UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF ALCOHOL DETECTION IN VEHICLE WITH GSM MONITORING

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

by

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TAJUK: **Alcohol Detection In Vehicle With GSM Monitoring**

SESI PENGAJIAN: **2016/17 Semester 1**

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APPROVAL

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

.....

(Project Supervisor)

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ABSTRAK

Tujuan utama projek ini adalah untuk menghasilkan sistem bagi melaksanakan sistem pengesanan alkohol yang berkesan sebagai langkah berjaga-jaga untuk mengelakkan kemalangan. Memandu dalam keadaan mabuk adalah salah satu masalah besar di setiap pelusuk negara. Pada tahun 2009 sahaja, lebih 10, 000 kemalangan trafik dikaitkan secara langsung kepada pemandu yang mempunyai tahap alkohol melebihi had undang-undang. Ini boleh menjadi sebab utama kemalangan. Oleh hal yang demikian, ia keperluan suatu sistem yang berkesan untuk mengelakkan kemalangan kes berdasarkan memandu di bawah pengaruh alkohol. Dalam projek ini, pada mulanya ia memeriksa sama ada orang itu telah mabuk atau tidak dengan menggunakan sensor gas MQ-3. Dalam sistem ini, sensor disambungkan kepada mikropengawal Arduino Uno. Untuk tujuan ini, saya telah merancang sebuah sistem apabila kepekatan alkohol dikesan melebihi had, enjin kereta tidak akan boleh hidup dan maklumat yang berkaitan lokasi kedudukan kenderaan tersebut akan dihantar melalui GSM kepada keluarga atau saudara-mara mereka.

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ABSTRACT

The main aim of this project is to design an embedded system for implementing an efficient alcohol detection system which as a precaution to avoid an accidents. Drunk driving is a big problem in every part of nation. Between 2010 and April 2015, there are over 1, 000 road accidents were linked directly to drivers who had alcohol levels above the legal limit which resulted 618 deaths. Thus, it is required an efficient system to avoid accidents cases due to drive under the alcohol influences. In this project, at initially, when the driver start vehicle engine ignition,MQ-3 gas sensor will automatically active, and it will checks whether the person has drunken over limit or not. In this system, sensor is connected to microcontroller Arduino Uno. I have develop a system at when alcohol concentration is detected above the limit, the vehicle engine will not be able to start and the position information related to the location of the vehicle will be sent via GSM to their family or relatives.

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DEDICATION

Alhamdulillah, thanks and praise to the Almighty Allah S.W.T

This thesis is dedicated to:

My dearest family,

My Parents,

My Supervisor,

My Lectures

And all my friends

Thanks for their encouragement and support

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ACKNOWLEDGEMENT

Alhamdulillah, thank you Allah because of His blessing, I finally complete and finish my final year project successfully.
In order to complete my thesis objective, I have do a lot of research either by using internet, reading past year thesis, reference books and journal. By some guidance, support and encouragement from peoples around me, I finally complete the project in the time given. Here, I want to give credit to those who helped me to achieve what I had achieved in my final year project.

I would like to express my sincere, appreciation and also respects towards my project's supervisor, Mr.Ahmad Nizamuddin bin Muhammad Mustafa for his kind, encouragement and suggestions. Without his support and interest, my project would not be like what it likes today. May Allah bless and reward him for his sincere, attempt and commitment in the way of knowledge.

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Thank you to all lecturers, staffs, friends and all who has directly and indirectly involved on this project. Your helps and cooperation will never be forgotten. May Allah bless and reward them for their sincere, endeavour and contribution in the way of knowledge.

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LIST OF ABBREVIATIONS AND NOMENCLATURE

GSM	=	Global System Mobile
GPS	=	Global Positioning System
SMS	=	Short Message Service
BAC	=	Blood Alcohol Concentration
OS	=	Operating System
UMTS	=	Universal Mobile Telecommunication System
TTL	=	Transistor Transistor Logic
UTC	=	Universal Time Coordinated
GNSS	=	Global Navigation Satellite System
ETSI	=	European Telecommunication Standards Institute
UMTS	=	Universal Mobile Telecommunication System
SS	=	Switching System
BBS	=	Base Station System
OSS	=	Operation and Support System

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CHAPTER 1
INTRODUCTION

1.1 Project Introduction

Driving while intoxicated is one of the major issues in every part of the country. Between 2010 and April 2015, there are over 1,000 road accidents cases were linked straightforwardly to drivers who had blood alcohol levels over the legal limit which have resulted 618 deaths. Many accidents happen due to the carelessness on the part of driver.

For such purpose, I have designing a suitable system for alcohol detection. This system will detect the content of alcohol concentration in the driver's breath and thus it probation to prohibit alcoholics. The detection of the sensor is straightforwardly corresponding to the content of alcohol consumed. For the time being, the alcohol sensor play a noteworthy part in our society and it has incomprehensible applications. This sort of sensors in vehicles is a great safety factor which can be installed in the steering of the vehicles.

