Heritage Institute of Technology, Kolkata
Department of ECE

ELECTRONIC DESIGN WORKSHOP

REPORT

TOPIC:

Car Automation using Arduino [Smart Wiper and Window System]

Group - 10

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CAR AUTOMATION USING ARDUINO & RAIN SENSOR

PROBLEM STATEMENT:

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. Today's car wipers work on the principle of manual switching. . In this project, we proposed an automatic rain sensing wiper and window system that detects rain and starts automatically and stops when the rain stops. The automatic rain sensing car wiper system is not only automatic but also intelligent. The wiper system detects the rainfall automatically and starts itself. The Wiper system is also intelligent. When the droplets of rainfall on the sensor, the sensor detects the intensity and the speed of the wiper are automated accordingly. The higher speed of rotation indicates the higher rainfall.

INTRODUCTION:

A car wiper is a device which is used to remove droplets of rainwater from a windscreen. Nowadays, each and every vehicle is provisioned with the wiper to avoid the accidents and to decrease the human intervention in controlling the wiper to ensure luxury. A wiper generally consists of a metal arm and a long rubber blade. In some vehicles, pneumatic power is used. Here, the metal arm gets powered by an electric motor. The blade moves in clock-wise and counter clock-wise direction on the glass, pushing the water from the surface of the glass. Modification of speed is automatically done based on the intensity of the rainfall. Two synchronized radial type arms are used in most of the automobiles, whereas pantograph arms are used in commercial automobiles. Wipers are automated in many ways. These days' automobiles consist of a series of mechanical parts which are automated by an electric motor. In this, we propose an unmanned wiper which senses rain and starts automatically and switches off automatically when the rain stops. By using this, there will be no need for physical intervention of human to control the speed of the wiper. For this purpose, we use a rain sensor to detect the rain and then the signal is managed by Arduino and takes the required action. Over the last ten years, the advancement in the automobile industry has been increased to find modern techniques to increase safety. There are many reasons behind the vehicles which are not equipped with automatic car wipers and window system.

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Many reasons in the sense, the car wipers are too expensive to fit in economical automobiles and they are too unreliable for new automobiles. Many automobile companies made an attempt to construct the automatic car wiper at low cost which is not only economical but also efficient. This project is all about the attempt we tried to construct. In the present day situation, only luxury vehicles are equipped with automatic rain sensing car wipers. Our work is created to show the need to use an automatic car wiper system which starts automatically when the rain starts. The speed of the wiper is also adjusted automatically based on the intensity of the rainfall. Such a system ensures the safety of a ride. A lot of reasons are responsible for accidents but the major reason for the occurrence of accidents during the rainy season is due to a lack of proper vision. The objective is to construct a self-starting car wiper system which starts automatically on sensing the rainfall. Automatic adjustments to the wiper speed are made based on the intensity of rainfall. The project is constructed using Arduino, Rain sensor, Servo motor and an LCD Module which displays the intensity of the rainfall. Adjustment to the speed of the wiper is made according to the intensity of rainfall which improves and ensures the safety. This project is a small step towards the comfortability and to save our time.

COMPONENTS REQUIRED:

- **Arduino UNO**
- **Rain Sensor Module**
- **Servo Motors**
- **16x2 LCD Module with I2C**
- **Breadboard**
- **Jumper Wires**

ABOUT THE COMPONENTS:

- ### *Arduino UNO*

Arduino is easy to use a type of software which allows us to write the code for controlling hardware and electronics. Arduino boards can sense the inputs like sensing a finger on the sensor, controlling a light in a pattern, placing a finger on a button etc. for example, whenever a finger is placed on a button, light switches ON and whenever it is removed, the light switches OFF. The Arduino Uno microcontroller board can be controlled by sending instructions to it in the form of a code. The code used here is based on Arduino programming. Arduino Software is used for processing.

- ### *Rain Sensor Module*

Rain sensors are generally used for sensing the droplets of rainfall. A threshold limit is set to every rain sensor. When the droplets or humidity reaches the threshold limit, the rain sensor sends the information to the one which takes the desired action. The rain sensor is equipped with digital analog pins through which the humidity can be sensed.

