AUTOMATIC WIPER CONTROL USING RAIN SENSOR

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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 traveling. 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. Today's car wipers are manual systems that work on the principle of manual switching. An automatic wiper system that automatically switches ON on detecting rain and stops when rain stops. This project brings forward this system to automate the wiper system having no need for manual intervention. When a raindrop hits the sensor, the sensor detects the intensity and the wiper speed is automated accordingly. The higher the rotation speed, the higher the rainfall. This project uses an Arduino with a rain sensor and servomotor. Humidity is measured via the analog output pin on the rain sensor and the wiper begins to rotate when the humidity threshold is exceeded. The information collected by the rain sensor is processed and analyzed by Arduino and controls the servomotor based on the processed information. The wiper blade is connected to the servo motor. All devices are connected to an Arduino that is connected to the car's power supply.

Introduction :

The issue of driver's safety is of great importance in today's automotive industry. In many cases, a lack of proper vision is responsible for accidents during heavy rainfall. In many cases, manual errors like not increasing the speed of the wiper by the driver lead to accidents. All vehicle manufacturers and automobile device companies have developed and incorporated several devices for the safety as well as taking convenience and easy operability of those devices into consideration. One of the many devices is the wiper, which are used to wipe the water on the

windshield during rainy seasons so as to obtain clear vision.

A windscreen wiper or windshield wiper is a device used to remove rain, snow, ice and debris from a windscreen or windshield. Almost all motor vehicles, including cars, trucks, train locomotives, watercraft with a cabin and some aircraft, are equipped with such wipers, which are usually a legal requirement. A wiper generally consists of a metal arm, pivoting at one end and with a long rubber blade attached to the other. The arm is powered by a motor, often an electric motor, although pneumatic power is also used in some vehicles. The blade is swung back and forth over the glass, pushing water or other precipitation from its surface. The speed is normally adjustable, with several continuous speeds and often one or more "intermittent" settings. Most automobiles use two synchronized radial type arms, while many commercial vehicles use one or more pantograph arms.

Wipers may be powered by a variety of means, although most in use today are powered by an electric motor through a series of mechanical components, typically two 4-bar linkages in series or parallel.

Operation of these wipers in the existing models is yet manual. The physical model of the operation includes two arms twirling at one end back and forth over the glass. The wipers invented previously used to oscillate at a slow speed, sometimes this cause the distraction to the driver's visibility. Hence there is need for automation. Automation greatly decreases the need for human sensory and mental requirements as well. An automation system consisting of a connection between hardware and software has freed the individuals from their day to day chores. Over the last ten years, the advancement in the automobile industry has been increased to find modern techniques to increase safety. Nowadays, each and every vehicle is provisioned with the wiper to avoid the accidents and many efforts are geared toward decrease in the human intervention in controlling the wiper to ensure luxury. Although the provision of the automatic wiper is costly, this makes its provision limited to luxury and expensive cars.

Nowadays most of the things in this world are electronically operated and are based on automation system. People always want something in which no manual work is involved so this system is mainly designed to operate automatically and this was the prim focus of our project that has enabled us to make this innovation which is also having a handful of future scope.

Literature Survey :

The most obvious reason anyone would want rain-sensing wipers is safety: rain sensors reduce driver distraction. The amount of rainfall hitting the windshield is constantly changing. The weather itself fluctuates, and the speed and traffic conditions change. As a consequence, the driver has to constantly adjust the wipers because they are wiping too often and smearing, or not often enough, and the driver cannot see properly. Adjusting the wiper control is a constant source of distraction, and distraction kills. The next reason is convenience. Drivers with special mobility or vehicle control needs have particular need of rain sensing wipers. If a driver requires hand-operated brake or throttle controls, then the constant adjustment required by conventional

wiper systems is downright dangerous. For these and other reasons, almost everyone that drives a car with rain sensing wipers likes the feature and does not want to go back to plain old intermittent wipers. Rain sensors are available in most new luxury cars, as well as the automotive after market.

