

AUTOMATIC ACCIDENT DETECTOR AND NOTIFICATION

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Date :-.....

Special dedicate to my beloved family, my kind hearted supervisor En. Mohd Sa'ari Bin
Mohammad Isa and to all my dearest friends.

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ABSTRACT

Over the past decade, Malaysia has undergone rapid economic development and growth in many areas. Economic and population growth led to the modern industrial and automobile usage rate of increase has brought on the road increases. The average population growth rate is 3 percent a year and for connectivity and easy access, roads are built. However, with increasing population and vehicles has brought a tremendous increase in the number of road accidents in which mostly fatal. Statistics show that road accidents are increasing each year in which the average accident rate more than 25 percent a month, especially on highways and main roads in urban areas. From static operation, an action conducted by the police to monitor and attempts to reduce the number of accidents on the road during the festive. Driver's negligence and attitude itself, hundreds of figures killed and seriously injured each forthcoming festive season. Aids often arrive late because the information about the accident is not clear and exact location could not be identified immediately. In general, the injuries sustained from the accident could be reduced if the ambulance, fire and rescue or police could arrive to the scene of the accident quickly. Therefore, the proposal to establish a system crash sensors become a relevant idea that can notify certain parties to better prepare for and respond more quickly. Software program written in Microsoft Visual Studio is built to record any information that is sent by the sender where detection method installed in a vehicle involved in an accident. Special code to identify the accident data will be presented in a short message (SMS).

ABSTRAK

Lebih sedekad yang lalu, Malaysia telah mengalami pembangunan ekonomi yang pesat dan pertumbuhan di dalam banyak bidang. Pertumbuhan ekonomi dan penduduk membawa kepada industri moden dan kadar penggunaan kereta meningkat dan telah membawa kepada peningkatan jalan raya. Purata kadar pertumbuhan penduduk adalah 3 peratus setahun dan untuk penyambungan dan akses mudah, jalan raya dibina. Walau bagaimanapun, dengan penduduk yang semakin meningkat dan kenderaan telah membawa peningkatan besar dalam bilangan kemalangan jalan raya yang kebanyakannya membawa maut. Statistik menunjukkan bahawa kemalangan jalan raya yang semakin meningkat setiap tahun di mana kadar kemalangan purata lebih daripada 25 peratus sebulan, terutama di lebuhraya dan jalan-jalan utama di kawasan bandar. Daripada operasi statik, tindakan yang dijalankan oleh pihak polis untuk memantau dan cuba untuk mengurangkan bilangan kemalangan di jalan raya semasa perayaan. Kecuaian pemandu dan sikap sendiri, beratus-ratus tokoh terbunuh dan cedera parah setiap musim perayaan akan datang. Pasukan kecemasan sering tiba lewat kerana maklumat mengenai kemalangan itu tidak jelas dan lokasi yang tepat tidak dapat dikenal pasti dengan segera. Secara umum, kecederaan akibat kemalangan itu dapat dikurangkan jika ambulans, bomba dan penyelamat atau polis boleh tiba ke tempat kejadian kemalangan dengan cepat. Oleh itu, cadangan untuk menubuhkan sebuah system pengesanan kemalangan menjadi satu idea yang berkaitan yang boleh memberitahu pihak-pihak tertentu untuk lebih bersedia dan bertindak dengan lebih cepat. Program perisian yang ditulis dalam Microsoft Visual Studio dibina untuk merekodkan apa-apa maklumat yang dihantar oleh penghantar di mana kaedah pengesanan dipasang di dalam kenderaan

yang terlibat dalam kemalangan. Kod khas untuk mengenal pasti data kemalangan akan dibentangkan dalam pesanan ringkas (SMS).

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Chapter 1

INTRODUCTION

1.0 Introduction

The statistic of transport ministry of Malaysia [1], the rapid growth and increase traffic on the highway accident rate increased every year especially during the festival seasons. From [2] after the feast show that 19 person died each day and from the 5 years record show 17 died per day regardless of whether weekdays or weekends. It shows that thousands of road users in Malaysia died each year and more victims suffered severe and permanent injuries due to the emergency help failed to respond in time.

Insufficient information on accident such as seriousness, location and victims involved resulting in emergency crew arriving late and not fully equipped with the required equipment and tools. Each minute of this information's are very useful to expend a preparation for emergency requirement which will save live for an accident

victims. The possibility of saving lives increase when crash victims receive medical attention within the first hour [3]. Most accidental deaths occur within a few hours of the automotive accident. 30% of death occurs within minutes of the crash [3].

Since the early information is the essential tools about of saving process, the effort to develop can be done to alert the service providers to take faster action toward an accident. In this project automatic accident detector and notification is a project to inform the owner or related trough SMS to a mobile phone. A technology to automatically detect the vehicle crash and then provides dispatcher with information about the crash event for the information about the level the accident will be developed the precious accident time, location and severance will be collected and conveyed to the central for relay such information to the rescue parties involved.

