



**Faculty of Electrical and Electronic Engineering Technology**



**Development Of Automatic Rain Sensing Wiper Using Rain Sensor and  
Arduino**

**MOK WEN KEN**

**Bachelor of Electronics Engineering Technology (Telecommunications) with Honours**

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# **Development Of Automatic Rain Sensing Wiper Using Rain Sensor and Arduino**

**MOK WEN KEN**

**A project report submitted  
in partial fulfillment of the requirements for the degree of  
Bachelor of Electronics Engineering Technology with Honours**



**Faculty of Electrical and Electronic Engineering Technology**

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## DECLARATION

I declare that this project report entitled “Development of Automatic Rain Sensing Wiper Using Rain Sensor and Arduino” is the result of my own research except as cited in the references. The project report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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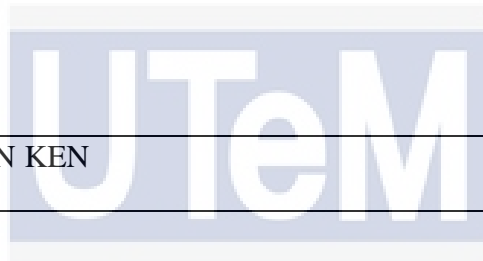
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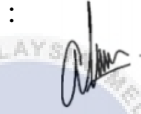


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## APPROVAL

I hereby declare that I have checked this project report and in my opinion, this project report is adequate in terms of scope and quality for the award of the degree of Bachelor of Electronics Engineering Technology (Telecommunications) with Honours.

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## DEDICATION

I would like to present this article to my lovely family members. They give me many supports and encouragement in completing this project. I also want to dedicate my fellow friends and supervisor for always patient helping me when I meet difficult problems on this project.



## ABSTRACT

Every year automotive safety organization report that the life of drivers is very important today. Accident happen in car most probably due to lack of focus by the driver during heavy rainfall. Minor errors which contributed by the visibility of the car may cause accident. Most of the car wipers today's implement with wiper function manually. In this project, an automatic rain sensing wiper system has been implemented so that it can sense rain and wipe automatically and stops when no more rain. This project construct using Arduino Uno represent microcontroller ATmega 328P that detect rain water smartly and switch on wiper. Automatic Wiper System typically used in luxury cars where wind shield wiper automatically gets activated when there is Rain or if there is some water on the windshield. Electronic Wiper is very common device in 2021 that is attached in nearly every modern car to wipe the water on the wind shield during the rain. But generally, they are manually operated, and we need to switch them ON manually. First the project is being design using Proteus. Second step is implementing the circuit on a breadboard and the last step is connect the circuit with rain sensor and clad board, test and run. When raining and rain drops on wind shield, the sensor will trigger to transmit the signal to the Arduino. After that Arduino will filter the information and optimize the servo motor to switch on the wiper. Throughout these implementations the wind shield will cleaned automatically with less effort.