Rain Detector using 555 Timer is a simple alarm that can be used to find out if it was raining. In principle, Rain Detector using 555 Timer is a stable multi vibrator which is prepared by IC555 with installed sensor that can detect water. A stable multi vibrator with the 555 timer asset in the audio frequency with a frequency of 1 KHz. The series of using Rain Detector 555 Timer can be supplied with a voltage source that is free enough from 5-15V DC. In application, Rain Detector using this 555 Timer can be mounted in a motor, car or other object that we want to protect from rain. Water sensors that are used in circuit 555 Rain Detector using this can be designed with a PCB that one can make the path as shown in the image above or as disclosed from the image below is by using aluminum foil taped to a board or boards that are plastic insulator . The important principle of the sensor is to conduct electrical current very well when the surface is exposed water even a little.

Rain Detector Using the Combination of 555-Timer and Darling ton-pair Here is a simple rain alarm circuit that produces an audible alarm whenever rain falls. The rain detector circuit is based on two transistors (Q1 & Q2) and a NE555IC (IC1). The two transistors are wired as a switch which goes on when the base of Q1 is shorted to the positive of the supply by the rainwater falling on the sensor. When the transistors are ON power supply is available to the IC1 which is wired as a stable multi vibrator. The output of IC1 drives the speaker to produce an alarm. It uses a 9V battery or a 9V regulated DC supply for powering the circuit and hence has a stable power supply.

However, connecting any speaker less than 8 ohms impedance as load can damage the IC. Comparatively, most of the rain detectors as shown above are not easy to design and are expensive to construct, but the two- transistor rain detector is very easy to design and requires less components for its construction. Its sensing element can be locally constructed instead of importing, and it can be made from two separate transistors connected in parallel. This makes it less expensive and affordable.

Rain Detector Using 8051 Micro controller works in the principle of water conducting electricity. This rain detector is working in very simple process of water conducting electricity. The wire which is connected to Vcc and the other four wires are made to be inside the pipe whoseimage is given below. It has different levels namely slow, moderate, high, and very high via BC547 transistor. Port P2 is connected to data pins of LCD and P1.0, P1.1, P1.2, are connected to RS, RW, and EN pins of LCD respectively. When there is no rain it will show No Rain. As the

rain starts the pipe gets filled slowly wire at different levels get some positive voltage, due to conducting nature of the water. Due to this voltage is sent to their respective pins on controller.

When first drop fall in that pipe, LCD displays the message slow. When the speed of rain increases the water get touched the wire and show different message like slow, moderate, high, very high.

Existing Method :

Manual car wiper is our existing method.Wipers may be powered by a variety of means, although most in use today are powered by an electric motor through a series of mechanical components, typically two 4-bar linkages in series or parallel.

Operation of these wipers in the existing models is yet manual. The physical model of the operation includes two arms twirling at one end back and forth over the glass. The wipers invented previously used to oscillate at a slow speed, sometimes this cause the distraction to the driver's visibility. Hence there is need for automation. Automation greatly decreases the need for human sensory and mental requirements as well. An automation system consisting of a connection between hardware and software has freed the individuals from their day to day chores.

Problem Identification :

Manual controlling might be distracting for heavy raining days as especially for rainy season.To build a system which would wipe out the rain from any shield with minimum man power having handful of systems automatically operated and reduce the cost of previously used automatic wiper system and make it available for common man. Over the last ten years, the advancement in the automobile industry has been increased to find modern techniques to increase safety. Nowadays, each and every vehicle is provisioned with the wiper to avoid the accidents and many efforts are geared toward decrease in the human intervention in controlling the wiper to ensure luxury. Although the provision of the automatic wiper is costly, this makes its provision limited to luxury and expensive cars.

Proposed Method :

An automatic car wiper system which turns on automatically when the rain starts and stops when the rain stops. There will be no need for physical intervention of man for controlling car wiper. we use a servo motor, rain sensor and Arduino for control in the wiper system. Whenever the rain falls, the rain sensor detects the intensity of the rainfall and sends the information to Arduino. The information collected by the rain sensor is processed by the Arduino and send the processed information to the servo motor to take the desired action. The rain sensor consists of digital

analog output pins from where the intensity of the rain is calculated. The information which is sent to the micro controller is responsible for controlling the speed of the wiper and based on theintensity of the rainfall.

