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Automatic Rain sensing wiper using Arduino

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Abstract: *In this paper implementation of automatic rain sensing wiper using Arduino has been explained. It can be used in automobile sectors as four wheeler and other heavy vehicles require wiper in their windshield in the rainy season. Sometimes it is also used to remove snow from the wing shield. Wipers are generally used in rainy season to remove the excess of water from the wind shield so that visibility can be more clear while driving. Few year ago only manually operated wiper were available but in the present automatic wipers have been introduced which may sense the intensity of rainy water and operate automatically with variable speed. Driving in the rainy season may cause severe road accidents and manually operated wind shield wipers takes time to adjust meanwhile any accident may occur. In this paper Arduino based automatic rain sensing wiper has been modeled. By adopting such a technique higher safety can be achieved not for the driver only but for the other people present in the road or nearby the vehicles. Using this automatic system; a driver can get better focus on the road without any distraction while driving.*

Key Word: *Wiper, windshield, rainy season, Arduino, safety.*

I. INTRODUCTION

According to the World Health Organization(WHO) every year about more than two million people die worldwide due to road accidents in the rainy season[1]. A small mistake may cause fetal accidents[2]. In the manually operated wiper system driver may be busy to adjust the wiper and controlling its speed. It may be inconvenient for drivers which amy cause severe accident. In the present scenario; human use various types of transportation media viz. train, car, aircraft, truck, locomotive etc[3]. Most of the vehicles use wiper in rainy season to remove water and in winter season used to remove snow so that driver can concentrate on the road while driving which is very important for the safety purpose[4]. Wiper generally consists of metal arm provided at one end and with the long rubber blade attached to the other. This arm is powered by an electrically driven motor[5]. The blade swing back and forth over the windshield glass to remove rainy water or snow[6]. Its speed can be adjusted manually. In heavy rain, speed of the wiper must be high to remove water in excess. Many vehicles are equipped with the automatic wiper which senses the water and starts automatically without any manual operation[7,8]. Sensors are used to sense in the wind shield. And wiper starts working. In heavy rain condition its working speed increases [9,10].

II. METHODOLOGY

In this section designing of automatic rain sensing wiper using Arduino has been discussed. This proposed system is useful as it is operated automatically and adjusts the speed itself based on the intensity of the rainfall. Such system many increase the safety while driving[11]. In general; windshield wipers are operated using electrical motor which is attached with the worm gear. This gear generates the force which is required to move the wiper as fast as required. However the controlling part consists of manually operated switches operated by the driver [12].

Proposed System: The proposed system consists of Arduino Uno, rain sensing plate, servo motor and a driver. The speed of the servo motor is adjusted with the intensity of the rainfall. Fig 1 shows the flow diagram of the proposed system. Rainfall sensor converts the intensity of rain into Vo if it is in the range of 600< Vo < 800 then the wiper motor speed is low. If Vo is in the range of 460< Vo < 600 then the speed is medium and finally Vo is Vo < 460 then the speed is high.

This wiper system has four stages:

Stage 1: It is a reading stage in which data is read from the rain sensor module.
Stage 2: It is processing stage in which information collected by the sensor is processed.
Stage 3: It is analysis stage in which the processed data is compared and analyzed.
Stage 4: In its control stage in which the servo motor is controlled by the arduino.

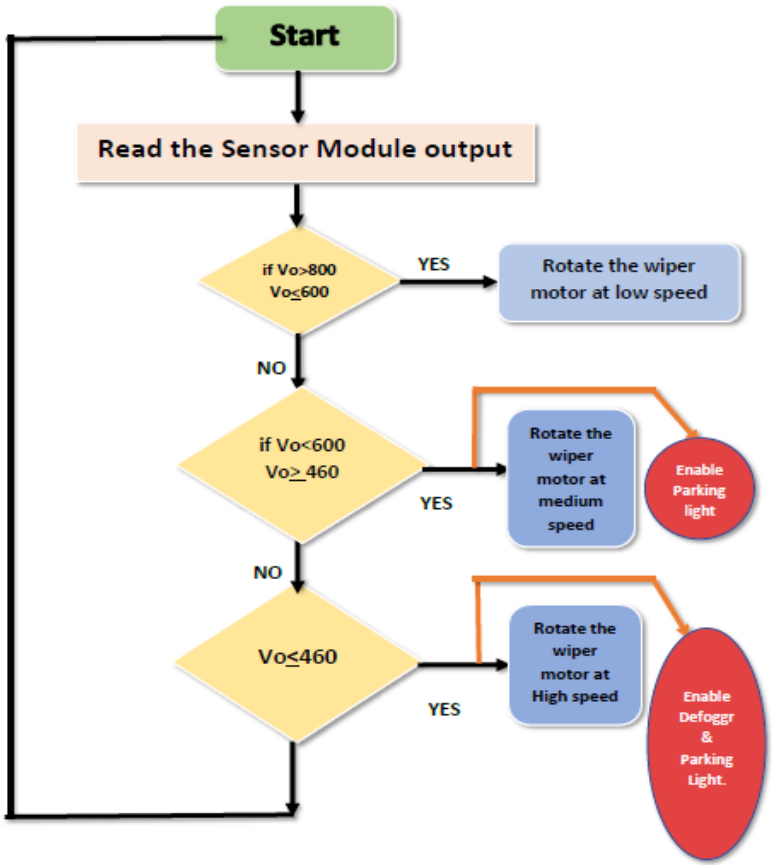

Fig. 1 Flow diagram of the proposed system

Fig. 2 shows the block diagram of the proposed system which removes the shortcomings of the existing system. It has five different blocks viz. Arduino nano, Rain sensor module, Servo motor and external power supply.