## ***ABSTRAK***

Setiap tahun organisasi keselamatan automotif melaporkan bahawa nyawa pemandu sangat penting. Kemalangan yang berlaku di dalam kereta mungkin disebabkan oleh kurangnya tumpuan pemandu semasa hujan lebat. Kesalahan kecil biasanya disebabkan oleh seperti pemandu tidak menjaga penglihatan yang kurang baik dan mungkin menyebabkan kemalangan. Sebilangan besar pengelap kenderaan hari ini menggunakan fungsi pengelap secara manual. Dalam projek ini, sistem pengelap pengesan hujan automatik telah dilaksanakan sehingga dapat mengesan hujan dan mengelap secara automatik dan berhenti apabila tidak ada lagi hujan. Pembinaan projek ini menggunakan Arduino Uno sebagai pengawal mikro ATmega 328P yang secara automatik mengesan hujan dan mengaktifkan pengelap kereta untuk membersihkan cermin hadapan. Penggunaan sistem pengelap automatik pada kereta mewah di mana pengelap pelindung angin secara automatik diaktifkan apabila terdapat hujan atau jika terdapat sedikit air di pelindung angin. Alat Pengelap Elektronik adalah alat yang sangat biasa pada tahun 2021 yang dipasang di hampir setiap kereta moden untuk mengelap air pada cermin depan kereta semasa hujan. Tetapi secara amnya ia dikendalikan secara manual dan kita perlu menghidupkannya secara manual. Pertama projek ini dibuat dengan menggunakan Proteus. Langkah kedua adalah melaksanakan litar di “breadboard” dan langkah terakhir adalah menghubungkan litar dengan sensor hujan dan “cladboard”, uji dan jalankan. Apabila hujan dan hujan turun pada cermin, sensor akan diaktifkan untuk menghantar isyarat ke pengawal mikro. Setelah itu pengawal mikro akan menyaring maklumat dan mengoptimumkan “servo motor” untuk menghidupkan pengelap. Sepanjang pelaksanaan ini cermin akan dibersihkan secara automatik dengan sedikit usaha.



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## LIST OF SYMBOLS

$V$	-	Voltage
$I$	-	Current
$R$	-	Resistance



## LIST OF ABBREVIATIONS

<i>UTeM</i>	-	Universiti Teknikal Malaysia Melaka
IoT	-	Internet of Thing
etc	-	And the rest
PIC	-	“pick” is a family of microc ontrollers made by microchip technology
GPIO	-	General purpose input/output
PCB	-	Printed circuit board





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## CHAPTER 1

### INTRODUCTION

#### 1.1 Background

For a car, a car wiper could be a device which is utilized to urge rid of drip of rain or clean any residue left on the wind shield of a car. A wiper mounted on the wind shield fixed by metal arm and an extended silicon blade to wipe the screen. In some vehicles, aerial power is employed. Here, the arm operates by battery. The blade moves in rightward and leftward direction on the glass, press the water from the plane of the wind shield to administer a transparent view to driver all the time. Modification of speed will be done supported the quantity of the downpour. In most of the car today, two integration spiral type arms are employed majority automotive, whereas pantograph arms are employing in merchandising automotive. Wipers are employing in some method. This project proposes an unmanned wiper which senses rain and starts automatically and switches off automatically when the rain stops besides manual off is additionally provided. By using this technology, there will be no need for physical intervention of human to regulate the speed of the wiper during rain. To construct this project, motor driver will carry out action when the signal is transmit by rain sensor. Over the last ten years, the advancement within the automotive industry has been increased to search out modern techniques to extend safety in their own brand vehicle. However until today year 2021, some causes behind the vehicles which are not equipped with automatic car wipers is that the car wipers are too expensive to suit in economical automotive and that they are too unreliable for current automotive. Many automotive companies made a trial to construct the automated car wiper at low cost which it isn't only economical but also efficient they really failed. This project is all about the attempt to construct and produce out the correct methodology for the automated wiper.

#### 1.2 Problem Statement

In the present vehicle the number of features is much higher. The driver has to concentrate on road while driving, and with increased traffic on road, things get

complicated when driver drives their own car on the road. The feature in the car is increased for the aim of man like apple car play/android auto system to search the destination, play favourite music and control air vent blowing speed automatically has been introducing as standard feature among cars to focus the attention of the driver in all ways. Thus, many attempts have been made to reduce the effort of driver. However, on rainy days, driver still need to activate the wiper manually to give a clear vision on wind shield at all times. Since the automatic wiper control system has been introduce in many higher end cars and has been successfully working, an attempt was made to reduce the cost of the system so that this system can be implemented in common economic cars where a standard man also can enjoy the advantages of driving a car on rainy days.

### 1.3 Project Objective

The objectives of this project are:

- 1) To design an automatic wiper using Arduino that switch on automatically when rain is detected.
- 2) To design an automatic wiper that adjust the speed of wiper blade automatically depends on rain intensity.
- 3) To develop the prototype on PVC enclosure box to test the automatic wiper system.