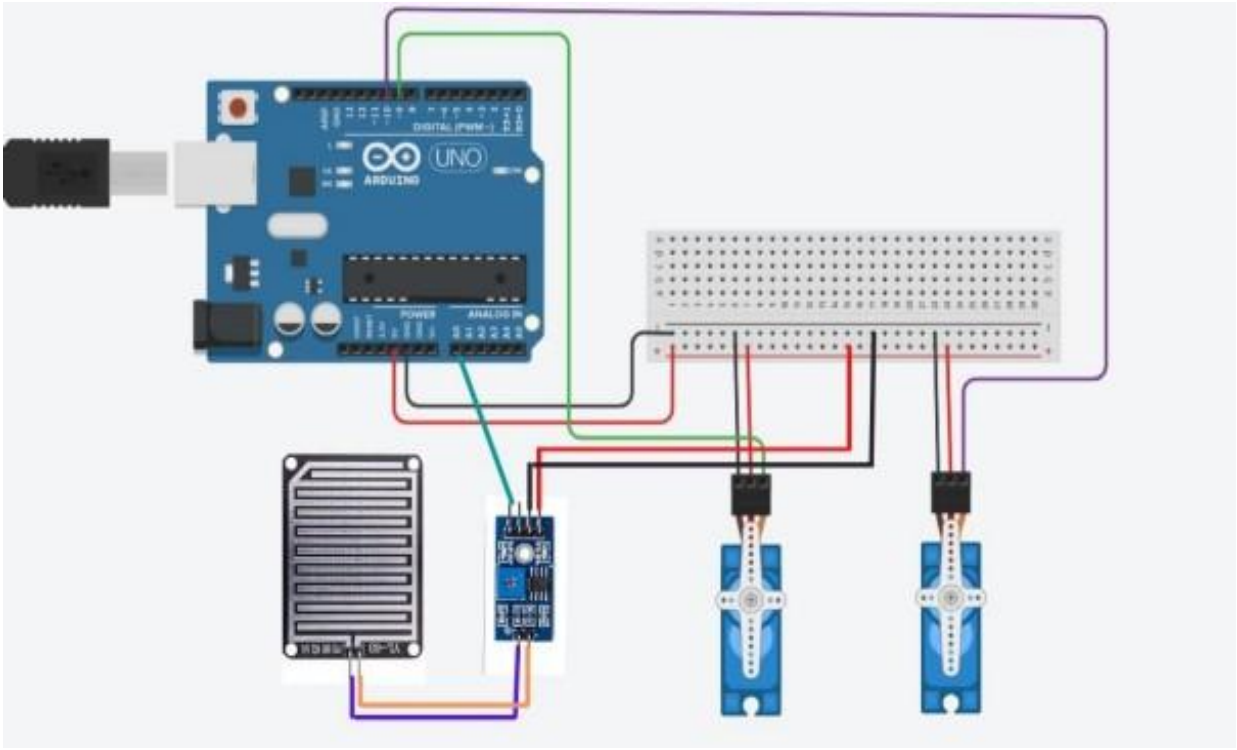


Fig.Circuit Diagram

Through a working example, we hereby attempt to explain the working of the rain sensor. Say, the resistance in resting senor is 1000 KΩ. In a mild rainfall, the height of the water column inside the rain sensor is little as the intensity of the rain is low. The resistance of the sensor drops down and now gets into the range of, say, 900-400 KΩ. When rainfall increases, the build-up and accumulation of rain drops in the sensor increases, and thus the resistance falls down to 300-100 KΩ. As the rainfall's intensity increases, the resistance decreases. The decrease in resistance is taken in as a signal through which the Arduino Uno micro controller determines the intensity of the rain. The signal is transmitted to the servo motor which then operates the working and movement of the wiper blades. As the intensity increases, the speed of the wipers increases.

Depending on the intensity of rain we considered three cases. They are:

Case 1: Rain intensity is low When the rain intensity is low then the wiper rotates at lower

speed.

Case 2: Rain intensity is medium When the rain intensity is ranges between low and high then the wiper rotates at medium speed.

