UNIVERSITI TEKNIKAL MALAYSIA MELAKA

PORTABLE CAR MONITORING SYSTEM

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor's Degree in Electronic Engineering Technology (Industrial Electronics) (Hons.)

by

MUHD NUR ASYRAF BIN RUSLI

B071110155

901122-11-5155

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BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

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SESI PENGAJIAN: **2014/15 Semester 1**

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I hereby, declared this report entitled “Portable Car Monitoring System” is the results of my own research except as cited in references.

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APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Electronic Engineering Technology (Industrial Electronics) (Hons.). The member of the supervisory is as follow:

……

(Project Supervisor)

ABSTRAK

Projek ini adalah berkaitan dengan sistem pemantauan kereta mudah alih berasaskan sistem android. Sistem ini akan dikawal penuh oleh peranti android. Objektif utama projek ini adalah untuk mengesan maklumat tentang lokasi kemalangan serta kelajuan kereta tersebut. Ini adalah disebabkan oleh kemalangan salah satu punca utama kematian. Pada masa sekarang, lokasi kemalangan lambat untuk diketahui. Ini kerana, masa untuk ambulans ataupun polis pergi ke lokasi kejadian lambat. Salah satu pendekatan untuk mengurangkan kelewatan antara kejadian kemalangan dan ambulans adalah dengan menggunakan pengesan kemalangan dalam kenderaan tersebut yang akan memberitahu kepada pemilik kereta, polis ataupun hospital. Dimana sistem ini akan memberitahu lokasi kemalangan tersebut berlaku. Projek ini akan menggunakan sistem GPS untuk mengesan lokasi kemalangan tersebut. Projek ini juga menghantar koordinat atau lokasi dalam longitud dan latitude yang akan dipaparkan pada peranti android sekiranya mempunyai apa-apa kemalangan berlaku pada kereta. Selain itu , sistem ini akan menggunakan sensor kejutan. Sensor kejutan akan mengesan getaran pada kereta jika apa-apa kemalangan di kereta. Sensor kejutan akan diletakkan di hadapan kereta . Tambahan pula , projek ini juga dapat mengesan pecutan kereta. Jika kelajuan kereta melebihi had yang telah ditetapkan, sistem akan memberi amaran kepada pemandu dengan memaparkan kelajuan di peranti android dan kelajuan kereta tersebut akan disimpan didalam peranti android untuk dirujuk oleh pemilik kereta atau pihak berwajib.

ABSTRACT

This project is related to Portable Car Monitoring System based on mobile android system. The system will be fully controlled by the android device. The main objective of this project is to monitoring location of the accident and the speed of the car. This is caused by accident is the one of the leading causes of death. Nowadays, the accident location is late to know. This is because the time for an ambulance or the police arrive to the location is late. One approach to reduce the delay between the accident and the ambulance was using vibration sensors in the vehicle that will inform the owner of the car, police or hospital about the accident. This project will use a GPS system to monitor the location of the accident. The project will also send the coordinates or location in longitude and latitude to be displayed on android devices if have any accident occur at the car. In addition, the system will use shock sensor. Shock sensor will detect the vibration in the car if anything in the car accident. Shock sensor will be placed in front of the car. Furthermore, the project is also able to detect the acceleration of the car. If the speed of the car exceeds the predetermined threshold, the system warns or alerts the driver by displaying speed in android device and speed of the car will be stored in android device to be referred by the car owner or the authorities.

DEDICATION

I would like to dedicate this project to my beloved supervisor, Mr. Khairul Azha Bin A. Aziz that give extra knowledge to assists me throughout developing this project. I also want to thanks to my family members, lecturers and friends that give me extra spirit to develop this project.

ACKNOWLEDGEMENT

I am highly indebted to Mr. Khairul Azha Bin A. Aziz for their guidance and constant supervision as well as for providing necessary information regarding the project and also for their support in completing this project. I would like to express my gratitude towards my parents and members for their kind co-operation and encouragement which help me in completion of this project. My thanks and appreciations also go to my colleague in developing the project and people who have willingly helped me out with their abilities.