### 1.4 Scope of Project

The scope of this project are as follows:

- 1) Propose an automatic wiper system that automatically switches ON on when detecting rain and stops when rain stops.
- 2) This project conduct using only prototype on PVC enclosure box and not on real car.
- 3) This system built with rain sensor together with Arduino to drive the electric motor. The system uses rain sensor to detect rain and also the signal is then processed by Arduino to take the desired action. The rain sensor works on the principle of using water for completing its circuit, so when rain falls on its circuit the simulation is completed and it sends out a signal to the Arduino.
- 4) The wiper will only wipe the windscreen automatically with a maximum speed of 3 similar to in manual control system of wiper and when the rain is simply too small the wiper won't be activate due to the sensitivity of rain sensor.

## 1.5 Organization of Report

Chapter 1 summarizes the introduction of the project which is the development of automatic rain sensing wiper using rain sensor and Arduino. In this chapter, development of project background from manual wiper to automatic wiper will be discuss and the objective of this project to simulate in real life will be implement also. This project only cover scope on prototype on PVC enclosure box and not on real car.

Chapter 2 summarizes the literature review of other author project supported different resources etc journal, report, internet, wiki pedia and so on. In this chapter different technique has been accustomed to developing automatic rain sensing wiper and they are design with same concept but different operating mechanism. Conductive method, piezo electric method and capacitive method are the foremost common method use in automatic wiper mechanism in many author's project. This chapter will compare this different method used to develop the project and study the advantage and disadvantage of each method.

Chapter 3 summarizes the methodology of this project which will include the software and hardware to be used, the idea of the project, as well as method of implementation. This chapter also show the gantt chart for both final year project 1 and final year project 2. Some of the thought of the project will discuss here like block diagram of project, algorithm flow of project and flowchart of project. However, these idea may be change during final year project to suit the development process of project.

Chapter 4 discuss the result and analysis of simulation and the development of automatic rain sensing wiper using Arduino and rain sensor. The simulation result obtain in this chapter will be recorded in video form and present to panel in week 14.

Chapter 5 conclude the implementation process and also the simulation result obtain.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Introduction

This chapter provides an overview of previous implementations of automatic wiper systems. They were designed with the same concept but with a different operating mechanism however with same objective of working principle of the car wiper. An automatic wiper will only function when detect different amount of rain droplets.

#### 2.2 Review on Automatic Wiper Implementation Method

An automatic wiper can be implement using different component with different types of rain sensor. Some of the component that were used by the authors in their automatic wiper project are Arduino UNO, micro controller and raspberry pi with different type of rain sensor has been use to implement their project will be discussed.

##### 2.2.1 Implementation using Arduino

The rain sensor detects the rain drops and sends the signal to Arduino that aligned with the rain sensor place on wind shield glass, and send information to Arduino when rain droplets fall on rain board. The servo motor takes the signal in the form of pulse width modulation and rotates the wiper in accordance with the signal amplitude given by the Arduino module. (P. Abhilash Reddy, G. Sai Prudhvi. P J Surya Sankar Reddy)[11] claim that Arduino Uno will be used in their project implementation and the language used is Arduino programming language by involving four stages in their car wiper system. The first stage is the reading stage, in which the data is read from the rain sensor module takes place. The second stage is the processing stage where the sensor will filter the information before the information is transmitted to Arduino. The third stage is the analysis stage where comparison/analysis of the processed information takes place in Arduino. The last stage is the control stage in which the power for servo motor and LCD display takes place.

In 2019, (Anshumali & Bhattacharya)[6] propose an intelligent wiper system using Arduino Atmega8, Rain sensor module and servo motor. Arduino works when the rain sensor module detects rain fall and sends the information to Arduino. It will process the information gathered from module and adjust the wiper from the signal given. The signal will then sent towards servo motor.

