



**Faculty of Electrical and Electronic Engineering Technology**



**DEVELOPMENT OF AUTOMATION ACCIDENT DETECTION  
SYSTEM USING ARDUINO CONTROLLER FOR MOTORCYCLE**

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**Bachelor of Electrical Engineering Technology (Industrial Power) with Honours**

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**DEVELOPMENT OF AUTOMATION ACCIDENT DETECTION SYSTEM USING  
ARDUINO CONTROLLER FOR MOTORCYCLE**

**WAN NOR ATHIRAH BINTI WAN AYUB**

**A project report submitted  
in partial fulfillment of the requirements for the degree of  
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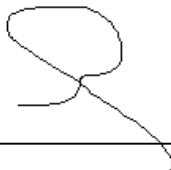
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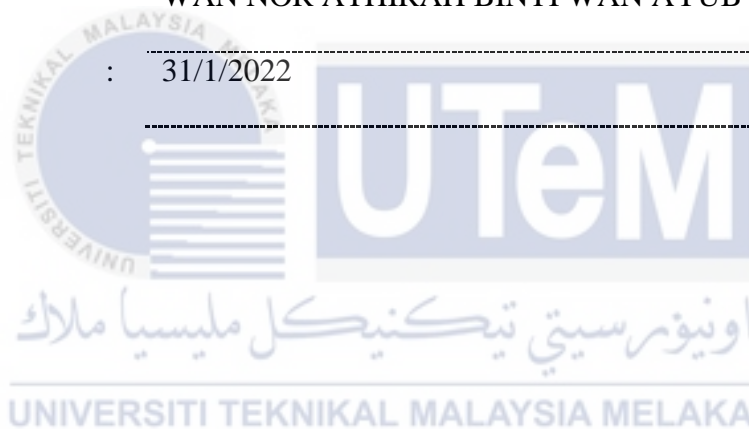
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## DEDICATION

Thanks to my beloved parents Wan Ayub bin Wan Jusoh and Salmiah binti Mamat who support me through thick and thin every time I shattered apart and for nursing me with tons of love and their dedicated partnership for success in my life. Moreover, a thousand thanks for the sacrifice has inspired me from the day I learn to read and write to the point of what I have progressed to be at this point. I could not find the most suitable words that could properly describe my appreciation for their dedication, support, faith in my ability to accomplish my dream. Next, special thanks to my classmates for always give moral value and help my project. Finally, lot of thanks to my supervisor Puan Nurbahirah binti Norddin for the advice and guidance through my research and development of the project.



## ABSTRACT

Accident situations are receiving more and more attention in the present age of globalization. This can happen anywhere and at any time. These can occur at any moment and go unnoticed. Depending on the severity of the accident, this could make things worse. In many circumstances, the survivor of a rescuer-caused fatal accident was also unable to arrive on time. Because the rescuers were unable to locate the victim, they have been unable to arrive on time. A time and accident scene monitoring system will be designed and expanded to address the problem. When an injury happens, only those in the immediate vicinity are usually aware. As a result, this prototype functions by informing authorities or families about the accident. Then, utilizing an Accelerometer, the project was created at a low cost to fix the problem (MPU 6050). An Arduino Uno has been added to this system that controls the incoming and outgoing operations, creating a more efficient. With contemporary tracking devices, GPRS and GPS technology work to send warning signals, where the precise location of the accident may be determined using longitude and latitude readings, which are then relayed to the authorities. In this instance, rescuers will be able to arrive on time. Furthermore, the research has the potential to save many extra human lives and identify missing victims undetected.