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

ADT	-	Android Development Toolkit
B4A	-	Basic4android
CHG	-	Charge Current Trimmer
GNSS	-	Global Navigation Satellite Systems
GPS	-	Global Positioning System
GPRS	-	General Packet Radio Services
GSM	-	Global System for Mobile Communication
LCD	-	Liquid Crystal Display
MCU	-	Microcontroller Unit
NPN	-	Negative Positive Negative
OHA	-	Open Handset Alliance
PWM	-	Pulse Width Modulation
RAD	-	Rapid Application Development
SDK	-	Software Development Kit
SMS	-	Short Message Service
TWSC	-	Two-Way, Stop-Controlled Intersection
V	-	Volt
VSS	-	Vehicle Speed Sensor

CHAPTER 1
INTRODUCTION

This project could be a part of an assistive technology. It is for more independent, productive and enjoyable living. The background, objectives, problem statement and scopes of the project will be discussed in this chapter.

1.1 Project Background

There is a sudden increase in the number of the vehicles nowadays. The increasing numbers of accident in these days is because of the numbers of vehicles in that also increases. Furthermore, vehicle accidents are major public problem in many countries, particularly in Malaysia. This problem is rapidly increasing due to the rider's poor behavior such as speeding, drunk while driving, don't use of seat belts and riding without sufficient sleep. According to the research by the University of Michigan dated on February 2014, Malaysia was ranked 1st on the road fatality rate in the world, with 30 deaths per 100, 000 populations. This compares with only 6 peoples in Singapore, 6 peoples in France, 14 peoples in United States, 44 peoples in Thailand, 22 peoples in Brazil, 21 peoples in Saudi Arabia and 22 peoples in China. [1] But according to the World Health Organization (WHO), Malaysia has the highest number of ranking due to the road accident in the world. [2]

In order to reduce, this project came into existence. This project is mainly used to monitor the car accident, send the messages when accident occur and alert when over limit. For example, the company car, so the owner knows the location of the car. In case of any accident, the system sends automated messages to the owner, police or others rescue. Such as if the vehicle is the company vehicle, the messages will directly send to the company to inform that about the accident. This project can use when the accident is occurs at the location that nobody besides there or the drive have a problem such as fainted or die. Then, the project will send messages to any number of mobiles that have been set. The company can inform to the police and to go to the location of the accident immediately. This uses a GPS (Global Positioning System) to know the exact position of the vehicle with accuracy by detect the latitude and longitude. This GPS based on the satellite navigation system that will provide the location anywhere in the Earth. Furthermore, by saving the speed data in the android devices also is the one method to know the speed of the car. The speed data will be saved in the android devices for about one month. After one month the speed data will be clear in the android device. The data for the month can be duplicated as the company data saving. After that, the data will continue saved on the android devices. This data size that will save in the android devices is three bytes.

Other than that, this project is using IOIO board as a controller. Android devices will send the message from the user and send the position of the vehicles. When has an accident, the shock sensor will triggered and send the signal to the IOIO board. The main reason behind this is to minimize the delay in medical facilities to reach the accidental place. This project insures the losses of life will be reduced rapidly. The system consists of cooperative components of shock sensor, IOIO board as a controller and GPS device to find the accident location. GPS that consists of latitude and longitude will be sent if vehicle accident is detected. A android controller is used to process the signal from the shock sensor. This system also includes the speed on the GPS to detect the speed of the car. If the speed is over limit, the data will send to the owner as a warning.

1.2 Objectives of Projects

To develop the system that can:

(a) Give an alert message when accident occurs and the location of the accident.
(b) Alert when the speed is over limit.
(c) Save the speed data.

1.3 Problem Statements

No one has knows what happen when the accident occurs. When the accident occurs, the person that involved in the accident, their life need to save immediately. This project will help to reduce the problem when the accident occurs. If the accident occurs at the location that nobody were there, the information will arrive late to the authority, so the police or the rescue cannot go to the location immediately.

Other than that, some drivers like to drive the car very fast. The drivers do not care about the speed that has been set by the authority. More than that, the drive may forget about the dangerous that will waiting them but also will threaten other people life. To avoid this problem to continuously happen, various aspects have been studied to find how the alternative way to reduce this speed problem. With this project, it can help this problem from continuing. The entire problem can be solved by using suitable system.

