manual windshield wiper speed constantly varies according to time and vehicle's speed. Because the manual adjustment of the wiper distracts driver's attention, which may be a direct cause accidents. In this to developed an automatic wiper control system which is improved version of intermittent wiper system. This wiper system reduces cumbersome wiper operation and improves driver's level comfort. [7]

F. Automatic Wipers with Mist Control:

Ashik K.P, This paper shows Automatic wipers with mist control. Now a day, the accidents are most common in commercial vehicles. One of the reasons for these accidents

is formation of the mist inside the vehicle due to heavy rain. In rainy seasons for commercial vehicles, the wiper on the windshield has to be controlled by the driver himself, which distracts his concentration on driving. Also when the rain lasts for more time (say for about 15 minutes) the formation of mist on the wind shield is also hinders the visibility of the driver and makes driving difficult. The main aim of the project is to prevent the distractions to the driver of a truck or bus. The rain intensity is measured by the set of sensors placed in the beaker at the predetermined levels. All the four wheeled vehicles are equipped with the wipers. These wipers are used to wipe the water on the windshield during rainy season. The concept of Automatic Wipers with Mist Control has been implemented successfully. After the experimental setup the wiper motor was tested for all the following conditions drizzling, heavy rain, and medium rain. The tests have been conducted under mist on the wind shield. [8]

G. Smart Wiper Control System:

N. M. Z. Hashim, Wiper is an essential component that used to remove raindrops or any water from the vehicle's windscreen. The previous system used to activate the wiper manually. Thus, this system is proposed to solve these problems. The objectives of this project are to upgrade the older cars system by providing automatic wiping system, to improve the system by using sensor with actuator and to design a basic program that will fully operate with the system. Most of cars have two wipers on the windscreen, one on the rear window and the other on each headlight. The wiper system was well functionally according the water condition from the outside of a car. This project showed a contribution on the design of the automatic wiper system for the future research in this field. [9]

H. Factor Affecting The Automatic Rain Sensing Wiper System:

Rahul Sindhwan, The 21st century is the time of automation and it is defined as the replacement of manual efforts by mechanical power in all degree of automation. While driving the car, the driver cannot give his full attention on the road. So it will increase the chance of accidents in rainy season. This paper shows the factors affecting of efficiency of rain sensor which includes Convenience, comfort, installation, failsafe function. From above it conclude that technology is very cheap and design is also simple. It is also conclude the removal of controlling the wiper during rain which will provide them much ease and help them to concentrate on driving. [10]

I. Windshield Wiper Rain Sensor System:

Scott A Vandam, This present invention is relates generally to an automobile vehicle rain sensor system which controls the wiper speed in rainy season to remove the raindrops from the windshield. This invention is directed to a rain sensor system for automatically controlling windshield wiper action in associated with rain condition. The manual wiper system does not give the safety so the automation is required. [11]

VI. Conclusion

Due to automatic operated wiper the driver can see on the road without any obstacles. From the research papers we conclude that it can reduces the driver effort and also reduces the accidents. It will provide good visibility and increase the safety of driver as well as passengers. In most of the paper they were using rain sensor which detect the water drop on the windshield and start working. Some of them used different sensor for the automatic rain operated wiper but they had faced some problems with it. So from the research papers we can say that rain sensor is best for the automatic rain operated wiper and its design is also simple.

VII. References

[1] K.M. Gupta, " Automobile Engineering", Volume II, Umesh Publications,2001
[2] Rajput R.k., "a text book of automobile engineering", laxmi publication (p) ltd, Delhi, 2013
[3] Tapan S Kulkarni," The Semi-automatic rain wiper system".
[4] Shanatanu Dharmakumari," Automatic wiper System".
[5] Hidedki Kajioka,"Automatic wiper controller using optical rain sensor".
[6] Mr Anil G Bansode" Design and Development of Smart automatic windshield wiper system fuzzy logic approach".
[7] Sonali B Madanka,"Intelligent FRain sensing using automatic wiper system".
[8] Ashik. K.P,"Autoamtic wipers with mist contol".
[9] N.M.Z. Hashim, "Smart wiper control system".
[10] Rahul Sindhwan," Factors affecting the automatic rain sensing wip;er system".
[11] Scott A Vandam,"Windshield wiper rain sensor system".