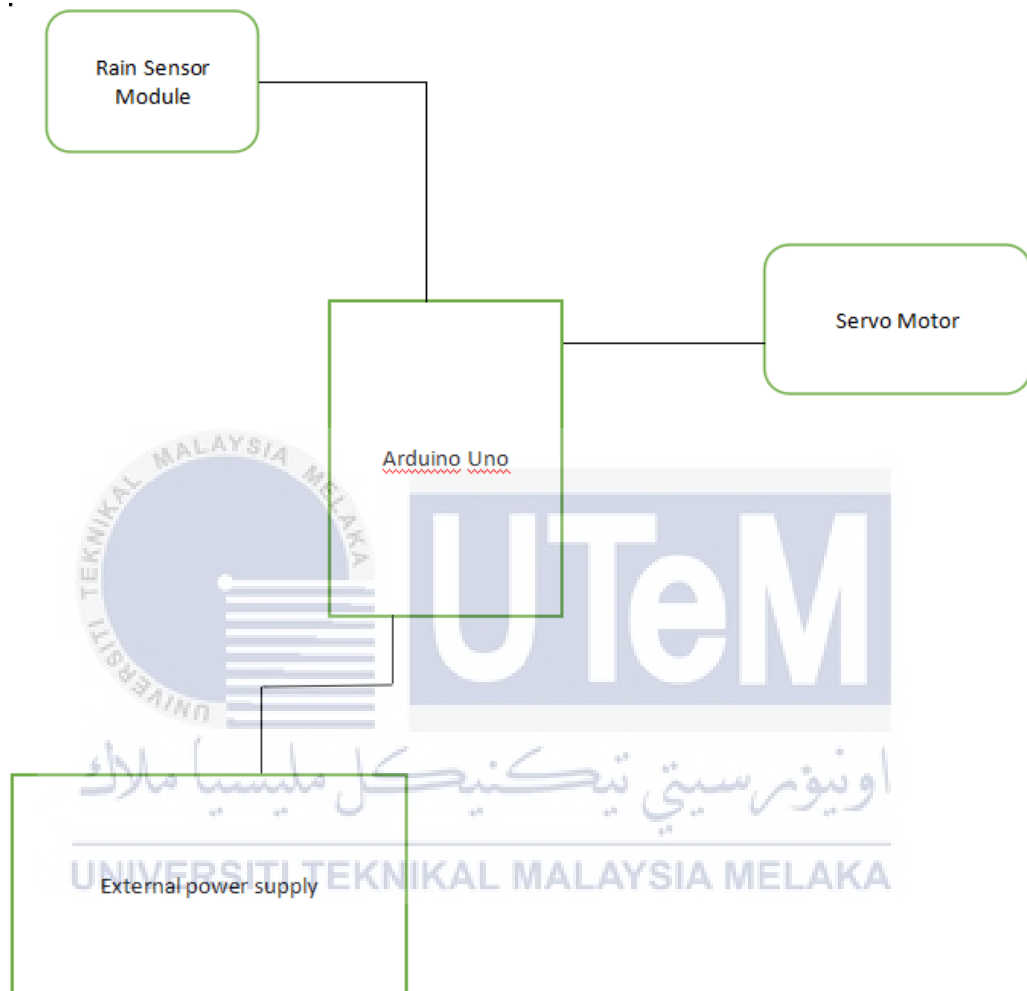


Figure 2.1 Arduino is connected by all these 3 devices together and fix near power source

The micro controller used by (Alazzawi & Chakravarty) [8] in 2015 was Arduino Uno, ATmega328. It has 6 analogue inputs, and a 16 MHz ceramic resonator. Figure below shows the Arduino board. Arduino has many advantages in that it is open source and less expensive. It also contribute to many components, and many option of components may choose to implement the project.



