



Automatic Rain Sensing Wiper Circuit Using 555 Timer IC

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Abstract: - Working of a windshield wiper is a manual procedure which requires to be switched on to remove rainfall and debris from the screen. This does not only require driver's attention, but also, causes a certain level of discomfort to the driver and serves as a source of distraction which increases the risk of accidents. To offer comfort to the driver and essentially reduce the risk of accidents, an automatic rain sensing device has become a necessity. While such a device is available in the market, its high cost and other such limitations have made it less popular in the automobile industry. Aim of this work was to propose another such model in market that limits the cost while maintaining the efficacy. A rain sensor, a microcontroller and a driver integrated circuit (IC) are the major components used in the construction and seamless working of the proposed device. Falling water is quickly and precisely detected by the rain sensor which then transmits the signal to the second component i.e. microcontroller which in turn energizes the driver IC to switch the required motion of the wipers on. This device converts a cumbersome manual operation to a smooth automatic one.

Keywords: Rain-Sensing Wiper System, Multivibrator, Microcontroller, LED's

I. INTRODUCTION

All the four wheelers are equipped with the wipers. These wipers are used to wipe the water on the windshield during rainy seasons so as to obtain clear vision. The wipers invented previously used to oscillates at a slow speed. Sometimes this lead to the distraction to the driver's visibility. This lead to the invention of different speed wiper motors. But still the wiper actuation is controlled by the driver. To provide tension free driving, automatic wipers were implemented. During night driving a lot of glare is experienced by the driver of the vehicle. He may sometimes face the Toxler Effect and this may lead to accident. This paper thus explains a system which will provide ease of operation and look after the human comfort that too with low cost.

II. 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.

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.

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 process signals from the sensor and controls the wiper 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.

D. Design and Development of Smart Automatic Windsheild 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 manual wiper system, requires driver's constant concentration in adjusting the wiper speed. This manual adjustment of the 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.

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.

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.

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.

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.

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.

III. METHODOLOGY

For Astable Multivibrator, we have used a 555 Timer IC for generating pulse in every 2-3 seconds (depends on capacitor value), means 555 Timer IC is configured in Astable mode. Output of Astable Multivibrator is directly connected to inverting pin of Comparator LM358 and Pin No 7 of Motor Driver L293D. Output of comparator is directly connected at pin 2 of motor driver IC. Comparator LM358 IC is used here for comparing 555 timer IC's output voltage and reference voltage across comparator's non inverting terminal, set by using Voltage Divider Circuit (R3 and R4). Two LEDs have been used, one at the output of 555 Astable circuit and other at the output of comparator LM358. A Water Detector or Rain Sensor is used for detecting the water or rain. Output of Astable Multivibrator and Comparator is applied to motor driver IC L293D, which will further drive the wiper motor. Whole circuit can be powered using 5v-12v battery depending upon the application.

