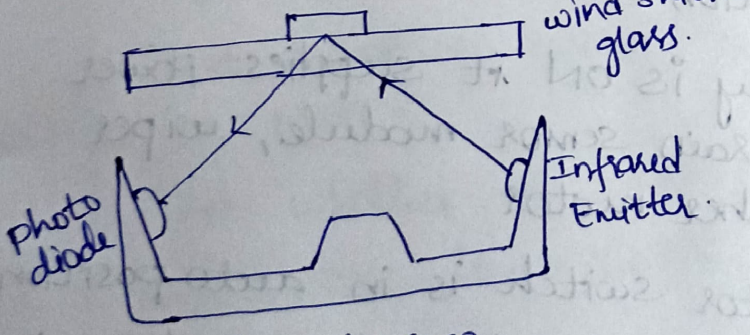
Rain-sensing automatic windsheild wipers using V-model

1. Requirements of wiper System

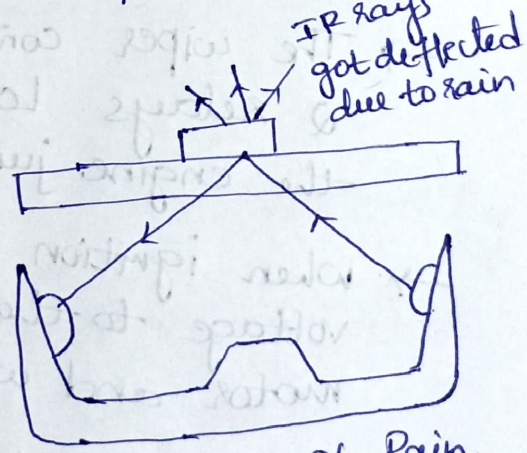
→ Efficient Removal of dirt, water and snow.
→ Operation in the range of temperature of 243K to 353K.
→ The ability to pass the stall and snow load test.

2. High-level Design

(1) Rain Sensor
(2) photodiode and Infrared Emitter
(3) BCM
(4) windshield glass and wipers.
(5) wiper motor.



(1) No rain case



(2) In case of Rain.

3. Detailed Design

Rain sensor

→ The rain sensor is combined with the compositions of infrared emitter and photodiode to detect the quantity of rain.

→ The principle of detection is simple when the ignition key is ON, the IR emitter will emit IR rays.

→ If no rain, then all the IR rays are reflected directly by windshield glass and goes into the photo diode.

→ If the rain drops on the rain sensor in the windsheild glass then some IR rays will be deflected to outside.

→ According to the quantity of the rain, the photodiode will receive the IR rays. Therefore it can measure the quantity of rain.

wiper controller

→ The wiper controller by the rain sensor has 2 relays. Low and High are attached in the engine junction box.

→ when ignition key is ON it supplies power voltage to the rain senior module, wiper motor and washer motor.

→ If the wiper motor switch is in auto position, wher the voltage of 10, pin number 8. drops to a low signal.

→ If it detect rain it will turn pin number 1 ON and OFF according to the amount of rain to operate the intermittent time interval of the wipers

→ If there is too much rain it will ground pin number 1 and 2 simultaneously to operate both High and Low relays.

4. Implementation (Coding)

→ Develop an algorithm that determines when to ON the windsheild wipers automatically and also see that there should not be any false detection of rain.

5. unit testing

→ unit testing is done during programming.

6. Integration Testing

1. Test the accuracy of detection of rain by its quantity.
2. Test whether wipers are ON automatically or Not.
3. Test whether the intermittent time interval of motors is accurate or Not.

7. System Testing

→ Test the overall system in the real-time environment.

→ Make sure to avoid false detection of rain, it requires rain sensors to take decision after few minutes.