Case 3: Rain intensity is high When the rain intensity is high then the wiper rotates at higher speed.

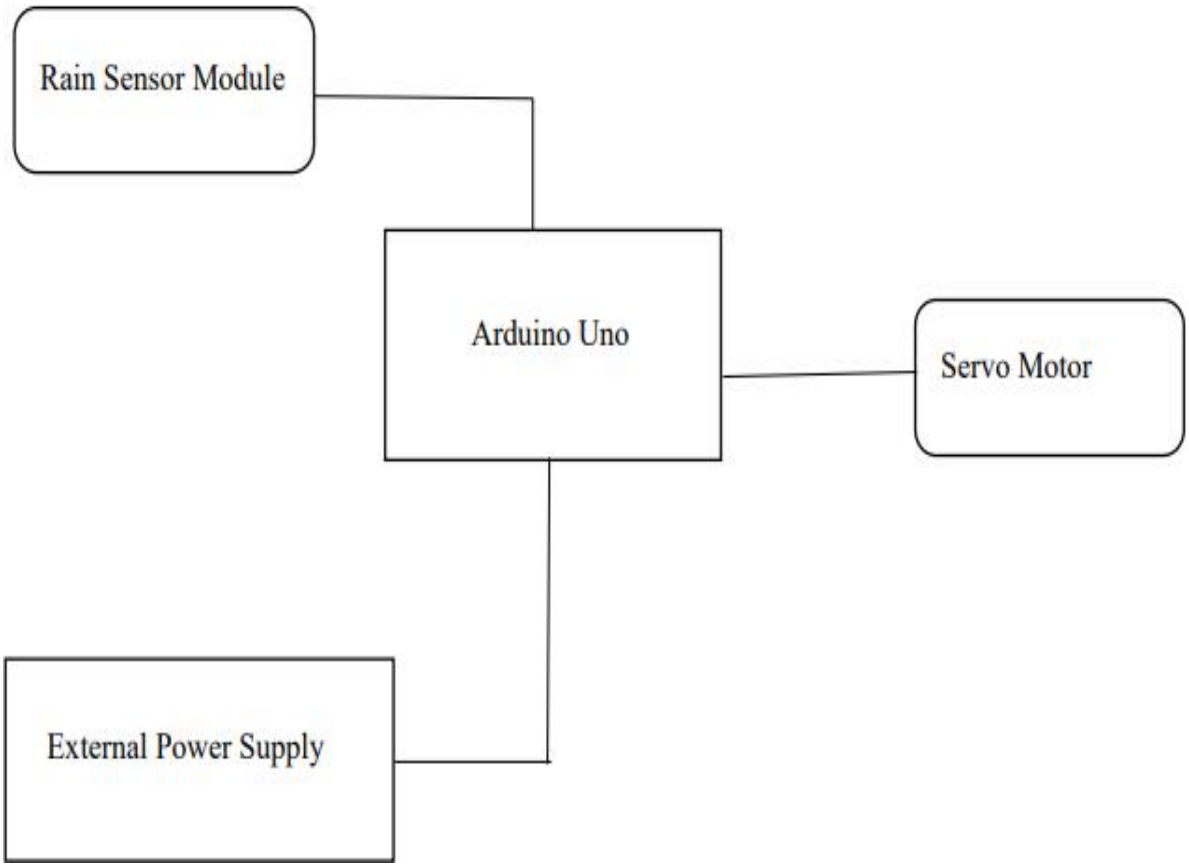
Code:

```
#include<Servo.h>

Servo myservo;

Servo myservo1;

int pos = 0;

 int sensorValue = 0;

void setup()

{ Serial.begin(9600);

myservo.attach(9);

myservo.attach(10);

}

 void loop() {

 sensorValue = analogRead(A0);

Serial.println(sensorValue);

if(sensorValue>800){ myservo.

write(0); myservo.write(0);

 delay(1000);

 }

 if(sensorValue<=800 && sensorValue>600)

 {for (pos = 0; pos <= 120; pos+=1)

 { myservo.write(pos);

myservo.write(pos); delay(3);
```

```
 }
for (pos = 120; pos >= 0; pos-=1)
{myservo.write(pos);
myservo.write(pos);
 delay(3);
}
delay(2000);
 }
if(sensorValue<=600 && sensorValue>460)
 {for (pos = 0; pos <= 120; pos+=1)
 { myservo.write(pos);
 myservo.write(pos);
delay(3);
 }
for (pos = 120; pos >= 0; pos-=1)
 { myservo.write(pos); myservo.write(pos); delay(3);
 }
delay(1000);
 }
 if(sensorValue<460){
 for (pos = 0; pos <= 120; pos+=1)
{myservo.write(pos);
myservo.write(pos);
delay(3);
 }
for (pos = 120; pos >= 0; pos-=1)
 {myservo.write(pos);
```

