Rain Sensing Automatic Car Wiper

An intelligent car/vehicle wiper system which can sense rain and start itself. The wiper adjusts speed itself based on the intensity of rainfall.

Objective of the Project

To design an intelligent car wiper system using Arduino, Rain Sensor Module, Servo Motor and a 16x2 LCD Module. The proposed car wiper system is automatic and intelligent. Automatic in the sense that the system detects rainfall and starts itself. Intelligent in the sense that the system calculates the intensity of rainfall and adjusts the speed of wiper motor accordingly – higher speed of rotation for higher rain fall and vice versa.

In the current scenario, only luxury vehicles employ intelligent rain sensing windshield wiper systems. Our system is modeled to demonstrate how useful is an automatic wiper system that adjusts speed itself based on rainfall intensity. Such a system improves the safety of a ride. There are many instances of accidents occurring during heavy rainfall due to lack of proper vision. In many cases, these accidents were due to manual errors (for example: not increasing speed of wiper) from the driver. An automatic, intelligent system like ours remove any manual errors. Our system adjusts wiper speed according to the intensity of rainfall and hence improves the safety.

Proposed Working Model

The intelligent wiper system is proposed to design using Arduino, Rain Sensor module, Servo motor and a 16x2 LCD module. The rain sensor module senses rain fall and sends the information to Arduino – which is an Atmega8 based micro controller board. Arduino processes the information collected from rain sensor and controls the output motor (servo motor) based on the processed information. The 16x2 LCD module is to display status messages to the driver – like intensity of rain fall, speed of wiper etc.

The rain sensor is placed outside the car/vehicle, ideally at the side corner of windshield. The servo motor is connected to the wiper blades. LCD module is kept inside the car nearby the driver’s vision. All these 3 devices are connected together via Arduino – which is kept inside the car near to dc power source.
**Software Requirements**

The software development for intelligent rain sensing wiper has following stages.

Stage 1 → Reading data from rain sensor module.

Stage 2 → Processing the information from sensor

Stage 3 → Comparison/analysis of the processed information

Stage 4 → Controlling output – servo motor and lcd display.

Languages:- Arduino Programming Language

**Hardware Descriptions**

**Rain Sensor module** - allows to measure moisture via analog output pins and it provides a digital output when a threshold of moisture is exceeded. The module is based on the LM393 op amp. It includes the electronics module and a printed circuit board that “collects” the rain drops. As rain drops are collected on the circuit board, they create paths of parallel resistance that are measured via the op amp. The lower the resistance (or the more water), the lower the voltage output. Conversely, the less water, greater the output voltage on the analog pin. A completely dry board for example will cause the module to output five volts.

**Arduino** - is an open source electronics development platform which mainly focuses on hobbyist and designers in creating interactive electronic devices. The main advantage of arduino is its simplicity and more over it is inexpensive and open source. It can be connected to the system without the need to any sophisticated PCB design and implementation. It consist of an on-board

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### Hardware Requirements

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller</td>
<td>Arduino Uno</td>
</tr>
<tr>
<td>Rain Sensor</td>
<td>FC-37 Module</td>
</tr>
<tr>
<td>LCD Module</td>
<td>16x2 LCD - JHD162A</td>
</tr>
<tr>
<td>Motor</td>
<td>Servo Motor, 5 volts</td>
</tr>
<tr>
<td>Others</td>
<td>Connectors, Power cable</td>
</tr>
</tbody>
</table>
power supply, and a USB port to communicate with PC. There are many different types of arduino boards available in the market. Arduino UNO, Nano, Mega, Due, Leonardo, Lilypad etc are examples for different arduino versions which are different in there processor, memory space, number of input-output pins and there functionalities. All the versions comes with an Atmel micro controller chip which uses Harvard architecture where the program memory and data memory are separate. i.e, the code is stored in the flash program memory, whereas the data is stored in the data memory.

**LCD Module** - JHD162A is the LCD module used here. JHD162A is a 16×2 LCD module based on the HD44780 driver from Hitachi. The JHD162A has 16 pins and can be operated in 4-bit mode (using only 4 data lines) or 8-bit mode (using all 8 data lines). Here we are using the LCD module in 4-bit mode.

**Servo Motors** - have been around for a long time and are utilized in many applications. They are small in size but pack a big punch and are very energy-efficient. Servo motors are also used in industrial applications, robotics, in-line manufacturing, pharmaceutics and food services. Servos are controlled by sending an electrical pulse of variable width, or pulse width modulation (PWM), through the control wire. There is a minimum pulse, a maximum pulse, and a repetition rate. A servo motor can usually only turn 90° in either direction for a total of 180° movement. The motor's neutral position is defined as the position where the servo has the same amount of potential rotation in the both the clockwise or counter-clockwise direction.

**Block Diagram**
**Expected Outputs**

**When there is no rain** – the data from sensors will not indicate any rain signal. The servo motor will kept OFF. The LCD module will display status **Rainfall Intensity – NIL**.

**When rain begins** – The servo motor will start automatically detecting rainfall. The LCD will display status of rainfall intensity ranging from Low, Medium and High.

**When rainfall intensity changes** – The servo motor will increase speed of rotation when rainfall intensity moves from Low to High. There are 3 speeds preset for – Low, Medium and High intensity. When rainfall intensity decreases, the speed of rotation will decrease automatically. The status message on LCD module will change according to rainfall intensity.