UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Faculty of Electrical and Electronic Engineering Technology

DEVELOPMENT OF AUTOMATION ACCIDENT DETECTION SYSTEM USING ARDUINO CONTROLLER FOR MOTORCYCLE

WAN NOR ATHIRAH BINTI WAN AYUB

Bachelor of Electrical Engineering Technology (Industrial Power) with Honours

2021

DEVELOPMENT OF AUTOMATION ACCIDENT DETECTION SYSTEM USING ARDUINO CONTROLLER FOR MOTORCYCLE

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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

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2021

UNIVERSITI TEKNIKAL MALAYSIA MELAKA
FAKULTI TEKNOLOGI KEJUTERAAN ELEKTRIK DAN ELEKTRONIK

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek : DEVELOPMENT OF AUTOMATION ACCIDENT DETECTION SYSTEM USING ARDUINO CONTROLLER FOR MOTORCYCLE

Sesi Pengajian : 2021/2022

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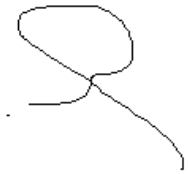
Signature : 

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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. Thiscan 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 ArduinoUno 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 andlatitude 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 pengesan 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.

ACKNOWLEDGEMENTS

First of all, I have to thank my project supervisor Puan NurBahirah binti Norddin. Greatly appreciate to her, without her assistance and dedicated involvement in every step throughout the process, this paper would have never been accomplished. I would like to thank you very much for your support and understanding over these past a year.

Getting through my dissertation required more than academic support, and I have many people to thank for listening to and, at times, having to tolerate me in accomplishing this thesis. I cannot begin to express my gratitude and appreciation for their friendship for unwavering personal and professional support during the time I spent at the University.

Most importantly, there is no words that can express my gratitude to my parents, who offered their encouragement through phone calls every week despite my own limited devotion to correspondence. With their own kind of humour, Wan Ayub bin Wan Jusoh and Salmiah binti Mamat has been kind and supportive to me over the last severalyears. I am forever grateful for every help I received. This dissertation stands as a testament to your unconditional love and encouragement.

None of this could have happened without the help from Allah for all the health, time, ideas and even the ability to think. Alhamdulillah.

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

LIST OF ABBREVIATIONS

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

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CHAPTER 1

INTRODUCTION

1.1 Background

Pursuant to the World Health Organization, up to 3000 people die in motorcycle incidentsevery 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 results in death. The frequency of accidents documented in 2017 reached 13,173,030. The proportion ofcases 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 suitablemanner. 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 themin 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 asaccelerometer 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-pointlocation via GPRS network. As the accident occur, more chance victim can be located and highpossibility 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, thesensor will detect it and send the accurate location to authority or parents. In addition, there arealso voice control that can report to the accident thru map application along the ride. Thus, thisis suitable to remind other road users. The prototype will be design suitable for motorcycle andusing charging battery as energy. Moreover, the prototype would be able to detect the accidentautomatically and instantly inform to authority and parent through Communication applicationSMS. This project will conduct experiment to test the sensitivity of the sensorto 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 diffrent, 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 analyze and that hasbeen applied in related to this project system. A group of great researcher have done theirresearch to develop the best method of improving automatic car accident detection system. It have many pattern and design that had been created. The research also used many method to do the automatic accident detection.

Bil	Title	Author	Technique
1	IoT Based accident detectionsystem	Shaikh A, 2018	Auto makers areinvesting in IoT projects to reducevehicle safety program includes the same accelerometerand 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 isinstalled in the car tocommunicate information to theowner
5	Wireless Sensor Network System Design Using Raspberry Pi and Arduino for Environmental Monitoring Application	Sheikh Ferdosh Xinron g Li, 2014	combining open- source embedded systems including such Arduino andRaspberry Pi, and even the XBee S2B ZigBee module, to construct a wireless sensōr network