## ***ABSTRAK***

Pada era globalisasi kini, kes kemalangan makin meningkat dari masa ke semasa. Hal ini juga boleh berlaku dimana dan bila-bila masa sahaja. Kadang- kadang ia berlaku tanpa dijangka dan disedari. Perkara ini boleh menyebabkan situasi menjadi lebih teruk bergantung kepada tahap kemalangan yang berlaku. Banyak kes yang berlaku , mangsa kemalangan maut disebabkan oleh pihak penyelamat tidak dapat sampai tepat pada waktunya. Pihak penyelamat tidak dapat menepati waktunya kerana pihak penyelamat tidak dapat menemui mangsa tersebut. Sebagai langkah untuk mengatasi masalah tersebut sistem pengesanan ketepatan masa dan tempat kejadian kemalangan telah dibangunkan dan diperkembangkan. Pada kebiasaan, apabila sesuatu kemalangan terjadi hanya orang yang berada di kawasan tersebut sahaja yang mengetahuinya. Justeru, prototaip ini berfungsi dengan cara memberi notifikasi secara terus kepada pihak berkuasa atau waris terdekat tentang kemalangan yang berlaku. Seterusnya, projek ini dibuat dengan kos yang berpatutan untuk menyelesaikan masalah dengan menggunakan *Accelerometer (MPU 6050)*. Untuk menjadikan sistem ini lebih berkesan, *Arduino microcontroller* telah ditambah untuk mengawal proses *input* dan *output*. Teknologi *GPRS* dan *GPS* berfungsi untuk menghantar mesej amaran dengan alat penjejak semasa, dimana lokasi kejadian kemalangan yang tepat dapat dikesan menerusi bacaan longitud dan latitud seterusnya dihantar kepada pihak berkuasa. Dalam kes ini, pihak penyelamat dapat sampai di kawasan kejadian tepat pada masanya. Tambahan lagi,projek ini dapat menyelamatkan banyak lagi nyawa manusia dan mencari mangsa yang hilang tanpa dikesan.



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## TABLE OF CONTENTS

	<b>PAGE</b>
<b>DECLARATION</b>	
<b>APPROVAL</b>	
<b>DEDICATIONS</b>	
Contents	
<b>ABSTRACT</b>	<b>3</b>
<b>ABSTRAK</b>	<b>4</b>
<b>ACKNOWLEDGEMENTS</b>	<b>5</b>
<b>TABLE OF CONTENTS</b>	<b>6</b>
<b>LIST OF TABLES</b>	<b>9</b>
<b>LIST OF FIGURES</b>	<b>10</b>
<b>LIST OF SYMBOLS</b>	<b>12</b>
<b>LIST OF ABBREVIATIONS</b>	<b>13</b>
<b>LIST OF APPENDICES</b>	<b>i</b>
<b>CHAPTER 1 INTRODUCTION</b>	<b>2</b>
1.1 Background	2
1.2 Problem Statement	3
1.3 Project Objective	3
1.4 Scope of Project	3
<b>CHAPTER 2 LITERATURE REVIEW</b>	<b>5</b>
2.1 Introduction	5
2.2 Patterns of Road accident and causalities	5
2.3 Causes of road accident and fatality	6
2.4 How to prevent motorcycle accident	6
2.5 Overview of existing project system	7
2.5.1 IoT Based accident detection system .	13
2.5.2 Arduino based car security system	13
2.5.3 Advanced Vehicle Security System with theft Control and accidentnotification using GSM and GPS Module	13
2.5.4 Implementation of a Smart Bike Accident Detection System	14
2.5.5 Wireless Sensor Network System Design Using Raspberry Pi and Arduino for Environmental Monitoring Application.	15

2.5.6	Statistical Analysis of Vehicle Detection in the ITS Application for Monitoring the Traffic and Road Accident Using Internet of Things.	15
2.5.7	Cloud based Accident Detection and Notification System	16
2.5.8	IoT Based Vehicle Accident Detection and Tracking System Using GPS Modem	17
2.5.9	IoT based car accident detection and notification algorithm for general road accidents.	17
2.5.10	A novel approach in real-time vehicle detection and tracking using Raspberry Pi	17
2.5.11	Vehicle Security System using Short Message Service (SMS) as a Danger Warning in Motorcycle Vehicles .	.18
2.5.12	Intelligent transportation system for accident prevention and detection	19
2.5.13	Pothole detection system design with proximity sensor to provide motorcycle with warning system and increase road safety driving .	19
2.5.14	DeepCrash: A Deep Learning-Based Internet of Vehicles System for Head-On and Single-Vehicle Accident Detection With Emergency Notification	. 20
2.6	Communication Transmission Device	21
2.7	IoT platform	22
2.8	Sensors	23
2.8.1	ADXL 345 IMU	23
2.8.2	MPU 6050 IMU	24
2.8.3	VIBRATION SENSOR	25
2.9	Comparison of Sensor Technologies.	26
2.10	Summary	26
<b>CHAPTER 3</b>	<b>METHODOLOGY</b>	<b>27</b>
3.1	Introduction	27
3.2	Hardware development	29
3.3	Arduino UNO	30
3.4	Battery	31
3.5	MPU 6050 (Acelerometer sensor)	32
3.6	Charging Board	33
3.7	Light Emitting Diode	33
3.8	Liquid Crystal Display (LCD)	34
3.9	SIM900a GSM and GPS module	34
3.10	Mini Piezo buzzer (3V-12V)	35
3.11	Software Development	36
3.12	Coding of Gyroscope for MPU 6050	37
3.13	Design of casing detection system in AutoCad software	38
3.13.1	The fully design for casing Prototype	38
3.13.2	The design casing prototype with dimension	39
3.13.3	The left side of casing prototype.	39
3.13.4	The front side of casing Prototype	40
3.13.5	The top side of casing prototype	40
3.14	The block diagram for the project	41
3.15	Simulation in Proteus	41
3.16	Coding of half Project	43
3.17	Summary	44
<b>CHAPTER 4</b>	<b>RESULT AND ANALYSIS</b>	<b>45</b>
4.1	Introduction	45
4.2	Project Overview	45