1.2 Problem Statement

Drunken drivers have increased very largely and so are the deaths and accidents due to drunken drivers. Those accidents could have been kept away if the intoxicated driver hadn't been able to turn their car on. Driving during drunk can causes the alcohol lowers inhibitions thus driver had difficulties to think rationally and that become drunk driver still want to drive the vehicles.

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Another issue, when the drunken drivers drive alone, nobody will give warning to them. That will be the primary problem because the drunk drivers always drive alone particularly during late night with unconsciousness situation and they loss their rationalism.

Another problem is drunken driver itself choose not to follow any safety. That mean either drunken driver itself will follow or not the procedure if any safety systems have been implemented in their vehicles. After that it is all depend on driver itself to choose what action driver suppose to be taken. They still choose to drive even they know the dangerous of driving during drunk.

Therefore, Alcohol Detection in Vehicle with GSM Monitoring project is designed to create the safety of the driver and people seating inside the car. This project has a system which have alcohol sensor to detect alcohol in drunk drivers' breath and automatically locks the engine of the vehicle if drivers is consumed drink alcohol above the limit. At the same time, an SMS along with the location of the vehicle is send to the selected contacts especially family and relatives.

1.3 Project Objectives

The objectives of this project are stated below:

i. To study the mechanism of alcohol detection
ii. To develop alcohol monitoring system in vehicles and GPS tracking system
iii. To analyze the monitoring system and GPS, GSM feedback

1.4 Project Scope

The scope is specified to insure this project system is conducted within its proposed limit. Scope is useful to make sure the project is flow in the correct direction to accomplish the objective. The main focus on this project is to apply what

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already learn about Alcohol detection system framework. In order to achieve the objective of this project, there are several scopes has been shortlisted.

a) The basic concept of Alcohol Detection System
b) The sensing system including the alcohol sensor,MQ3
c) The basic GSM and GPS working system

1.4.1 The Basic Concept of Alcohol Detection System based on Arduino

In this project, the sensing system consists of an Alcohol Sensor; MQ3. For this system, alcohol sensor circuit is utilized to check whether the alcohol was consumed by driver or not. To this end, system created such that when alcohol concentration above limit is detected, the vehicle will be cannot started, therefore the related information will go to nearby location through GPS and intimating it to their parents or relatives through GSM. The microcontroller requires software design which including some coding.

1.4.2 The Basic GSM and GPS Working System

GSM and GPS based vehicle location and tracking system will give effective, real time vehicle location, mapping and reporting this information value and includes by enhancing the level of service provided. GPS will detect the location of vehicle while, GSM will send the location of vehicle via message to selected contact.

1.4.3 The Microcontroller Used to Program Alcohol Detection System

The suitable software to implement this project is Arduino microcontroller. Arduino can be used to design the coding for sensor, GSM also GPS. It is used processing language. The Arduino software is also perfect microcontroller due to its high performance, simple and special features. It

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does not need any OS and software applications to run, it simply need to compose a few lines of code to make it use.

1.5 Project Methodology

The construction of this system consists of two sections which are hardware development and software development. Hardware development involved the designing the project circuit. While the software developments are focused on circuit simulation before test to the real components and also designing coding to be embedded in the hardware.

Alcohol detection in vehicle and GSM monitoring system includes several parts as follow: Arduino, alcohol sensor, motor, GSM, and GPS. The block diagram of this system is shown as below;

