ACCIDENT DETECTOR THROUGH CELLULAR PHONE (RECEIVER)

LENNY ADRIENNA BINTI ADI

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Supervisor's Name : Mohd Saa'ri Bin Mohammad Isa

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For My lovely Papa and Mama

(Mr Adi Bin Pati and Mrs Hamisiah Binti Saradam),

&

My brothers and Sister,

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ABSTRACT

Since the last decade, Malaysia has experienced a remarkable period of economic expansion and growth in all the major areas. Economy and population growth bring about modern industrialization and increase volume of automobiles on the roads. The population increases at an average rate of 3% per year. For networking and easier access, better and more roads have been built, so do the number of vehicles registered has increased many folds. The increase in population and motorization has led to a significant increase in the number of road accidents, some experiencing grave fatalities. Statistics reveal that accidents are on the increase annually, where the average accident rate among cars remains high, well over 25% per month, especially on highways and trunk roads in urban areas. From the *Operasi Statik*, an operation introduced by the police to monitor and reduce the number of accidents on the road during festivals, hundreds of Malaysians died during each festival period. Many more suffered serious and permanent injuries. Very often, help arrives late because information on the accident is vague and the location cannot be identified instantly. In general, casualties can be reduced if rescue teams such as the ambulance and the police can arrive at the accident scenes quicker to render assistance. Therefore, the idea of developing accident detector software becomes essential in order to alert the service providers more prepared and to response faster. The software program, written in VB.net is developed to record whatever information transmitted by the transmitter, the sensor is installed in the vehicle that is involved in an accident. Special codes to indicate the severity of the crash will be relayed in short messages data to the base station.

ABSTRAK

Sejak dekad yang lalu, Malaysia telah mengalami perkembangan ekonomi dan pertumbuhan pesat dalam banyak beberapa bidang utama. Pertumbuhan eknonomi dan penduduk membawa kepada perindustrian moden dan peningkatannya membawa kadar pengunaan automobil di jalan raya bertambah. Kadar purata pertambahan penduduk ialah 3% setahun dan bagi tujuan perhubungan dan akses yang mudah, banyak lagi jalan raya dibina. Walaubagaimanapun, dengan penambahan penduduk dan kenderaan telah membawa peningkatan yang besar dalam bilangan kemalangan jalan raya di mana kebanyakkannya membawa maut. Statistik menunjukkan bahawa kemalangan jalan raya semakin bertambah setiap tahun di mana pada puratanya kadar kemalangan lebih dari 25% sebulan, terutamanya di lebuhraya dan jalan utama dalam kawasan bandar. Dari Operasi Statik, satu tindakan dikendalikan oleh pihak polis untuk memantau dan usaha mengurangkan bilangan kemalangan di jalan raya semasa hari perayaan. Akibat kecuaian dan sikap pemandu itu sendiri, beratus-ratus angka terkorban dan mengalami kecederaan yang parah setiap kali menjelangnya musim perayaan. Kerap kali pertolongan cermas lambat tiba kerana maklumat tentang kemalangan kurang jelas dan lokasi yang sebenar tidak dapat dikenalpasti dengan kadar segera. Secara amnya, akibat kemalangan dapat dikurangkan sekiranya ambulan atau polis dapat tiba ke tempat kejadian kemalangan dengan lebih cepat. Oleh yang demikian, cadangan membina satu perisian pengesan kemalangan menjadi satu idea yang relevan supaya dapat memberi tahu pihak-pihak tertentu untuk lebih bersedia dan bertindak lebih cepat. Program perisian yang ditulis dalam VB.net dibina untuk merekod sebarang maklumat yang dihantar oleh penghantar di mana penderianya dipasangkan pada kenderaan yang terbabit dalam kemalangan. Kod khas untuk mengenalpasti keadaan kemalangan akan di sampaikan dalam data mesej pendek (SMS).

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ABBREVIATIONS

SMS	-	Short Message Service
PC	-	Personal Computer
GSM	-	Global System for Mobile Communication
I/O	-	Input/Output
GUI	-	Graphic of User Interface
VB.Net	-	Visual Basic.Net
CLR	-	Common Language Runtime
Net	-	Networking

CHAPTER I

PROJECT INTRODUCTION

1.1 INTRODUCTION

Due to the rapid growth and increase of traffic volume on the roads, there are lots of accidents occurring especially during the festival seasons. The latest road accident statistic reveals that accidents on the road have increased annually where the average accident rate among car remains high well over 25 per cent per month especially on highways and trunk roads in urban areas. From *Operasi Statik* (which was introduced by government), it showed that hundreds of Malaysians died each year and far more victims suffered severe and permanent injuries because emergency help failed to respond in time.

