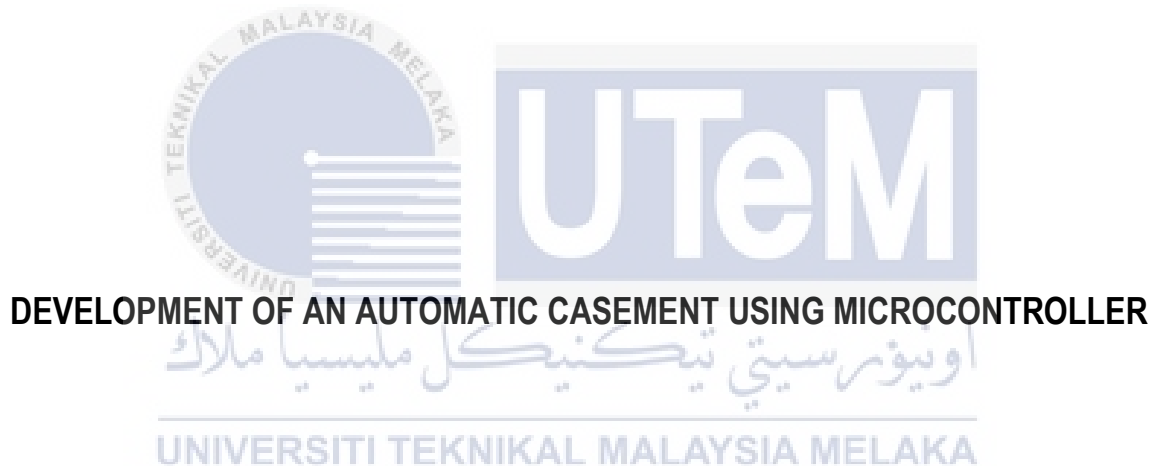




**Faculty of Electrical and Electronic Engineering Technology**



**DEVELOPMENT OF AN AUTOMATIC CASEMENT USING MICROCONTROLLER**

**MOHAMMAD SYAFIQ BIN AKMAL AZIZ**

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

**2023**

**DEVELOPMENT OF AN AUTOMATIC CASEMENT USING  
MICROCONTROLLER**

**MOHAMMAD SYAFIQ BIN AKMAL AZIZ**

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



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**Faculty of Electrical and Electronic Engineering Technology**

**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**2023**



UNIVERSITI TEKNIKAL MALAYSIA MELAKA  
FAKULTI TEKNOLOGI KEJUTERAAN ELEKTRIK DAN ELEKTRONIK

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Tajuk Projek :

DEVELOPMENT OF AN AUTOMATIC CASEMENT USING  
MICROCONTROLLER

Sesi Pengajian : 2019/2020

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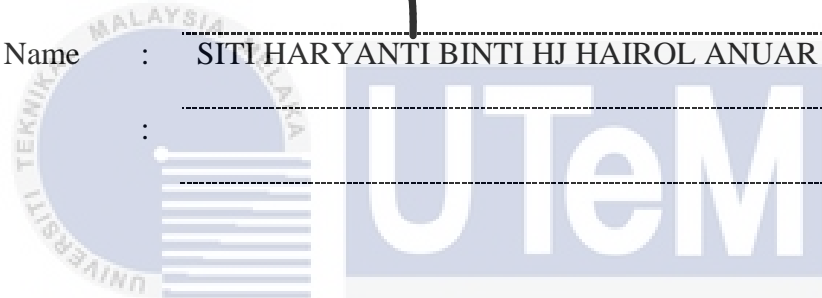
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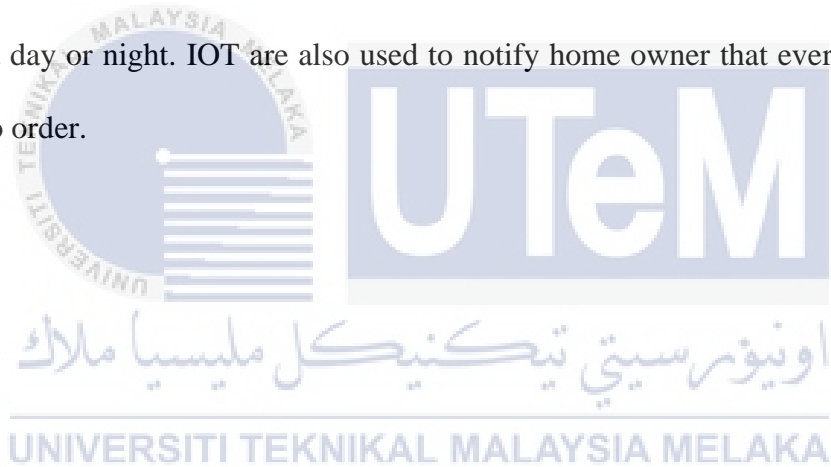