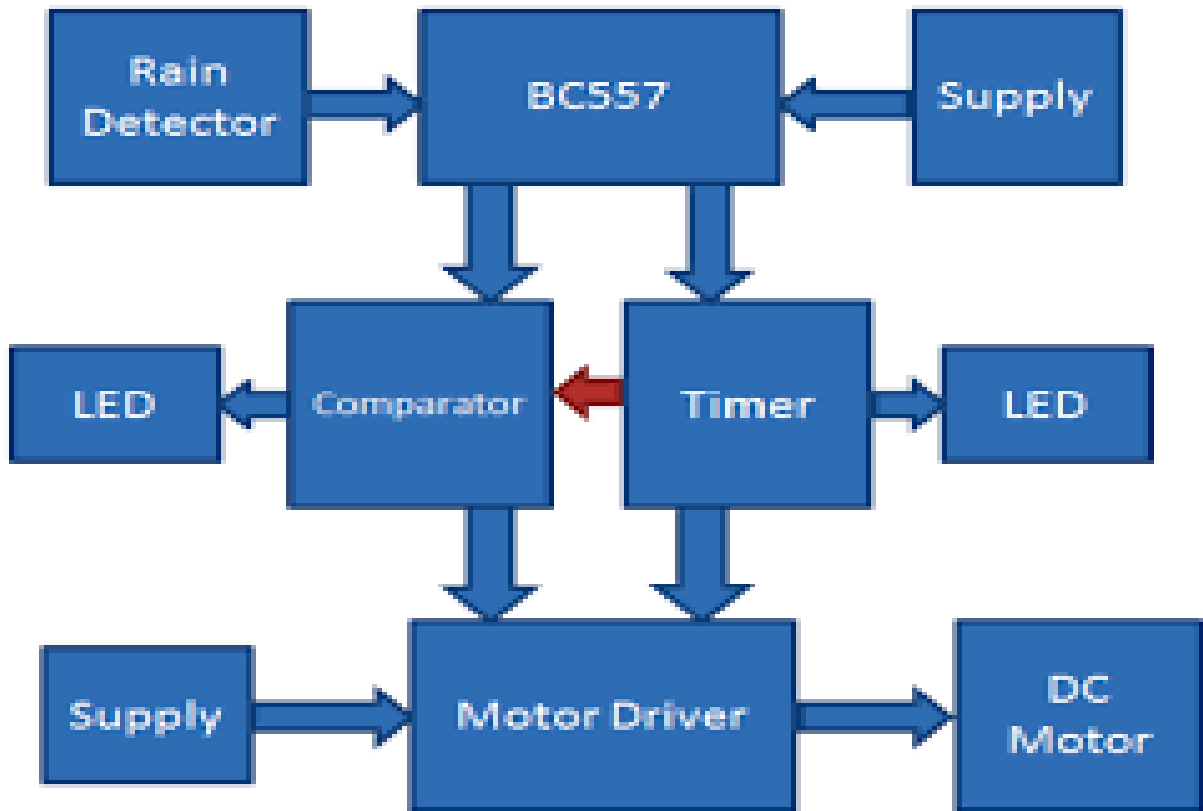


Fig.1.1 Block Diagram of Working

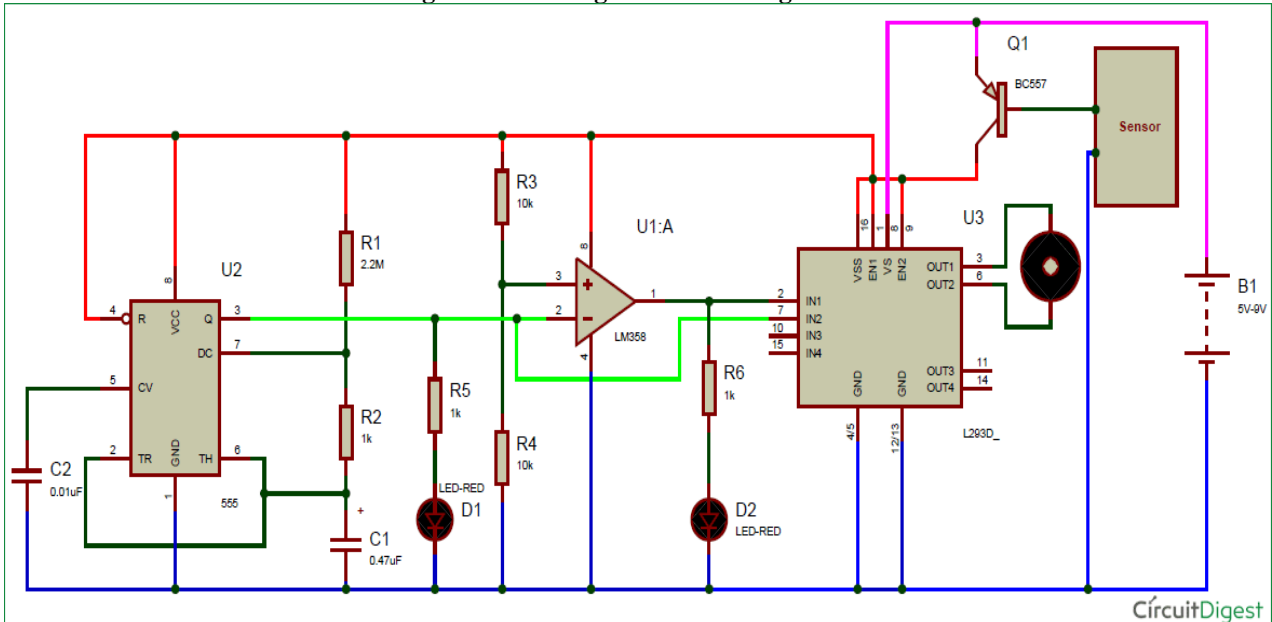


Fig.1.2 Circuit Diagram

IV. IMPLEMENTATION

Working of this Automatic Rain Sensing Car Wiper challenge is simple. As we already defined that this circuit has four elements namely Astable Multivibrator, Comparator, Motor Driver and Rain Detector. When water drops of rain falls over the Rain Sensor then it will trigger the PNP transistor BC557 and PNP transistor turns ON the electricity deliver of entire circuit and circuit begin working until there's water at the Rain Sensor. Now after the energy deliver has been become ON, Astable Multivibrator starts oscillating in configured frequency. Now when the output of 555 Timer IC is going HIGH then the comparator LM358 offers LOW output and when the output of 555 IC goes LOW then the Comparator's output is going HIGH. And by the usage of these two outputs DC motor turns clock smart and anticlockwise and wiper connected to it turns proper to left and left to proper, through Motor Driver IC L293D. That is how the wipers



automatically feel rain and gets activated. They continue to be activated till there's water on Rain sensor, as soon as the water evaporates wipers get stopped. Two LEDs are also used here used for indication.

V. FUTURE SCOPE

Automatic wipers are used in four wheeler vehicles both in front and rear mirrors. It can be implemented at house window for cleaning. A slight modification in it leads to a better cleaning system. Prevents glass shield or bars from getting corroded. Also it can be used in trains, aircrafts and watercrafts.

This system also useful in-home applications like cleaning the window glasses and it intimates the rainfall and also notify people in the house. So that people can take care of things like clothes, food grains and products.

VI. CONCLUSION

We have developed an automatic wiper control system which is improved version of intermittent wiper system. This wiper system reduce cumbersome wiper operation and improve driver's level comfort. It will give a new dimension of comfort and aid to the drivers who work at night and traffic prone areas where they already have to concentrate on brakes and clutch. The removal of controlling the wipers during rain will provide them much ease and help them concentrate on the basic ABC (accelerator, brake and clutch) of driving. Our system features high accuracy, high sensitivity, and non contact measurement. The system are used as component in home automation system because it can detect a sudden rain and notify people in the house.

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