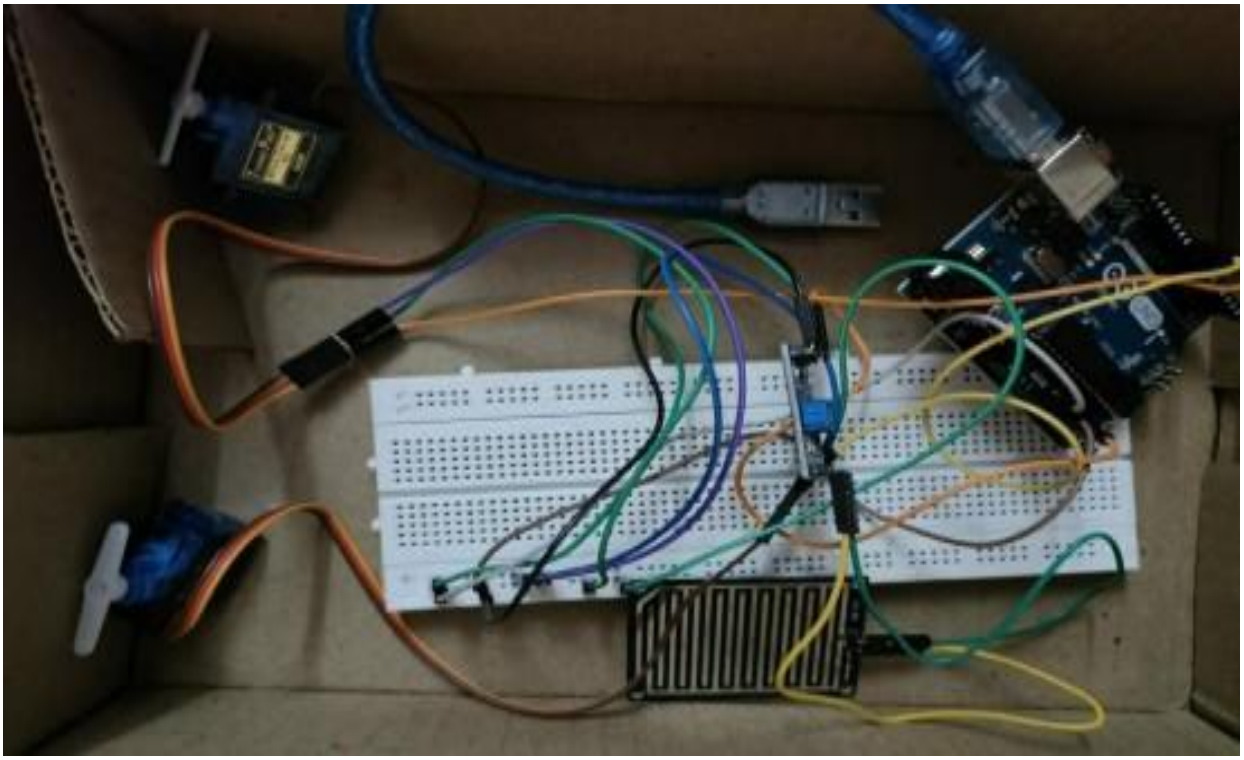
```
 myservo.write(pos);
delay(3);
}
delay(100);
 }
```