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## ABSTRACT

In every household will have window to facilitate the entry of natural light indoors. In this modern society, everyone is busy working and sometime late working from morning to night and not able to close the window before dark. The purpose of this project is to secure the window by open or close a window automatically when the raining day in daylight using rain sensor to detect rain and light sensor to detect day and night even nobody at home. Using Node MCU ESP8266 as controller and servo motor to adjust window to open or close. As the sensor, using rain sensor to detect wheather outside the house and photoresistor to determine it day or night. IOT are also used to notify home owner that everything happen according to order.



## ***ABSTRAK***

Setiap rumah akan mempunyai tingkap untuk memudahkan kemasukan cahaya semula jadi ke dalam rumah. Dalam masyarakat moden ini, semua orang sibuk bekerja dan kadangkala kadang bekerja lewat dari pagi hingga malam dan tidak dapat menutup tingkap sebelum gelap. Tujuan projek ini adalah untuk memastikan tingkap dengan membuka atau menutup tingkap secara automatik apabila hari hujan di siang hari menggunakan sensor hujan untuk mengesan hujan dan sensor cahaya untuk mengesan siang dan malam walaupun tiada sesiapa di rumah. Menggunakan Node MCU ESP8266 sebagai pengawal dan motor servo untuk melaraskan tetingkap untuk membuka atau menutup. Sebagai penderia, menggunakan penderia hujan untuk mengesan cuaca di luar rumah dan photoresistor untuk menentukannya siang atau malam. IOT juga digunakan untuk memberitahu pemilik rumah bahawa segala-galanya berlaku mengikut perintah.



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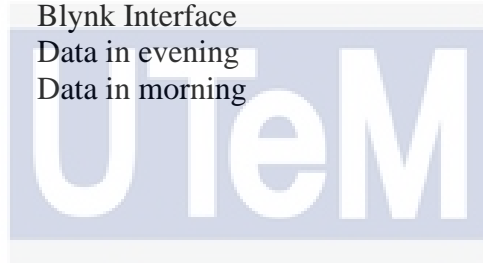
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## LIST OF SYMBOLS

$s$  - Seconds



## LIST OF ABBREVIATIONS

<i>IoT</i>	-	Internet of Thing
LDR	-	Light Dependant Resistor
RTC	-	Real-Time Clock



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# CHAPTER 1

## INTRODUCTION

### 1.1 Background

In today modern world, people are now likely to priority to works and sometime late to back home due to overtime. Due to increasing of people intended to do works more than chores, people are more likely not to closed casement at home. With this an automatic casement, it will help every household to open and closed casement according to plan even nobody at home.



### 1.2 Problem Statement

In every house in Malaysia always completed with a window to overcome heat or sense of bad smell in room, bedroom, kitchen and even a living room. The problem with window is need to open and close manually in house and it need human interaction to do so. People nowadays have is always busy with job and sometime because of overtime lead to late back home to close the window. This project to open or close the casement in every home owner automaticly even there are no people in the house.

### 1.3 Project Objective

- a) This project is a development to convenient in every houseowner to ensure every casement in house is according to plan. There are a few goals need to succeded in this project :

- b) a) To develop an automatic casement using microcontroller.
- c) b) To make an adjustment and modify the system with blynk implementation.
- d) c) To make a prototype window to open and close automatically or manually.

#### 1.4 Scope of Project

- e) To avoid any uncertainty of this project due to some limitations and constraints, the scope of the project are defined as follows:
  - Node MCU ESP8266 as a brain to control the components in this project and for communication between the user and microcontroller
  - LDR sensor was used to detect light during the day and night to make automatic casement to open and close.
  - Rain sensor was used to detect rain during the day and night to make automatic casement to open and close
  - Linear actuator is an actuator to move the casement to open or close.
  - Mobile application is developed to display the information received and perform monitoring toward ESP8266.



## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Introduction

In today society, we all about living in easy life and to have that people nowadays stuck with a lot of works and sometime staying at office until late night instead staying at home and do chores. with the technologies growth like mushroom on rainy days, Malaysian now have the capability to have internet in every household. With this internet we can do a lot of things such as Internet Of Thing (IOT) that can connect with electronics part to make out part of life easier. This project is to open and close casement using Linear Actuator controlled by Microcontroller with Internet of Thing (IoT) to notify the homeowner every window in the house open and close according to plan. With the help of sensors, it can detect daylight or night to automatically open and close the casement. This project using previous related project to perform a smooth build of the project.

#### 2.2 Previous Related Project

##### 2.2.1 “Design of an Automatic Window Using a PIC Microcontroller and Stepper Motor” by Design of an Automatic Window Using a PIC Microcontroller and Stepper Motor

The perpose of the project is used in the hopital because hospital using alot of windows to make sure the airflow in hospital. The problem is, the nurse dont have time to closed the window in time after the rain fall. It can damage the hospital equipment and report if the window is not close in time. In the project, it using 5 main component in system which is

stepper motor, current driver, rain detector, microcontroller and power supply unit to make the automatic window. Due to the usage of a sliding window that functions as a railing system window to open and close, the stepper motor can be used in the project. Although standard AC and DC motors might have been used for this project, they would have required an external feedback mechanism, which would have resulted in the motor not being precisely positioned. Because the feedback mechanism is embedded into the software design of the microcontroller, a stepper motor is a superior solution.

### **2.2.2 “Analysis of an Automatic Sliding Window” by Adedotun O. Owojori, Hawal O. Alade, Adebola O. Olotuah.**

The purpose of the project is to help the society in a country to increase of using more technology to make life easier and comforting life by relying on technology. It also mention the project is to help a disable person to open and close the window. The paper focuses on the design of an automatic sliding window system that responds to system command via a Bluetooth developed App on a mobile phone. By sending and receiving pulses, an ultrasonic sensor is utilised to measure the distance between the sliding window and the wall's edge. A distance greater than or less than a threshold indicates that the system is closed or open, and this can be altered via the mobile application according to the user's preferences. The window size would be of a quater size with fabrication compared with a normal size window and the material used would be a wooden edge with acrylic galss. At the top of the model is the part of the window that houses the accessories. The drive belt and pulley, gears, stepper motor, and microcontroller are all found in there. The project consist of 4 element which is Power supply, Sensing, Actuator or motor selection, and the communication link.

**2.2.3 “Design and construct of a weather-based Automatic sliding window” by Ademola AbdulKareem, T.E. Somefun, V.Ogunstosin,B.O.Adeyemi.**

The project is about an automatic sliding window with a weather-based. The main purpose of this project is to make human live in less stressful environment, which is the goal of engineering as a field. In the journal is explaining what is an automation, automation is use of various control system for operating equipment with minimal or reduced human intervention. The system is consist of Power supply, Microcontroller(Arduino), Temperature sensor and rain sensor, DC motor, and LCD Display. The detection in the project using a rain sensor and Temperature sensor are used to detect rain and degree of a temperature in the environment respectively. The problem it state in the project is rain sensor need to use in limited environment because need to be in a constant downfall of a rain, which make it unsuitable for for area that had harsh weather condition.

**2.2.4 “Intelligent Window Control System Design Based on Single Chip Microcomputer” by Zhao Sun, Shuyi Wei, Xiuxia Zhang.**

A single chip microcontroller operated the intelligent window control system, which was integrated with a variety of sensors. It included an automated closing feature to keep slant rain from damaging indoor objects. Natural gas, second-hand smoke, and other indoor hazardous gases were among them. These gases are dangerous if they surpass the limit, so the smart window will automatically open. If a thief enters a room, the intelligent window may sound an alert. The technology would keep a constant eye on the indoor environment. The smart window would automatically modify the switch state if the inside temperature and humidity were above or below the established criteria. Temperature sensor, gas sensor, and

infrared detection module are among the sensors included in the project. The project's microcontroller is an STC89C52 chip from STC, which is an 8-bit microcontroller.

