

Embedded Rain Sensing System

Module 2 project

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Contents

Sl.no	Index	Page no
1	Abstract	1
2	Introduction	2
3	Requirements	3
4	System Design: Block Diagram	4
5	Components	5-6
6	High level and Low level Requirements	7
7	Advantages	8

Abstract

- Today's car wipers are manual systems that work on the principle of manual switching. So here we propose an automatic wiper system that automatically switches 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. For this purpose we use rain sensor along with microcontroller and driver IC to drive the wiper motor.
- System uses rain sensor to detect rain, this signal is then processed by microcontroller to take the desired action. The rain sensor works on the principle of using water for completing its circuit, so when rain falls on it it's circuit gets completed and sends out a signal to the microcontroller.
- The microcontroller now processes this data and drives the motor to perform required action. The motor driver now drives a servomotor to simulate as a car wiper.

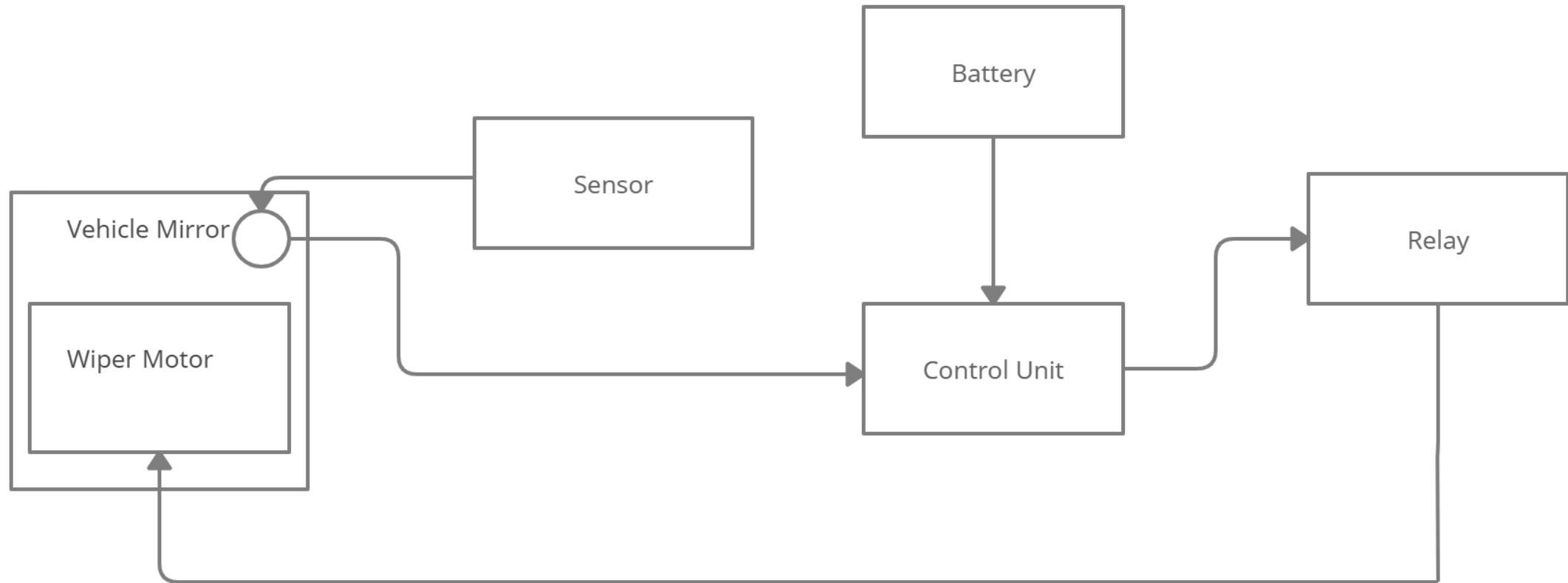
Introduction

- The automated rain wiper system is used to detect rainfall and activate rain wipers without driver interaction.
- Almost all motor vehicles, including cars, trucks, train locomotives etc. are equipped with such wipers, which are usually a important requirement.

Requirements

- In rainy days we suffer from sprinkling of water on front glass of vehicle. Due to this sprinkling of water on windshield glass the driver cannot see other vehicles on road clearly
- So he tries operating wiper on glass, for that he should often switch on for operating wiper and due to the distraction from the road there is a possibility for an accident to occur.
- This accident can be avoided by placing a sensor which senses the sprinkling of water and sends signals to automatically operate the wiper.
- The main requirement of this project is when the water hit the sensor, it will send signal to the system thus moving the wiper motor. Once sensor did not detect any water, the wiper will stop.

System Design: Block Diagram



Components

components names	Model type	Quantity
Power switch	DC type	1
Resistor	1M Ω ,10K Ω ,1K Ω	3
Relay	12V	1
Transistor(NPN)	BC548	1
Transformer	230V-12V	1
Servo motor		1
Rain sensor	Sensor pad	1
Control Unit	Arduino Mega	1
Attiny-85	AVR Microcontroller	1

Description of components

- Rain Sensor: The most common modern rain sensors are based on the principle of total internal reflection: an infrared light is beamed at a 45-degree angle into the windshield from the interior — if the glass is wet, less light makes it back to the sensor, and the wipers turn on.
- DC Motor: This is used for controlling the direction and the speed of the wiper. It actuates whenever it receives signal from the control circuit to operate the wiper.
- Attiny-85: ATtiny85 is an 8-bit AVR microcontroller that comes with 8-pin interface and mainly used in automation and Arduino projects.
- Arduino Mega: The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins. Arduino can be used to develop stand-alone interactive objects or can be connected to software on your computer.

High level Requirements

ID	Description
HLR-1	system shall be able to sense the sprinkling of rain water through the Rain sensor
HLR-2	System shall send the signals from sensor to control unit
HLR-3	The control unit shall operate the actuator to turn on the rain wipers after receiving signals from sensor
HLR-4	system shall avoid the accident that may occur due to the distraction of driver from road

Low Level Requirements

ID	Description
LLR-1	Sensor shall not send any signals to control unit when there is no sprinkling of rain water
LLR-2	The control unit shall stop the actuator upon not receiving signals from the sensor

Advantages

- It can be easily and quickly installed in automobiles.
- Low Power consumption
- Simple and Portable
- Easy to implement
- Cost Effective

Applications

- This small circuit finds numerous applications.
- Useful to vehicles.
- 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.