For nowadays technologies, some of company in Malaysia has developing GPS system which can protect their consumers from vehicle thief. The Captor-GPS is one of the products made from Netstar Advanced System (M) Sdn. Bhd that provide the consumers latest GPS tracking system for locating consumer vehicle when there are theft activities occurred. If violation is detected, SMS alerts will be sent to up to 2 mobiles. The Owner will confirm theft activities and notifies CAPTOR's 24 hour Call Center. The CAPTOR Recovery Teams dispatched to recover stolen vehicle. [4]

This project was designed to be easily installed in vehicles had an accident. The design integrated a collision sensor, GPS receiver, microcontroller (PIC), global system mobile (GSM), cellular communication equipment (mobile) and the software will be developed using visual basic and C++. Whenever an intense collision occurs, the detector or sensor mounted on the car will send the signal to PIC controller for data to be proceeding through PIC interface. The accident data will be transmitted to service

provider in the form SMS then will be transmitted to the service provider whose will take the necessary action according to accident indicator.

The process that required to be success and to be implemented in this project is how to design, develop and deploy an accident and notification to service provider. This project also needs to understand about software been involved in this project such as PIC C Compiler and Visual Basic. The needed to learn and practicing technical skills to overcome problems occurred in implementing the project are been addicted. This project also needs to analyze the system performance for project goal achievement confirmation by comparing it to the theoretical or expected results (analytical skill).

1.2 Objective Project

The main objective of this project is to design, develop and deploy an accident detector and notification system. To design it need to understand the microcontroller characteristics of this system and know to develop the software that being running on this project which is PIC C compiler (CCS) and Visual basic. Moreover it must be learn and practice technical skills to overcome problem occur in implement the project.

1.3 Problem Statement

Automatic accident detector and notification is a project which could give assurance for user when interfacing with an accident. This idea was acquired after intensive observation based on the accident statistics from ministry of transport Malaysia and local or international news nowadays which reveals highway accident case with higher death cases. The system providing a location, accident condition, time, and user

phone number to service provider such as 999 rescue squad, ambulance and any related of it.

While developing this project, a few problems were encountered. One of it is no auto-dial system to react fast system if the crash is a critical accident. This situation needs to be noticed because the system will interface on accident and the severity of accident must equally concern to protect the system from critical damage.

One of the problem is the system cannot use at the place with no network coverage. Since the communication by using an SMS, The best telecommunication provider need to be choose to get the better coverage for the system.

1.4 Scope of Work

The aim of this project is to develop a prototype with collision sensor. This project is using a collision detector as input and process the input using microcontroller. The microcontroller will decide the severity of accident and send to service provider by SMS to make an action. GPS receiver will give a longitude and latitude of the accident location to inform the location for service provider. This project is to alert the service provider and to receive fast information about the accident once it's happen to their client. Figure 1.1 shows scope of work for this project.

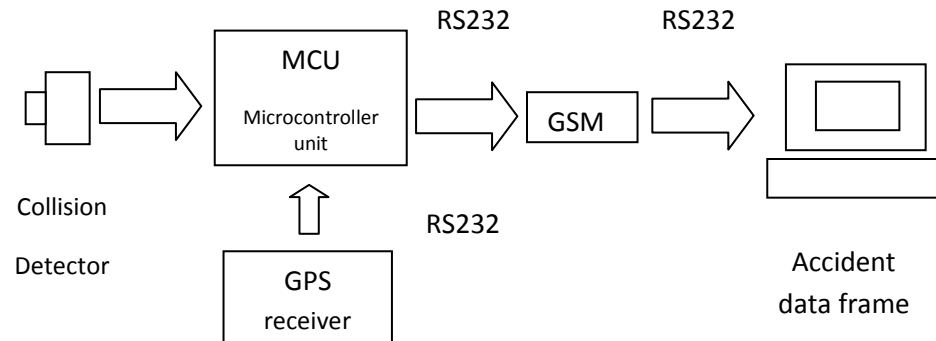


Figure 1.1: Scope of work diagram

Block description:

1. Collision detector : To detect the level of collision and send to MCU
2. GPS Receiver: Detect the time, date, longitude and latitude of the accident location. The Recommended Minimum Specific (RMC) NMEA protocol for U-Blox 6 GPS module been selected.
3. Microcontroller Unit (MCU):
Processing unit that received input signal from sensor and GPS Receiver then it will continually storing in the buffer (RAM or data storage) and process it to get the output desired. The output will be sending the result via using GSM modem.
4. GSM: GSM modem is a device that sending and receives the information by SMS. The AT commands are required to sending and receive the SMS.
5. RS232: Is an asynchronous serial communication method which is sending the information one bit at a time. GSM modem and GPS receiver are required RS232.
6. PC: will receive the information from the MCU via SMS. The GSM modem will receive the SMS and send the information by RS232. Visual Basic. Net will be an interface for service provider to collect the information about the accident.

1.5 Software Simulation

There are four different types of software used in this project. HyperTerminal software is software that can be used to send and receive the SMS. The AT command set is used for this purpose. The second one is for microcontroller programming. CCS Compiler software is used to write the code for microcontroller programming. The programming of the microcontroller is done in C language. The AT command set also include in this software for sending data about the severity of collision together with the location and time by SMS.

Proteus Design Suit 7 is software to help designing circuit and simulation into design environment. It include with ARES to design in printed circuit board (PCB) layout. For simulation it can be done when the .hex file from CCS Compiler been imported to the microprocessor (PIC). Lastly, Microsoft Visual Basic software to developing accident data frame which is to develop console and graphical user interface application for showing the information data from SMS along with Windows Forms application.