4.3	Design of the Prototype	45
4.4	Programming Language	47
4.5	Hardware Implantation	47
4.5.1	Connection component test	47
4.5.2	The Production of Prototype	50
4.6	Result	50
4.6.1	Switch of Project	51
4.6.2	The accident alert	51
4.6.3	The notification SMS	52
4.7	Field Test	53
4.8	System performance analysis	55
4.8.1	The analysis respond time taken with output devices	55
4.8.2	The analysis MPU 6050 sensor respond with output devices	57
<b>CHAPTER 5 CONCLUSION</b>		<b>58</b>
5.1	Conclusion	58
5.2	Future Works recommendation	58
<b>REFERENCES</b>		<b>59</b>
<b>APPENDICES</b>		<b>62</b>



## LIST OF TABLES

<b>TABLE</b>	<b>TITLE</b>	<b>PAGE</b>
Table 2-1	: Overview of existing system	12
Table 2-2	: Communication Transmission devices	21
Table 2-3	: Comparison Sensor	26
Table 3-1	: Arduino UNO specification	31
Table 4-1	: the production size	50
Table 4-2	: the analysis of project	55
Table 4-3	: The respond MPU 6050 sensor with output	57



## LIST OF FIGURES

FIGURE	TITLE	PAGE
Figure 2-1	: IOT System	22
Figure 2-2	: ADXL 345 Model	23
Figure 2-3	: MPU 6050 IMU Model	24
Figure 2-4	: Vibration Sensor	25
Figure 3-1	: Flowchart of PSM	27
Figure 3-2	: Block Diagram of proposed system	28
Figure 3-3	: Development project input and output	29
Figure 3-4	: Arduino UNO details	30
Figure 3-5	: 3.7V battery	31
Figure 3-6	: MPU 6050 sensor pin out	32
Figure 3-7	: powerbank charge	33
Figure 3-8	: LED	33
Figure 3-9	: 16 x 2 LCD display	34
Figure 3-10	: SIM900a GSM/GPRS GPS Module	35
Figure 3-11	: buzzer	35
Figure 3-12	: Flowchart of the prototype software	36
Figure 3-13	: coding testing of the MPU 6050 module	38
Figure 3-14	: Fully design for casing	38
Figure 3-15	: Fully desgin for casing with dimension	39
Figure 3-16	: the left side view	39
Figure 3-17	: front design for casing with dimension	40
Figure 3-18	: the top side view	40
Figure 3-19	: the block diagram of simulation	41

Figure 3-20 : The simulation circuit	41
Figure 3-21 : The simulation after click play button	42
Figure 3-22 : The simulation after the button toggle click	42
Figure 3-23 : The coding of half project	44
<i>Figure 4-1 : front view of prototype</i>	45
Figure 4-2 : side view of protoype	46
Figure 4-3 : testing the connection of LCD	48
Figure 4-4 : testing the connection of coding in arduino-UNO	48
Figure 4-5 : testing the connection and the coding with LCD and MPU 6050	49
Figure 4-6 : the connection with GSM 900a	49
Figure 4-7 : starting of project	51
Figure 4-8 : the ongoing system	51
Figure 4-9 : the notification SMS	52
Figure 4-10 : the motorcycle used in field test	53
Figure 4-11 : the box of prototype	53
Figure 4-12 : ongoing process of field test	54
Figure 4-13 : end of field test	54
Figure 4-14 : graph of analysis	56