#### **2.2.5 “Automatic Sliding Window” by Sumit P Patil, Jignesh R Dhabuwala, Liyakat Ali Patel.**

The project's main goal is to get experience in design and fabrication. The design is eco-friendly and incorporates simple features such as lead screw and dc motor qualities, as well as remote controls and sensors. Sliding windows have a wide range of applications nowadays. Its unique characteristic is that it contains rollers that assist in sliding on a designated rack. It decreases friction and facilitates handling. When we press the open button on the automated sliding window, a signal is sent to the main circuitry board, which then allows current to travel through to the window motor, causing the motor to run and the window to open. The motor stops running once the window is fully open (depending on where the resistance beam is positioned), causing the window to cease moving. When the close button is hit, the same thing happens, only the motor now runs in the opposite direction, closing the window.

#### **2.2.6 “Design and Implementation of Automatic Window Closer Based on Intelligent Control Algorithm” by Keping Zhang, Guangtian Shi and Zhihao Zhai.**

This project designs an intelligent window closing device that can sense external information and convert it into an electric signal to control the mechanical part to complete the corresponding action based on an intelligent control algorithm and mechanical design principle in order to realise the intelligent home concept. Through the collection, analysis, transfer, and control of many external data, the design can realise the corresponding switch

window action in response to changes in the real-time weather environment, which is an ideal choice for smart home and also provides security for people's lives and property. Smart windows; control system; single chip are all terms that can be found in the project. The motor drive mechanism completes the mechanical element of switching a window; use a DC motor as the power source, with a 24V battery power supply system, to eliminate the inconvenience caused by a power outage at home. It is important to select thrust bearing (thrust bearing) in order to perform the function of self-locking anti-theft. Thrust bearing is separated into thrust ball bearing and thrust roller bearing, with two one-way thrust ball bearings available.



### 2.3 Comparison of past year research

Table 1 : Comparison Table

No	Title	Author	Objective	Project Scope	Method
1	Design of an Automatic Window Using a PIC Microcontroller and Stepper Motor.	Design of an Automatic Window Using a PIC Microcontroller and Stepper Motor.	To develop automatic window to avoid damage hospital property.	PIC microcontroller PIC16F877A	<ul style="list-style-type: none"> <li>• Stepper Motor</li> <li>• Rain Detector</li> </ul>
2	Analysis of an Automatic Sliding Window.	Adedotun O. Owojori, Hawal O. Alade, Adebola O. Olotuah.	To develop automatic sliding window for home automation	Arduino Uno	<ul style="list-style-type: none"> <li>• HC-05 Bluetooth Module</li> <li>• HC-SR04 Ultrasonic sensor</li> <li>• MITSUMI M49SP-2K bipolar stepper motor</li> <li>• LCD Display</li> </ul>
3	Design and construct of a	Ademola AbdulKaree	To develop automatic	Arduino Uno	<ul style="list-style-type: none"> <li>• Rain Sensor</li> </ul>

	weather-based Automatic sliding window	m, T.E. Somefun, V.Ogunstos in,B.O.Ade yemi	sliding window for home automation		<ul style="list-style-type: none"> <li>• Temperature Sensor</li> <li>• LCD Display</li> <li>• H-Bridge Driver</li> <li>• DC motor</li> </ul>
4	Intelligent Window Control System Design Based on Single Chip Microcomputer	Zhao Sun, Shuyi Wei, Xiuxia Zhang	To develop automatic sliding window for home automation	STC89C52 shingle chip 8-bit microcomputer	<ul style="list-style-type: none"> <li>• Temperature Sensor</li> <li>• Humidity Sensor</li> <li>• Photoresistance</li> <li>• LCD Display</li> <li>• Infrared Sensor</li> <li>• Buzzer</li> <li>• Gas Sensor</li> <li>• Stepper Motor</li> </ul>
5	Automatic Sliding Window	Sumit P Patil, Jignesh R Dhabuwala, Liyakat Ali Patel	To develop automatic sliding window for home automation		<ul style="list-style-type: none"> <li>• Stepper Motor</li> <li>• Remote</li> <li>• Relay module</li> </ul>

6	Design and Implementation of Automatic Window Closer Based on Intelligent Control Algorithm	Keping Zhang, Guangtian Shi and Zhihao Zhai	To develop automatic sliding window for home automation	STC89C52 single chip 8-bit microcomputer	<ul style="list-style-type: none"> <li>• Temperature Sensor</li> <li>• Wind Sensor</li> <li>• Infrared Sensor</li> <li>• Buzzer alarm</li> <li>• pm2 5 sensor</li> <li>• DC motor</li> </ul>
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