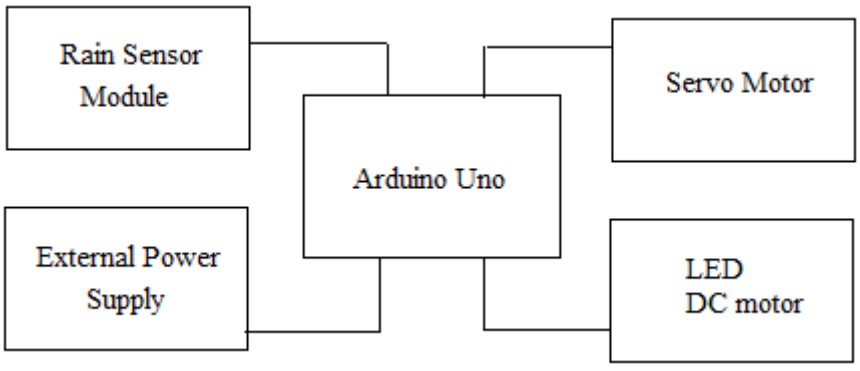

Fig. 2 Block diagram of proposed system

Now we will discuss all the blocks one by one:

1. **Arduino:** Basically it is microcontroller based hardware electronics device in which programming can be done using software. It can be used in many applications like motion detection, light control, finger placement on buttons.

2. **Rain Sensor:** It is a sensor used to sense rain droplets. When it rains the circuits art closed and resistance changes accordingly. When moisture or rain reaches to its threshold level; sensor sends the data to the control module for further action.

3. **Servo Motor:** It consist of output shafts that is used to drive the wiper. This motors are economical and efficient. Small size makes them suitable to use in many small application devices.

4. **External Power Supply:** The whole circuit need power supply externally. For this purposed either 5 V battery can be used or AC can be converted into regulated DC supply.

Fig. 3 shows the hardware implementation of rain sensing wiper using Arduino.

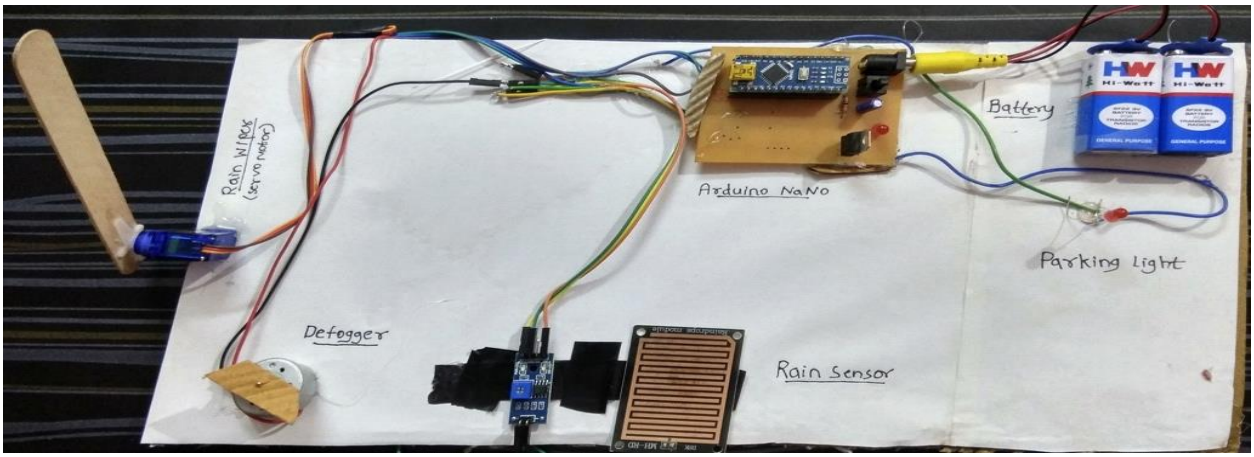

Fig 3: Hardware implementation of automatic rain sensing wiper using Arduino

III. RESULTS AND DISCUSSIONS

From the above discussion it is clear that automatic wiper control system is better than the manually operated wipers. It is bit costlier than the manually operated system but if mass production is done cost may be decreased. It is efficient and clears the windshield properly and make the visibility more clear. When the droplets of rainy water fall on the surface of the sensor it starts working. However some more features may also be used which is beyond the scope of this paper.

IV. CONCLUSION AND FUTURE SCOPE

From the above we may conclude that automatic car wiper system can be developed to sense rainy water so that it can be removed from the wind shield so that visibility must be clear in such a manner that there would be very less chance of road accident due to aforementioned reasons. Arduino based automatic wiper system is one of the best wiper which may be used in cars, trucks and other heavy vehicles. It has many advantages such as, with the mass production it may cost low, it decreases the manual operations so accidents may be avoided. It can be easily installed in the vehicles. Near future there may be many modifications done like they can be made smaller so that they can be installed in the helmet also. Many more features can also be introduced in this system.

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