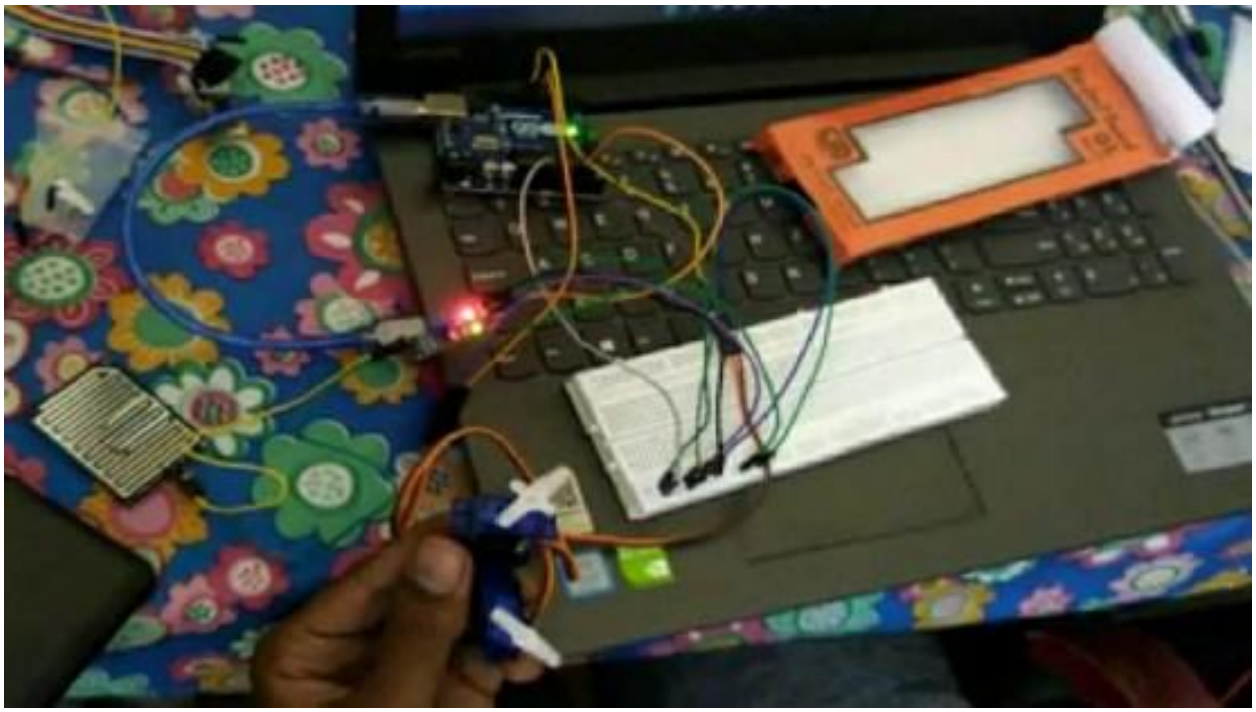
Block Diagram :



Results and Discussions :

The intensity of rainfall ranging from NIL to low, medium, high. When there is no rainfall, the intensity of rainfall as NIL.The information collected by the rain sensor is processed by the Arduino and send the processed information to the servo motor to take the desired action. The rain sensor consists of digital analog output pins from where the intensity of the rain is calculated. The information which is sent to the micro controller is responsible for controlling the speed of the wiper and based on the intensity of the rainfall When the rain begins, the rain sensor senses the rain automatically and sends a signal to the Arduino as the intensity of the rainfall ranging from low to high. When the intensity of the rainfall changes, the rain sensor senses the intensity and sends a signal to the servo motor and the servo motor will increase the speed of rotation accordingly.





Conclusion and Future Scope :

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 sensor response to the rain for moving the windshield wipers is less than 400 milliseconds. Proper vision is very important to the automobile drivers during heavy rainfall. Automatic wipers do not only reduce the stress of operation for the drivers but also prevent distractions which might cause accident and makes driving more comfortable during heavy rainfall. The proposed system designed will operate without interference of the driver during rainfall. It is also cheap and affordable system as this will encourage many automobile vehicle owners to acquire the system. This will also reduce accidents related to the use of wipers on the roads

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. The usage of better speed control mechanisms will guide wiper more effectively and reduce the consumption of batter power.

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