Figure 2.2 Arduino Uno

In 2018,(P. Abhilash Reddy, G. Sai Prudhvi. P J Surya Sankar Reddy)[11] use Arduino UNO that is micro controller based on the ATmega328. 14 digital input/output pins, 6 analogue inputs, 16MHz ceramic resonator, a USB connection, a Power jack, an ICSP header and a reset button is are included in the Arduino uno. A battery may be require to start. Function of Arduino UNO in this project is it estimates the intensity of rain fall by manipulating the signal given by the rain sensor module and then passing the signal to the servo motor according to the rain fall. The servo motor then picks up the signal in the form of pulse width modulation and rotates the wiper accordingly.

### 2.2.2 Implementation using Microcontroller

Author (Madhu) [1] implement automation in body control module(BCM) of a car using micro controller PIC16F877A.BCM is an electronic device, it controls and regulates a large number of basic functions on modern vehicles. Vehicle electronic system comprises of engine control, steering control, fuel injector control, wind shield wipers, power window, headlight adjustments etc, can be controlled by their respective sensors and controller unit.

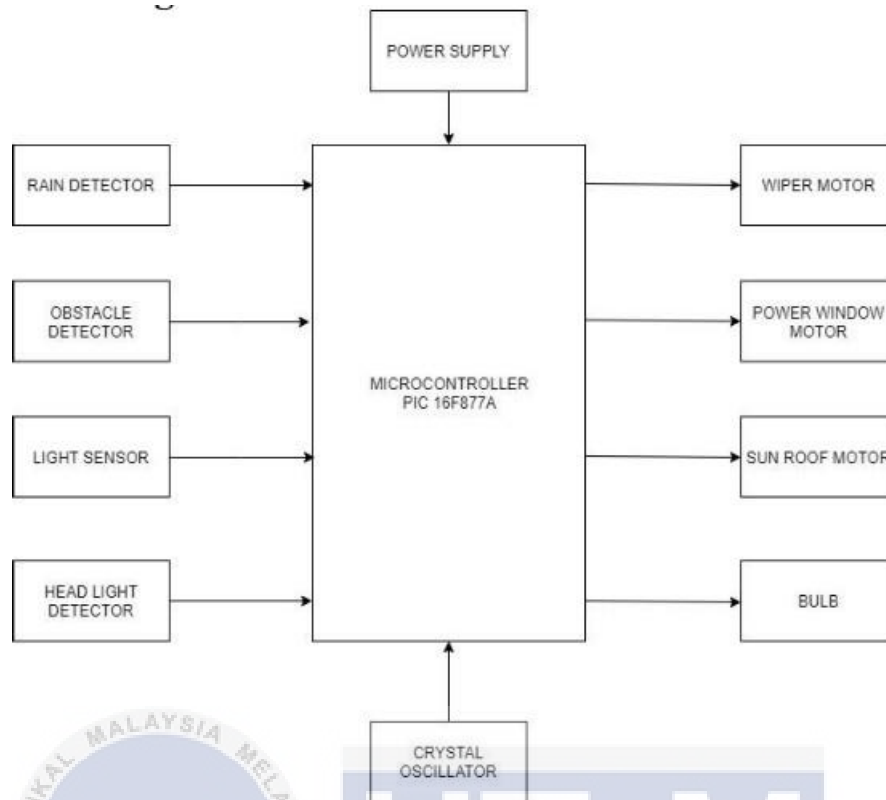


Figure 2.3 Block diagram of BCM of a car

Based on block diagram of BCM of a car above, PIC micro controller is a compact integrated circuit designed to govern a specific operation in an embedded system including wiper motor accordingly. A typical micro controller has a processor, memory and input/output (I/O) peripherals on a single chip. Besides, wind shield wipers are powered by a small electric motor and usually mounted on the firewall or under the cowl (the area under the wind shield's base). The motor activates linkage that moves the wiper arms back and forth.

In 2019, author (Warke)[2] write a newly proposed automatic wiper system using AT89551 micro controller. Micro controller works when the information are processed by micro-controller 8051 and wiper rotates at different speed when sensors at different position are activate through command.