

BORANG PENGESAHAN STATUS TESIS

JUDUL: VEHICLE COLLISION DETECTOR (VCD)

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Tesis dimaksudkan sebagai Laporan Projek Sarjana Muda(PSM)

VEHICLE COLLISION DETECTOR (VCD)

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This report is submitted in partial fulfilment of the requirement for the Bachelor of
Computer Science (Software Development)

**FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
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DECLARATION

I hereby declare that this project report entitled
VEHICLE COLLISION DETECTOR (VCD)

Is written by me and is my own effort and that no part has been plagiarized
Without citations.

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DEDICATION

I Dedicate this thesis to my late parents who always encourage me to do the best in my life. I hope this achievement that I have achieve will complete their dream. Not to forget my supportive supervisor Madam Nor Haslinda Ismail who always positive with her student, my best friend who always lend me their shoulder and last but not least to all my fellow classmate, thank you very much for all the thing that we do together. May Allah S.W.T bless you all.

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ABSTRACT

The purpose of this project is to develop a new system called Vehicle Collision Detector (VCD) that has the capabilities to detect vehicle accident and provide a situational awareness to the emergency responder. This application is expected to replaced the current system that are very rare to be use because of the cost of implementation. This application will be develop on android operating system that will be implement on Android Smartphone that has build in Accelerometer sensor and GPS receiver. However there are a rules to be set to avoid the false-positive detection such as the g-force detected must be equal or greater than 4G and the vehicle speed must be equal or greater than 15mph or 24.1km/h. Detail on this new application will be discuss throughout this report.

ABSTRAK

Tujuan projek ini adalah untuk membangunkan satu sistem baru yang dikenali sebagai Vehicle Collision Detector (VCD) yang mempunyai keupayaan untuk mengesan kemalangan kenderaan dan memberi kesedaran situasi kepada responder kecemasan. Aplikasi ini dijangka menggantikan sistem semasa yang sangat jarang digunakan kerana kos pelaksanaan. Aplikasi ini akan dibina pada sistem operasi android yang akan diguna pakai pada Android Smartphone yang mempunyai sensor meter pecutan dan penerima GPS. Walau bagaimanapun, terdapat beberapa peraturan yang akan ditetapkan bagi mengelakkan pengesanan positif palsu seperti g-force dikesan mestilah sama atau lebih besar daripada 4G dan kelajuan kenderaan mestilah sama atau lebih besar daripada 15mph atau 24.1km / h. Lanjutan mengenai aplikasi baru ini akan dibincangkan dalam laporan ini.

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CHAPTER 1

INTRODUCTION

1.1 Project Background

Based on Statistic of 22 times Ops Sikap over a period from 2001 to 2010 the number of accidents and the number of life that killed or wounded are so frightening. For 22 Ops Sikap in the 2001-2010 period, a total of 279,204 accident event, where 3,909 event of an accident involving at least one person dead.

The total death was 4,479 people. The average number of the dead in a day achieve two-digit, with Ops Sikap IV (Chinese New Year 2003) recorded an average lowest daily death is 11 and Ops Sikap III (Hari Raya 2002) recorded the highest average of 18 people a day. This also means that an average of 16 deaths a day in Ops 22 recent attitude is among the highest in the history of this program for ten years.

Simple study using the least squares method that has being run on the data for 22 Ops Sikap (2001-2010) shows the trend of the average daily mortality clearly increased, on average 5.4 percent per Ops Sikap or an average of about 10.8 percent per year.

we found that they are a relationship between the increasing in number for personal car sold and the number of killed in vehicle accident is respectively increase and this number keep increasing until today.

They are factors that cause a death in accident which is the case reported it's too late, unclear or missed communication that may lead to the wrong location. And the worst case is unreported case especially when nobody near the accident location.

All of the factor above is the main factor that play a human life as a token game where with a small mistake means death. And the mission here is to solve or to minimize the problem above with a lowest cost and minimum effort as possible.

The idea is to give a fast and accurate information to the person selected whenever the accident occur and the benchmark set is to send the information below than a minute, the accident location should already being sent for further action.

The Current technology like OnStar (Traditional Accident Detection System) will notify the responder by utilize the airbag activation and by using the accelerometer sensor. But not all vehicle is build with the system and to add on the system will cost the user.

As the Solution we try to copycat the OnStar capability on other device to give a same function. And for this project an Android Mobile is selected cause it have all the sensor needed and its doesn't require extra device.

1.2 Problem Statements

- In case of accident the time taken before the case is reported sometimes is to late
- Case location reported unclear cause missed communication that may lead to wrong location of accident.
- Nobody reported the accident because accident occur in the middle of night or nobody near the location.

1.3 Objective

- To reduce time taken for person incharge to reach the accident location
- To ensure the information given is accurate
- To act as assistance that will automatically report the accident without involving human action.

1.4 Scope

Currently this project is aiming on the vehicle user who has an android mobile phone that has built in Accelerometer and GPS sensor capabilities, because this device is the main device used to detect if the collision occur. An accelerometer is a device that has the capabilities to measure the proper acceleration. An accelerometer on a rest on a earth surface will give an acceleration value $g=9.81\text{m/s}^2$ while in the outer space the accelerometer will measure the 0 value. Another type of acceleration that can be measure by accelerometer is g-force acceleration. According to the Bureau International de Poids et Mesures, International Systems of Units (SI), the Earth's standard acceleration due to gravity is: $g = 9.80665 \text{ m/s}^2 = 32.1740 \text{ ft/s}^2$.