Insufficient information on the nature of road accidents such as seriousness, location and victims involved resulted in emergency crew arriving late and not fully equipped with the required gears and equipment. Precious minutes and lives are lost because emergency responders cannot automatically locate the caller or to dispatch the appropriate emergency requirements. The likelihood of saving lives increases when crash victims receive medical attention within the first hour following the crash referred to as the "Golden Hour." Most deaths occur within a few hours of the automotive accident. 30% of deaths occur within minutes of the crash.

Therefore, the effort to develop a system or tool to alert the service providers to take faster action during an automobile accident is the main objective of this project. The receiver located at the base station is able to receive the short messages data of the accident transmitted by the transmitter fixed in the involved vehicle. The idea is a simple and cost effective solution where the accident can be monitored directly by the receiver. The data collected will be comprehensive and precise for the base station to relay such information to the rescue parties involved.

The software will interpret the data code received from the transmitter and the panels will display the required information such as where and when the accident has happened within the shortest possible time. This project when successfully implemented will benefit the people and a feasibility study can be conducted to implement such an accident detector technology in this country.

1.2 OBJECTIVES

For the project to be a success and to be implemented, the following objectives have to be achieved in the first place:

a. To design, develop and deploy an accident and notification of Alert System.

b. To design the programming using Vb.net Software and create the database of Accident and Detector.

c. To acquire the necessary data such as time of accident, location, nature of accident, which part of the vehicle is affected and others to the service provider immediately.

d. To successfully display the relevant information of the user and action taken based on the received accident data via SMS.

1.3 SCOPE

The scopes of this project will be guided by project objectives listed above to ensure the project is conducted according to schedule. The scopes include:

a. Develop the user interface in Vb.net software and the layout of interface consists of data tabulated in three columns. The first column shows the received data from SMS, which consists of ID phone number, location, time, date, accident type, accident level and accident description. The second column is for personal data and last column is for the appropriate action to be taken for a particular accident.

b. Create the database of the user using Microsoft Access 2003 and then link with interface in Vb.net. These databases are developed which is user friendly and easy to be used with the software.

c. The software then communicates (process in programming coding) between GSM modem and serial port to PC to display all the data send to receiver.

d. Using Vb.net, all the data received in bit code have to be converted first to the readable information before it can be displayed. The data then will be displayed with the information and action to be taken after receiving the data from the transmitter cellular phone.

e. Finally, the warning or alert call will be sent to the service provider about the mishap.

1.4 PROBLEM STATEMENT

Some lives could have been saved if help comes early during a serious accident involving automobiles. In Malaysia, fatalities caused by accidents are among the highest in this region. Vehicle accidents can take place any time and any place, be it on the highways, trunk roads or streets. But the serious ones are normally those that happen on the highways and trunk roads as the vehicles on such roads are moving at top speed and the impact results in serious injuries or death. Very often, the victims do not experience instant death but die later due to injuries such as excessive loss of blood that are not attended instantly. A system that can transmit information about an accident to the service providers such as the ambulance or rescue 991 in the shortest possible time will definitely save some lives in some accidents.

This project is to develop an accident detector system via the mobile phone where it automatically detect an accident and convey a car crash and location through a communication device to a designated service centre. In addition to automatic detection, it is possible to allow the service provider on manual request assistance.

While developing this program, a few problems were encountered. There is no auto-dial system to react fast system if the crash is a critical accident. After some studies on this project, some problems and solutions were figured out;

a. Writing programs to allow the components to communicate with each other from receiving signal from GSM and from serial port at computer.
b. Making sure the data bits that represent in transmitter can be read during receiving signal which is representing the types, levels, location of crash and the number phone of the user to display the database of user.
c. Be able to pop-up the data immediately from cellular phone through interface of Main Display at Vb.net software.
d. To link and synchronize the data from transmitter and receiver.

1.5 SYSTEM OPERATION

The goal of this project is to design and developed the Accident Detector System through cellular phone. It will involve the receiver section of the system. When an accident occurs, the service provider will receive a message or information that is sent through the cellular phone and the system will immediately give an **ALERT** message.