When the sensed humidity is more than the threshold limit, then the desired action is performed. When the rain sensor is wet, it changes from 100000 to 2M ohms acting as a variable resistor. So, when the board is wet the more conduction of current is more. A0, D0, GND, and VCC are the analog output, digital output, Ground and positive voltage respectively. Rain sensors are provided with two loop pins that are + and-, which are sensor board hook up A and B respectively.
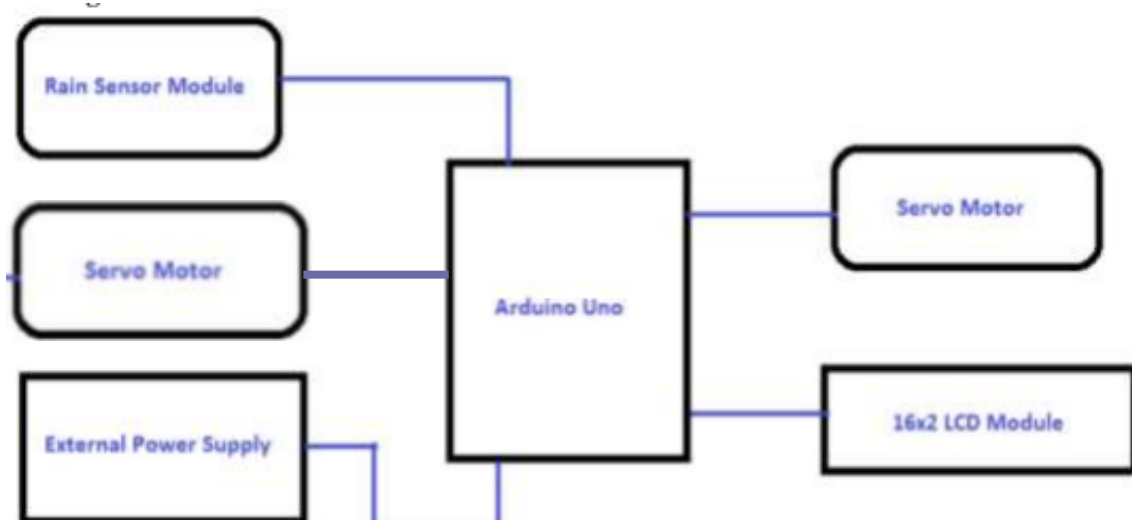
- ## *Servo Motor*

A servo motor generally consist of an output shaft through which the positioning of the shaft to a certain angle can be done using a coded signal which is sent by the servo. Servo motors are very useful in day-to-day life and are used in many appliances. Servo motors are very efficient and economical. Servo motors are small in size and can be placed in appliances for performing the desired action more effectively. Servo motors are very efficient and low energy consuming motors. These servo motors are controlled by using pulse width modulation, where a control wire is used to send electrical pulses. Minimum, Maximum pulse and repetition rate are the three types of pulse width modulations. A servo motor has a total movement of 180° of which it turns 90° in either direction. The servo motor rotates in clockwise as well as counter clock-wise direction

- ## *16x2 LCD Module with I2C*

2×16 character LCD Module with BLUE Backlight uses an I2C interface to communicate with the host microcontroller. This budget-conscious LCD is used on projects requiring the display of text, data, or ASCII characters of all types. Connect to Vcc, Gnd, SDA (serial data line), and SCL (serial clock line). This is a 5VDC device and will be found on the I2C bus at address 0x27 / 0x3F.

BLOCK DIAGRAM:

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CIRCUIT DIAGRAM:
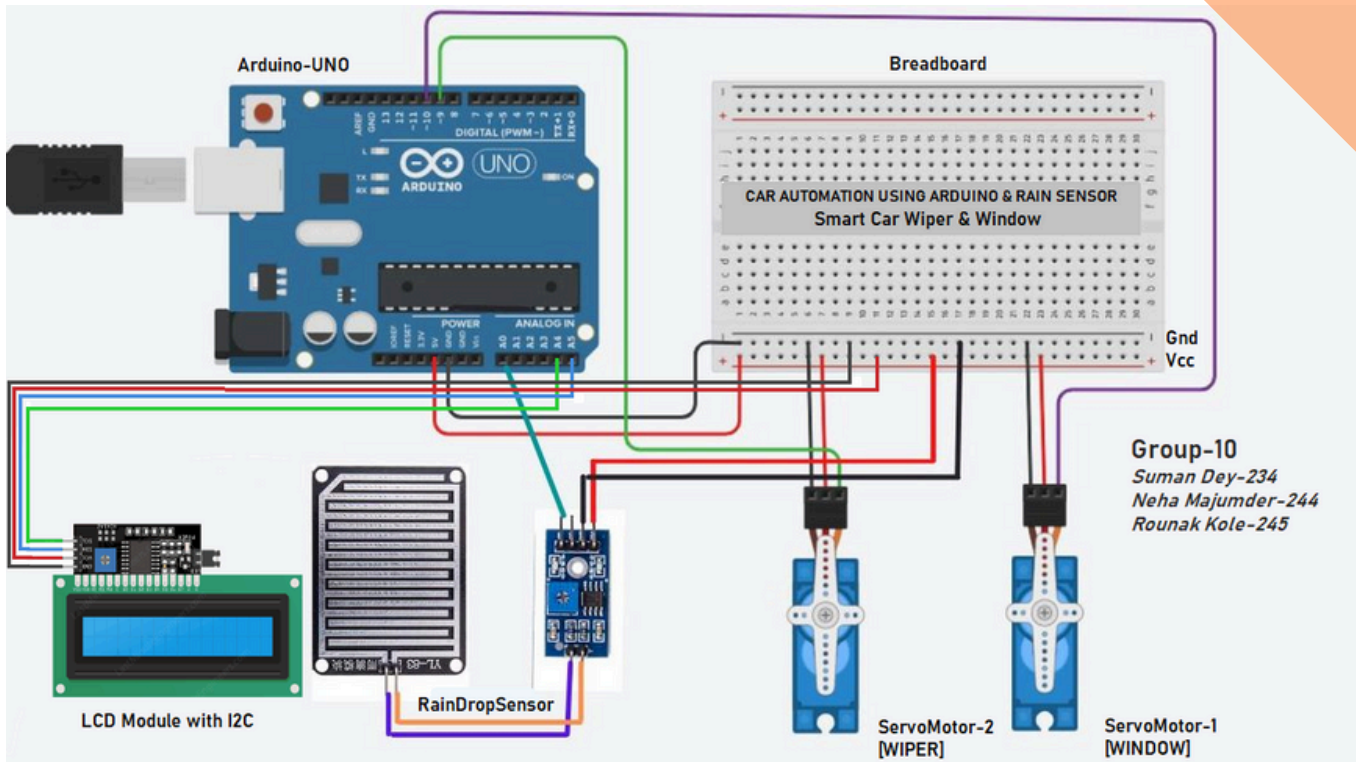
IMPLEMENTATION:

The rain sensing wiper system is constructed using Rain Sensor, Servo motor, LCD module, and Arduino. Whenever the droplets of the rain on the rain sensor, it senses the rainfall and sends Arduino the necessary information for the process to carry on. Arduino is a microcontroller board which is generally an Atemga8. The information sent by the rain sensor is processed by the Arduino and controls the servo motor based on the information processed. The LCD module is to display the information about the speed of the wiper and intensity of the rain. The rain sensor, which senses the rainfall is placed at the side corner of the windshield outside the car. The wiper blades are connected with the servo motor and are powered by it. And another servo motor is connected to the window, so whenever rain starts falling the window will get closed. LCD module is kept inside the car nearby the driver's vision. The rain sensor, LCD module, and the servo motor are connected with Arduino, which is present in the car connected to a dc source. The speed of the servo motor is increased whenever the intensity rises from low to high. There are three different speeds for the Low, Medium and High intensity of the rainfall. When the intensity of the rainfall increases, the rotation speed of the wiper will decrease automatically. Accordingly, the LCD module displays the information.