GPS is a Global Positioning System where it has the capabilities to communicate with the satellite to get the location in all weather condition. this device also can be manipulate to create a speedometer where it are capable to measure the speed. With this both device allow us to predict the collision.

1.5 Project Significance

This project will slightly give a huge impact after being implement all over the world and it will give the benefit to all vehicle user for those who use android mobile since this application is running on mobile device. With the function promised it will give a fast responds in any incident case. Moreover the information given is also accurate and the time taken to deliver the information could be less than a minutes, but the time for deliver the information might be depends on how good your telecommunication coverage. This application will use the build in accelerometer and GPS sensor to predict the collision and get the current location by then when it the impact is given to the device it will automatically trigger an automate system that has being develop and the system will get the accident location and send it to the predefine number. The overall impact it will slightly reduce or decrease the risk of death.

1.6 Expected Output

- This application will give a fast repond in case of accident and cause of that it will reduce the cause of death, this is slight a huge barrier compare to human responds where human are no compare to automated device that cannot be influence by environment or emotional factor that might cause a delayed. Unless if the device is completely destroy.
- This application will increase the productivity of person incharge due to fast and accurate information, for example person incharge in police control room will receive an emergency message from the user in less than a minutes and he or she can perform further action to send rescue team to the accident location.
- This application will save a lot of human life, any accident is involving human life and any delayed might cause death becasue early treatment is very important.

1.7 Conclusion

With the function provided by the system definitely it will achieve its objective as a vehicle collision detector to detect the accident and giving an accurate accident location. All of this is possible by manipulating the accelerometer sensor to measure the g-force and GPS sensor to get the current location and also to measure the vehicle speed. Then if the collision occur it will automatically trigger the SMS by sending the accident location to the selected person for example user can set the number to the police hotline number and their relative as a receiver. Even though it will not completely save the victim but it will help a lot to reduce the risk as well as increasing the chance of saved life.

CHAPTER 2

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

Collision can be clarified when moving object exert forces on each other within a very short period. This can happen with at least two objects whether both are moving or one is idle and the other one is moving. These two objects can be moving in the same direction or opposite direction.

Vehicle is a portable or mobile machine that can move and transport passengers or cargo from point A to point B. It can be divided into three categories: land, water, and air vehicle. Vehicle collision is a collision involving one or more vehicles that collide with another vehicle or other object.

Vehicle Collision Detector is an idea on how to detect any possible collision that may occur especially for land vehicle that has the highest risk of accident compare to air or water vehicle. How to measure the force that happen when the collision is occur, how to measure whether the vehicle is moving and how to get the current location to make a rescue team possible to reach the accident location within a short time. And last but not least how to avoid false detection. It a matter of how? then we find the solution of it with a minimum possible cost.

Based on research that has being done by Chris Thompson, Jules White, Brian Dougherty, Adam Albright, and Douglas C. Schmidt from Vanderbilt University, Nashville, TN USA. They stated that it is possible to use a Smartphone to detect the car accident and provide situational awareness to emergency responders. Smartphone onboard sensor like a GPS and accelerometer are capable to be manipulate and constructing such system that provide collision detection function.

2.2 Facts and Findings

2.2.1 Existing System

Currently OnStar Corporation is provide subscription-based communication where they also provide the collision sensor system. the vehicle has an electronic sensor that can predict in the event of collision, for example the accelerometer can be used to measure the G force and this device can be manipulates to do some other thing. G force is a gravity force due movement of earth. a normal G force for normal condition is 1G or 9.80665 meter per second squared (m/s^2).

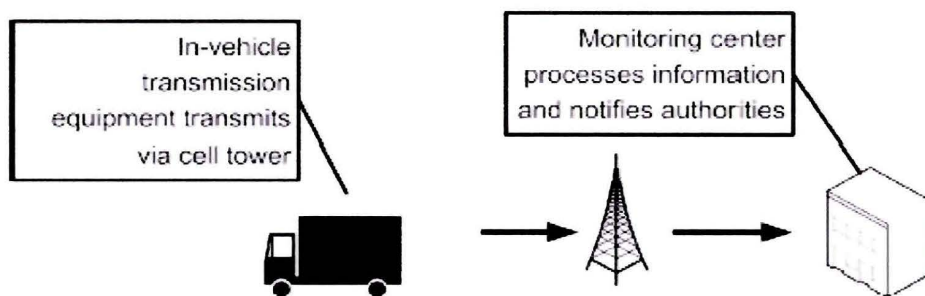


Figure 2.1 Traditional Accident Detection System

Based on the OnStar, sensor that attach to the vehicle such as airbag deployment monitor and accelerometer will detect the collision and respond to the monitoring centre by using the radio cellular. And the center will process the information and notifies the authorities.

2.2.2 Technique

The other techniques that can be used to Detect the event of accident is by using the e-Alert sensor this device is add on to the vehicle an in the event of accident the sensor will trigger the Smartphone by using the Bluetooth to prepare the SMS to be send to the preset number. It also will get the current position by using the GPS built in the Smartphone and send the event location to the selected number. But the disadvantage of using this techniques is this techniques is using the Bluetooth technology to communicate between the device and the Smartphone before the SMS is trigger. Any other wave interference might cause the Bluetooth wave lost or cut off in the middle of send the information to the Smartphone. As the conclusion this techniques still can be used but not so practical.