1.4 Scope of Project

The scopes of this project are listed to ensure the project is conducted within its intended boundary. Scope is useful to ensure the project is heading in the right direction to achieve the goal. The scopes of this project are to study the basic of android system from several published papers and books and also study the code that will used when develop this project. The focus in this project is to develop android application by using Basic4android software. This android system will used the IOIO board as the controller to the project. In addition, the using of Bluetooth technology is used as a medium to communicate between IOIO board and the android devices. Then, the shock sensor will use to detect the impact if the car in accident and will send the signal to the IOIO board. After that, the messages will be sends to the number that have been set to inform the accident. Furthermore, over limit car also will be alert.

1.5 Project Methodology

In order to achieve a goal for this project, there are several procedures that must be followed. The first step is to find information about the accident and over limit speed problem. Furthermore, get more information about the accident and over limit speed problem from the journal, internet, book and also article. Besides that, the research is continue with the searching on the basic concept of android application and also searches on coding for Basic4Android software to be programmed at the android device. Next, after finishing the research, the coding will be simulated in order to verify whether the coding that have program can run without any error. After that, the hardware for the Portable Car Monitoring System controller will be design by using the IOIO board as the controller circuit. Lastly, the hardware will combine with the coding to get the complete Portable Car Monitoring System controller that will be controlled by android device.

1.6 Thesis Structure

In order to fully understand the flow of the thesis, the thesis outline is provided.

(a) Chapter 1:

The first chapter introduces brief idea of the project. It focused on the overview of the project, detailing the objectives, the problem statement, scope and outcome of the project.

(b) Chapter 2:

The project background is discussed in this chapter. The focused on this chapter is about the method concept, theory and some characteristic of the components of hardware that will use in this project. This chapter also contains the definition of term that will use.

(c) Chapter 3:

This section is about the methodology. This chapter will explain about the procedures that have taken throughout the project. This chapter also will brief about the designs, specifications and the project flow.

(d) Chapter 4:

This section is about the result and discussion. This chapter will explain about the result of the project and the analysis that have been done. This chapter also will discuss about the overall of the project.

(e) Chapter 5:

This section is about the conclusion and future work. This chapter will conclude about the project. This chapter also will have an idea to make a recommendation for the future works.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

A literature review is a body of text that determines the aims to review the critical points of current knowledge including substantive findings as well as theoretical and methodological contributions to a particular topic. To start build this project, some research and collecting information had been done. The information is collected from many sources such as books, journals, article and website. All this collected information were recorded and been discuss with lecturer and friends to collect and choose the best information and idea. All information is very important and useful as a guide to build this project. All research and studies is related to the topic such as type of component used, hardware and software that was used in this project.

2.2 Evolution of Android System

The version history of the android mobile operating system began with the release of the Android beta Software Development Kit (SDK) in 12 November 2007 which make the platform to create application, games and other software. The first commercial version, Android 1.0, was launched in 23 September 2008 on the HTC Dream G1. In August 2005, android is under ongoing development by Google and the Open Handset Alliance (OHA), and has seen a number of updates to its base

operating system since its initial release. Since April 2009, android versions have been developed under a confectionery-themed code name and released in alphabetical order such as in Table 2.2 below:

Table 2.2: Android Version and Name

No.	Android Name	Android Version	Year Established
1.	Android	1.0 – 1.1	September 2008
2.	Cupcake	1.5	April 2009
3.	Doughnut	1.6	September 2009
4.	Éclair	2.0 – 2.1	October 2009
5.	Froyo	2.2 – 2.2.3	May 2010
6.	Gingerbread	2.3 – 2.3.7	December 2010
7.	Honeycomb	3.0 – 3.2.6	February 2011
8.	Ice Cream Sandwich	4.0 -4.0.4	October 2011
9.	Jelly Bean	4.1 – 4.3	August 2012
10.	KitKat	4.4 – 4.4.2	October 2013

On 3 September 2013, Google announced that 1 billion activated devices now use the Android OS worldwide. The most recent major Android update was KitKat 4.4, which was released to commercial devices on 22 November 2013, via an OTA update.