ARDUINO CODE:

```
nclude <Servo.h>
#include <Wire.h>
#include <LiquidCrystal_I2C.h>

LiquidCrystal_I2C lcd(0x3F, 2, 1, 0, 4, 5, 6, 7, 3, POSITIVE);
Servo wiper;
Servo window;

int pos = 0;
int sensorValue = 0;

void setup() {
 Serial.begin(9600);
 lcd.begin(16,2);
 myservo.attach(9);
 myservo1.attach(10);
 lcd.clear();
 lcd.setCursor(0,0);
 lcd.print("AUTOMATIC CAR");
 lcd.setCursor(0,1);
 lcd.print(" WIPER & WINDOW");
 delay(5000);
}

void loop()
{
sensorValue = analogRead(A0);
Serial.println(sensorValue);
if(sensorValue>800){
 wiper.write(180);
 lcd.clear();
 lcd.backlight();
 lcd.setCursor(0,0);
 lcd.print("  NO RAIN!! ");
 delay(1000);
 }
```

```
if(sensorValue<=800 && sensorValue>600){
 lcd.print("AMOUNT: LOW ");
 lcd.setCursor(0,0);
 lcd.print("IT IS RAINING!!");
 lcd.setCursor(0,1);
 for (pos = 180; pos >= 0; pos-=1) {
 wiper.write(pos);
 delay(3);
 }
 for (pos = 0; pos <= 180; pos+=1) {
 wiper.write(pos);
 delay(3);
 }
 delay(2000);
}

if(sensorValue<=600 && sensorValue>460){
 lcd.setCursor(0,0);
 lcd.print("IT IS RAINING!!");
 lcd.setCursor(0,1);
 lcd.print("AMOUNT: MODERATE ");
 for (pos = 180; pos >= 0; pos-=1) {
 wiper.write(pos);
 delay(3);
 }
 for (pos = 0; pos <= 180; pos+=1) {
 wiper.write(pos);
 delay(3);
 }
delay(1000);
}

if(sensorValue<800)
 for(pos=0;pos<=180;pos++)
 window.write(pos);
else
window.write(0);
```
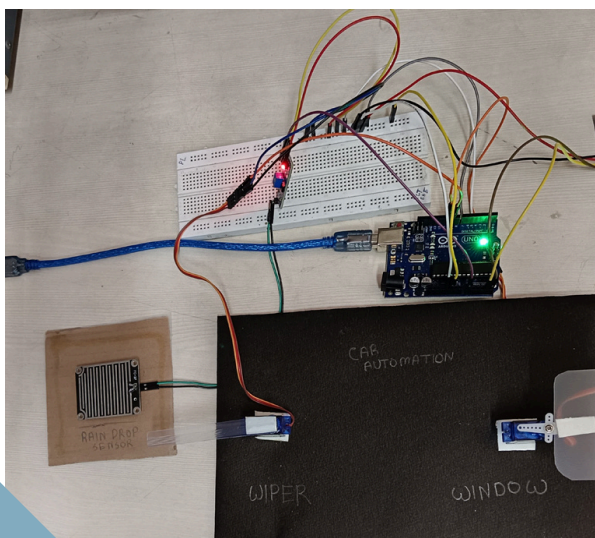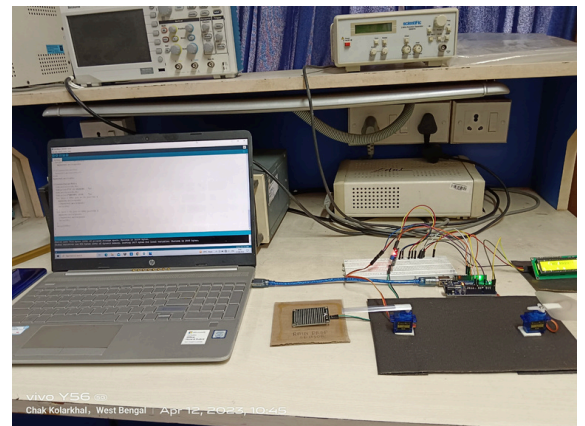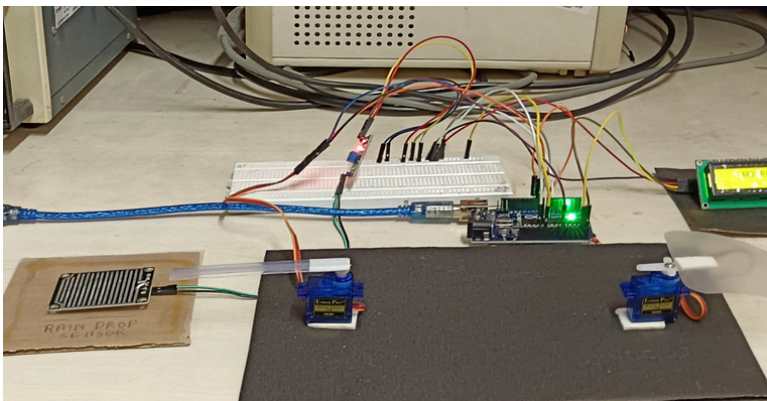
```
if(sensorValue<460){
 lcd.setCursor(0,0);
 lcd.print("IT IS RAINING ");
 lcd.setCursor(0,1);
 lcd.print("AMOUNT: HIGH ");
 for(pos = 180; pos >= 0; pos-=1) {
 wiper.write(pos);
 delay(3);
 }
 for (pos = 0; pos <= 180; pos+=1) {
 wiper.write(pos);
 //myservo1.write(pos);
 delay(3);
 }
 delay(100);
}
}
```

GLIMPSES OF OUR PROJECT:

RESULT:

The LCD module displays the intensity of rainfall ranging from NIL to low, medium, high. When there is no rainfall, the LCD display will show the intensity of rainfall as **No Rain**. When the rain begins, the rain sensor senses the rain automatically and sends a signal to the LCD and displays 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

SensorValue>800	NO RAIN
SensorValue<=800 AND SensorValue>600	LOW RAIN
SensorValue<=600 AND SensorValue>460	MODERATE RAIN
SensorValue<460	HIGH RAIN

CONCLUSION:

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 sensors response to the rain for moving the windshield wipers is less than 400 milliseconds. 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.

END OF REPORT
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