## LIST OF SYMBOLS

<b>V</b>	-	Voltage
<b>F</b>	-	Force
<b>g</b>	-	Gravity = 9.81 m/s
<b>I</b>	-	Moment of inertia
<b>l</b>	-	Length
<b>m</b>	-	Mass
<b>G</b>	-	Giga
<b>Hz</b>	-	Hertz
<b>mA</b>	-	Mili Ampere
<b>KB</b>	-	Kilo Byte





## LIST OF ABBREVIATIONS

<b>IMU</b>	Inertial Measurement Unit
<b>GPS</b>	Global positioning System
<b>GSM</b>	Global System for Mobile
<b>LCD</b>	Liquid Crystal Display
<b>PWM</b>	Pulse Width Modulator
<b>GPRS</b>	General Packet Radio
<b>IoT</b>	Internet of Things
<b>VHF</b>	Very High Frequency
<b>UHF</b>	Ultra High frequency
<b>Wi-Fi</b>	Wireless Fidelity
<b>WHO</b>	World Health Organization
<b>MCU</b>	Micro Controller Unit
<b>UID</b>	Unit Identifier
<b>MEMS</b>	Micro Electro Mechanical Systems
<b>DMP</b>	Digital Motions Processors
<b>I2C</b>	Inter-Integrated Circuit
<b>V</b>	Voltage
<b>mA</b>	mili Ampere
<b>SRAM</b>	Static Random Access Memory
<b>EEPROM</b>	Electrically Erasable Programmable Read-only Memory

## LIST OF APPENDICES

APPENDIX	TITLE	PAGE
	Appandices 1 : full coding for project	69



# CHAPTER 1

## INTRODUCTION

### 1.1 Background

Pursuant to the World Health Organization, up to 3000 people die in motorcycle incidents every year, while millions are damaged or incapacitated; [1]. Malaysia scored top among ASEAN nations in 2013, with approximately 6,915 deaths, according to statistics for 2019. In Malaysia, motorcycle accidents are more common, and majority of the time, they result in death. The frequency of accidents documented in 2017 reached 13,173,030. The proportion of cases increase by 706,302 in 2019, raising the whole amount of cases to 13,879,085 in 2019, reflecting a 47.36% rise beyond the total amount of accidents affecting other categories of vehicles. Many accidents occur in Malaysia modern days, with motorcyclists responsible for the preponderance of them. Mistakes can happen, but they aren't generally detected in a suitable manner. If the accident is not noticed within a particular period of time, the individual might die. If the accident occurred in a confined or quiet area, for example, there might be no witnesses, finding it difficult to find.

In this project, developed a system that can instantly track a motorcycle and identify them in seconds where it located. This is based on GPRS and GSM network, just like and Vehicle Tracking System. However, this system has integrated motion and orientation sensors know as accelerometer. So that all data regarding the motorcycle motion and orientation can be monitor. In addition, microphone was added to report an accident happen along the route. This system can detect any accidents and instantly notify the person we choose or authority with the pin-point location via GPRS network. As the accident occur, more chance victim can be located and high possibility still alive. This two system, if integrated together, can give a complete solution for preventing from accident happen without knowing.

## 1.2 Problem Statement

Nowadays, accident happen without a warning. Furthermore, accident are always happen every second and counting. There are a way to prevent it from happen and instantly alert other. Thus, alert system are made to track it. The device can detect accident and alert that we want to notify either authority or parents. It would feel safe if something happen to us that can notify others. This prototype also can prevent victim from missing if the accident happen without a trace. Thus, high possibility victim can survive if the authority came right on time.

## 1.3 Project Objective

- 1) To design the automatic motorcycle accident detection system by using Arduino.
- 2) To develop a prototype that detect motorcycle accident using Arduino microcontroller.
- 3) To alert the family about accident using Communication application by SMS.