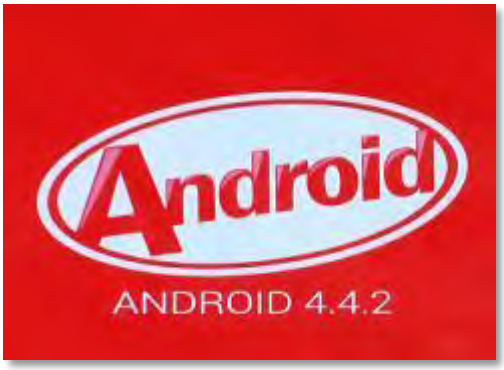

Figure 2.2: Android 4.4.2 KitKat

2.3 IOIO Board

The IOIO board that pronounced as “yo-yo” is a board that specially designed to work with Android 1.5 and latest android version, Kit Kat 4.4. The board provides robust connectivity to an android device via a USB or Bluetooth connection and is fully controllable from within an android application using a simple and intuitive Java API. The IOIO board contains a single MCU that acts as a USB host and interprets commands from an Android application. In addition, the IOIO can communicate with peripheral devices in the same way as most MCUs. Digital Input/output, Pulse Width Modulation (PWM), Analog Input, I2C, SPI, and UART control can all be used with the IOIO. Code to control these interfaces is written in the same way as write an android app with the help of a simple to use app-level library.

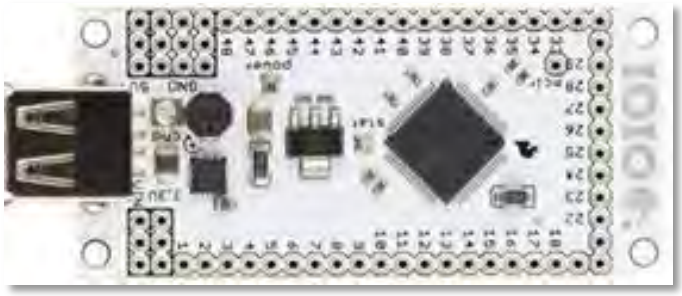

Figure 2.3: IOIO Board

Main features:

(a) 48 total I/O pins - all of which can function as digital inputs and outputs.

(b) Up to 16 analog inputs (10-bit).

(c) Up to 9 PWM outputs.

(d) Up to 4 UART channels.

(e) Up to 3 SPI channels.

(f) Up to 3 TWI (I²C-compatible) channels.

(g) On-board switch-mode regulator providing up to 1.5A of 5V supply. Can charge the Android device as well as power a couple of small motors.

(h) Boot loader on the board pulls firmware off phone, enabling OTA firmware upgrades and application-specific firmware.

(i) Pulse-width measurement, capacitance sensing and more (will be pushed with first OTA firmware upgrade).

The IOIO-OTG board contains the following components:

(a) **USB connector (micro-AB, female)**: Used to connect to host computer, an Android device or a Bluetooth dongle.

(b) **Power jack (2-pin JST, female)**: Used for power supply to the board. Voltage between 5V-15V should be supplied.

(c) **GND pins (10 pins)**: Ground connection.

(d) **VIN pins (3 pins)**: Used for outputting the supply voltage to your circuit, or as an alternative input to the power jack.

(e) **5V pins (3 pins)**: 5V output from the on-board regulator, which can be used in your circuit.

(f) **3.3V pins (3 pins)**: 3.3V from the on-board regulator, which can be used in your circuit.

(g) **I/O pins (46 pins, numbered 1-46)**: General purpose I/O pins. Some have special functions, see below.

(h) **PWR LED (red)**: Lights when the IOIO is getting power.

(i) **STAT LED (yellow)**: General purpose on-board LED, under application control.

(j) **MCLR pin**: Not normally used. Its purpose is for programming new bootloader firmware on the IOIO board.

(k) **BOOT pin**: Special pin used for getting the IOIO into bootloader mode on power-up. Note that this pin is shared with the stat LED.

(l) **Charge current trimmer (CHG)**: Adjusts the amount of current supplied on the VBUS line of the USB when acting as a USB host. Typically used in battery-powered application with Android to prevent the Android from draining the battery quickly. Turning in the (+) direction increases charge current.