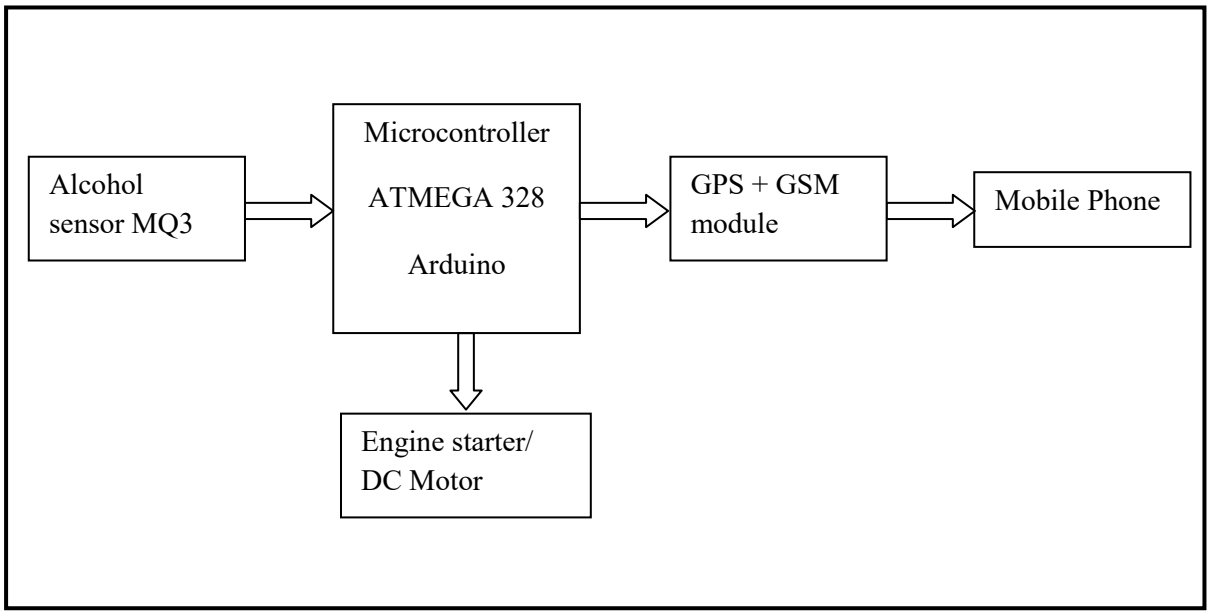

Figure 1.1: System block diagram

At the point when the driver begins the vehicle ignition, sensor will active and measures the content of the alcohol in driver's breath, thus system automatically switches off the vehicle engine if the driver drunk at above limit. At the same time, related information will go to nearby location through GPS and intimating it to their parents or relatives through GSM.

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CHAPTER 2
LITERATURE REVIEW

2.1 Overview

This project depends intensely on the utilization of Alcohol detection sensor, MQ3 and both GPS receiver and GSM modem. This chapter will start with an overview of the Alcohol Detection System explaining about how the system working from previous research. Furthermore, details about Tracking System and how the location tracking device will be explored.

2.2 Alcohol Detection System (Previous Research)

The concept of alcohol detection system was starting when the driver start the vehicle ignition, automatically system will check whether the person has drunken over limit or not by using the MQ-3 gas sensor. In this system, sensor circuit is used to detect whether the alcohol was consumed by driver or not. To this end, they have designed such a system that when alcohol concentration is detected then car will be stopped and the related information will go to nearby location through GSM. (Version et al. 2014)

The project is developed by integrating the alcohol sensor with the microcontroller 16F877A. The alcohol sensor used in this project is MQ-2 which to detect the alcohol content in human breath. An ignition system which will produce spark plugs is build up as a prototype to act like the ignition starter over the vehicle's

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engine. The ignition system will operate based on the level of blood alcohol content (BAC) from human breaths detected by alcohol sensor. (Vaishnavi et al. 2014)

From the above literature review about alcohol detection system, I can found there has some different alcohol detector used, that is MQ-2 and MQ-3 gas sensor. To recognize the most suitable alcohol sensor, I have made summarize on these two different alcohol gas sensors.

Table 2.1: Comparison of gas sensor

Sensor Type	**MQ-3 Gas Sensor**	**MQ-2 Gas Sensor**
Sensitive Gas	Alcohol, Ethanol	Combustible gas and smoke (butane, propane, methane, alcohol, hydrogen, smoke)
Concentration can be detected	• 0.04-4.0 mg/l	• 0.3-1.0 mg/l
Applications	Car alcohol alarm system	Industrial combustible gas detector

There have quite some differences in sensitive gas and concentration between MQ-2 and MQ-3gas sensor. The sensitive gas for MQ-3 is alcohol and ethanol. Otherwise, MQ-2 focused on combustible gas and smoke such as butane, alcohol, and others. Mostly, each of alcohol that causes intoxicated contains ethanol. Therefore, the suitable gas sensors for this system are MQ-3 gas sensor. For the concentration that can be detect, the MQ-3 is more sensitive, it can detect in a wide range; 0.04 to 4 mg/l concentration of alcohol. Whereas, the MQ-2 gas sensor only can detect in between 0.3 to 1 mg/l of combustible gas and smoke.