## 1.4 Scope of Project

The purpose of the project was designed to archive the objectives of the project. This project focuses on automatic accident detection. Whenever the accident happen, the sensor will detect it and send the accurate location to authority or parents. In addition, there are also voice control that can report to the accident thru map application along the ride. Thus, this is suitable to remind other road users. The prototype will be design suitable for motorcycle and using charging battery as energy. Moreover, the prototype would be able to detect the accident automatically and instantly inform to authority and parent through Communication application SMS. This project will conduct experiment to test the sensitivity of the sensor to define and simulate the accident. One of the import criteria is to programming the Arduino sending the information or signal to authority through GSM.

In order to achieve the whole objective, design the automatic accident detection need to be compact and light weight as possible to install on motorcycle. The project aim to automatically detect accident .Thus the accelerometer need to ensures in most accurate and simulate the accident condition. Lastly, for the analysis part, analyze what the G-force for the accelerometer to be conclude as accident



## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Introduction

In this section, would highlight in general about motorcycle accident that been high number and increase day by day. Some of the cases, motorcycle accident without anyone notice. This prototype may help to save motorcyclist life. Moreover, some of cases the motorcyclist heavily injured, they could survive if help arrive in time and also know the location. Here will explain the past overview of existing project, microcontrollers and accelerometer technology. In different, there are more of previous that can be related works, the articles and also journal linked to this project will be discuss.

#### 2.2 Patterns of Road accident and causalities

Numerous technology, psychological, and environmental aspects equally play an important role in traffic accidents. These possible behavioral throughout time and space. As both a response, the number of road accidents and fatalities ranges on both a geological and environmental scale. The accident risk in a specified place is regulated by land use changes, road network types, and local small business and population designs. So according Cutter, evaluating the demographic makeup of road traffic accidents is crucial because evaluating the effect of major elements. (Eid, 2015)

Transportation systems that seem to be sustainable are necessary aspects of sustainable cities. Traffic safety was among the most crucial components that determines the lengthy profitability of transportation systems. Accidents in traffic are indeed a priority cases in others countries all through the world. In fact, based on the World Health Organization (WHO), car accidents are the seventh most frequent cause of incident. The cumulative number of civilians affected in road fatalities every year is expected to be approximately 1.3 million. (Shahid S, 2015)

### **2.3 Causes of road accident and fatality**

Most studies of traffic fatality rates look at the rate in proportion to the population or number of registered cars in the region under investigation. From 2000 till 2005, Zhao investigated road traffic accidents in China. He reached the conclusion that the driver's experience, the road classification, and the number of industrial population surrounding the road are perhaps the most key elements in fatal accidents in China. Other factors linked to security concerns and high mortality rates were also discovered by him. Drunk driving, terrible road conditions, and excessive tolls were among the factors (which lead to overloaded trucks). Moreover, one of the main reasons of China's high traffic accident rate is the nation's rapid urbanization development. (Abdelfatah, 2016)

### **2.4 How to prevent motorcycle accident**

There are no more possibilities for escaping a motorcycle incident. The measures, however, did not totally succeeded in decreasing the accident and road accidents to the optimum consistency. Different intervention methods, such as an automatic enforcement system, a new driver educational system, and reserved motorcycle lanes, were determined to be underused. Some of the intervention, such as rear mandatory helmet laws, motorcycle helmet efforts, and community-based training programmers, were executed but could not include the intended impact. As already said, one of the central tenets that may improve traffic safety is traffic enforcement. As a consequence, measuring the level of prosecution in Malaysia is important to the research's conclusion. . (Abdelfatah, 2016)

## 2.5 Overview of existing project system

In this section, the previous project implementation will be analyzed and that has been applied in related to this project system. A group of great researchers have done their research to develop the best method of improving automatic car accident detection system. It has many patterns and designs that have been created. The research also used many methods to do the automatic accident detection.

Bil	Title	Author	Technique
1	IoT Based accident detection system	Shaikh A, 2018	Auto makers are investing in IoT projects to reduce vehicle safety  program includes the same accelerometer and GPS as the prototype
2	Arduino based car security system	Kumar, P.S , 2016	techniques to stop theft and locate a vehicle's exact location  GSM system is installed in the car to communicate information to the owner
5	Wireless Sensor Network System Design Using Raspberry Pi and Arduino for Environmental Monitoring Application	Sheikh Ferdosh Xinrong Li, 2014	combining open-source embedded systems including such as Arduino and Raspberry Pi, and even the XBee S2B ZigBee module, to construct a wireless sensor network