It is possible to display the phone number of the user, the level and types of crash, time, date, and their location with automatic notification of the crash to provide immediate emergency response by the service provider to call the police station, ambulance, fire station and their relatives for fast action to be taken based on type and seriousness of the crash.

The VB.net software is used to develop the interface user and to program the data between GSM modem and the serial port to PC. The final part of this project will display the information on the accident that consists of received data from SMS, the personal data and the action to be taken for an accident. All the information and data are stored using Microsoft Access 2003. After completing the program, the software then display on the PC and tested using GSM modem whether the data can be read while the data is transmitted. The overview of this project is shown in Figure 1 below;

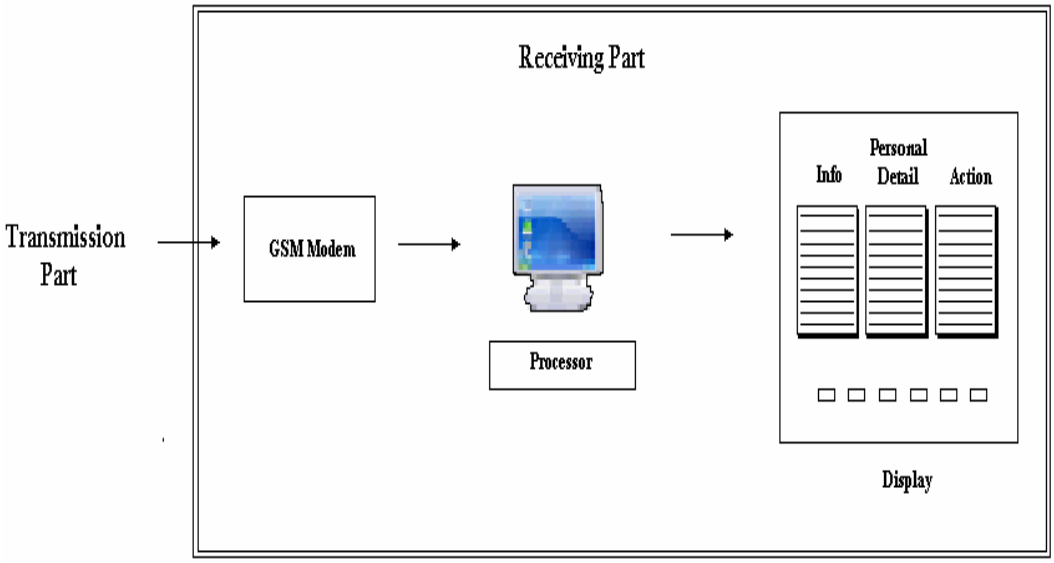

Figure 1.1: Overview of Receiving Part of Accident Detector System

1.6 THESIS STRUCTURE

This thesis is divided into five chapters that include the main idea of the project and discussion for the reader to understand the whole idea of the project. In Chapter 1, it reviews the general ideas of the project and shows the importance of the case study based on the various related topics. The project will be pursued along the set objectives, scope of work and various aspects to meet the objectives.

Chapter 2 deals on the literature review which are used to describe the perspective of the project and the methods being used to implement on this project. All the related ideas are used to be consistent with the theory and principles to ensure the project is in the right track and as scheduled.

In Chapter 3, it discusses on the project methodology. This chapter covers all the methodology being used, collecting the related data and analyzing the data to process the data in order to make this the project a success.

For Chapter 4, it consists of all the development, implementation and results obtained. It covers the overall performance, analysis and achievement of the project.

Chapter 5 is the last chapter where it contains the discussion, conclusion and future development of the project. At the end of this chapter, it also covers on some discussions and proposal for this project to be pursued further to ensure that the system works as desired.

CHAPTER II

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter will include all the data, which focuses on the basic concepts and theories that need to generate the main idea to develop the initial system. Besides that, it also contain the data required to develop and implement the project.

2.2 THE CONCEPT OF PROJECT

A vehicle collision can occur any time, but not every vehicle on the road is equipped and ready to notify the authorities in case of an accident. The Accident Detector System is a portable and universal solution that allows the system to notify the service provider automatically that an accident has happened. Time is spent on the analysis and feasibility studies on the project, research and case study narrows down to three following units:

a. Detection

i. The pressure sensor that mounted on the vehicles will be used as detector. Once an accident occurs, the output is send into the processing unit by RS-232 serial link from GSM to PC via SMS from transmitter