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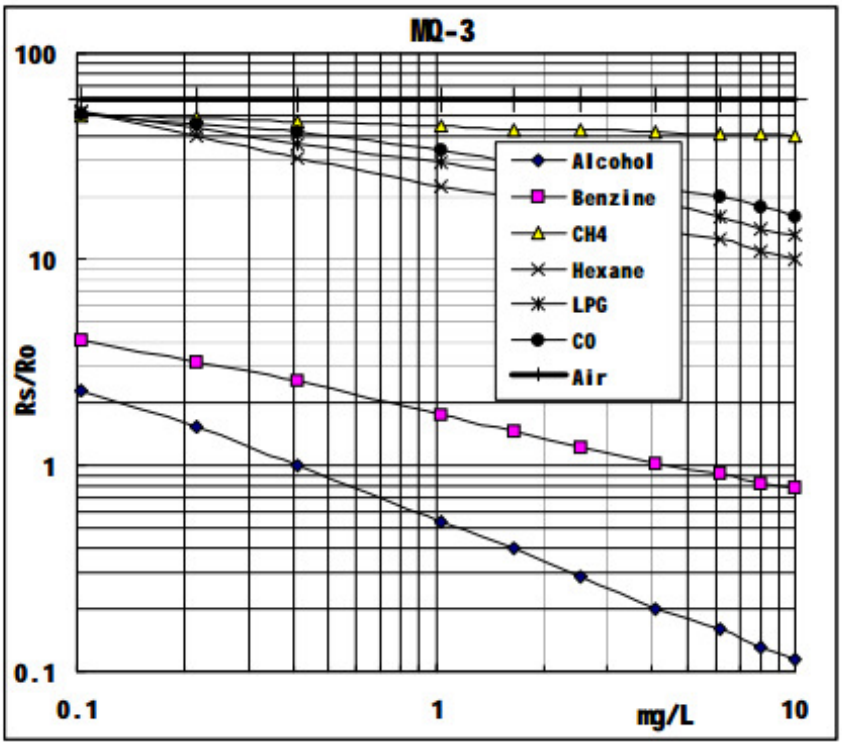

Figure 2.1: MQ3 sensitivity characteristics

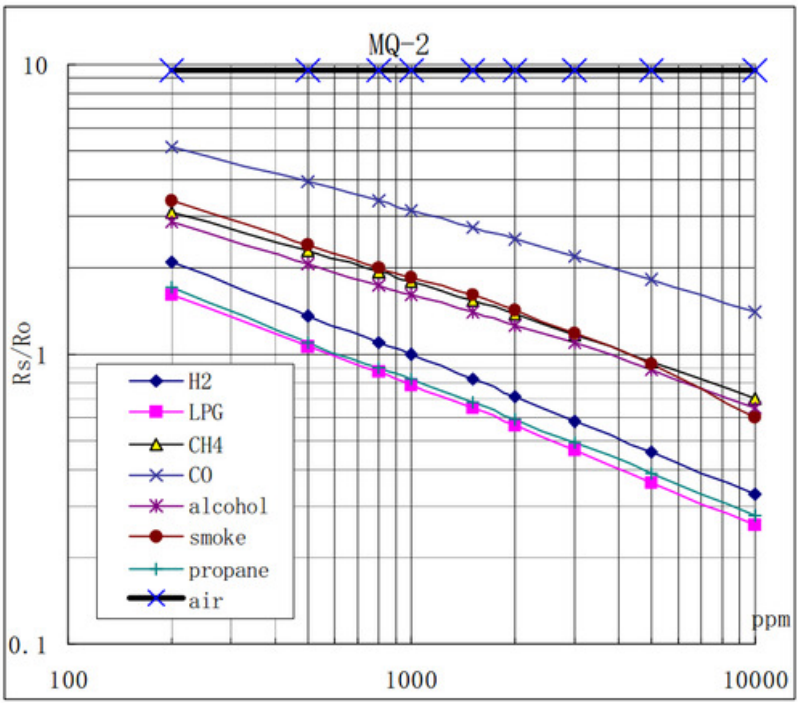

Figure 2.2: MQ2 sensitivity characteristics

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Both the figures above shows the typical sensitivity characteristics of the MQ3 and MQ2 gas sensors. Ordinate means resistance ratio of the sensor (Rs/Ro). Rs refer to resistance contains in different gases; while, Ro means resistance of sensor in 0.4mg/l alcohol for MQ3 gas sensor, while 0.3mg/l alcohol for MQ2 gas sensor.

From the figure above, the MQ3 has high sensitivity to alcohol gas compared to liquid petroleum gas (LPG) such flammable mixtures and other gas tested. Otherwise, the MQ2 gas sensor has good sensitivity to liquid petroleum gas followed by propane, hydrogen and alcohol. Thus, the MQ3 has good sensitivity to alcohol gas compared to MQ2.

2.3 Tracking System

For a long time, people has been searching for an accurate navigation system and positioning methods to allocate their location. The Global Positioning System (GPS) is the best system in accuracy for positioning searching. The United States Department of Defence runs this freely available and highly accurate positioning system. This section will explain an overview and background of GPS also the longitude and latitude coordinate system used in this project.

2.4 Global Positioning System (GPS)

To track the location of the user, it used the SKM58 GPS module. The GPS module is likely GPS receiver, which has capabilities such as maps, including street maps, directions fed directly to an autonomous vehicle, traffic congestion maps and others. (Bhuta et al. 2015)

For location tracking also used GPS with Tiny GPS module receiver. The Tiny GPS also can detect the location precisely in static or moving condition. Otherwise, this type of GPS receiver slightly difference compared to SKM58 GPS receiver. (Ramju 2015)

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