UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF ALCOHOL DETECTION SYSTEM WITH VEHICLE IMMOBILIZATION

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electrical Engineering Technology (Automotive) with Honours.

by

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ABSTRACT

Drinking alcohol and driving a car in a drunken state can result in loss of life. The development of the system is to prevent such cases from happening. The system works by monitoring the driver's breath and is located at the car steering or dashboard so that the monitoring process is accurate and continuous. If the driver is found to be in a drunk condition while trying to drive the car, the sensor will detect alcohol presence in the driver's breath and the system will simultaneously turn off the engine system to prevent it from starting the car. In another situation, if the car engine is already in a running condition and the driver is drink the alcohol while he is driving, the alcohol sensor will detect the presence of alcohol and stop the car from keep running and alert the driver to pull to the roadside. The system that is used are an Arduino Uno as a microcontroller, alcohol sensor (MQ-3) for the sense of the alcohol presence, Liquid Crystal Display screen(20x4) and a direct current motor to show the engine system of the car in the demonstration. With the completion of this project, it is expected that the car engine system is turned off within five seconds when alcohol is detected in the driver's breath and the system is safe to be implemented as a safety measure in every vehicle

DEDICATION

The development of this project is wholeheartedly to my beloved parents Mr. Sallleh and Mrs. Faizah, who have given me the strength when I was thought of giving up on this project, there was continually provide me their moral support and financial support.

Furthermore, to my sibling, mentor, and classmate who had shared their opinion of advised to me for this development of the project and encouragement me to this development of project until success.

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LIST OF ABBREVIATIONS

PCA	Principal Component Analysis
LED	Light Emitting Diode
CPU	Central Processing Unit
GPS	Global Positioning System
GPRS	General Packet Radio Services
LCD	Liquid Crystal Display
API	Application Programming Interface
SVM	Support Vector Machine
EtG	Ethyl Glucuronide
GSM	Global System for Mobile
RAM	Random Access Memory
I/O	Input Output
ROM	Read Only Memory
ADC	Analog Digital Converter
AVR	Advanced Virtual RISC
BDP	Bachelor's Degree Project
PSM	Projek Sarjana Muda
USB	Universal Serial Bus
DC	Direct Current
2WD	2Wheel Drive

CHAPTER 1

INTRODUCTION

1.1 Background

Drinking alcohol and driving a car in a drunken state can result in loss of life. The development of the system is to prevent such of the cases happen. The system will always monitor the driver breathing by placing it on the steering car or dashboard that will always monitor by the sensor. If the driver is found in drunk condition and still want to drive the car, the sensor of alcohol will detect alcohol presence in the breath and stop the engine system to prevent it from start the car.

In another situation, the engine system can start the car and the driver is drink the alcohol while he is driving, the alcohol sensor will detect the presence of alcohol and stop the car from keep running and alert the driver to pull to the roadside. The system that is used are an Arduino Uno as a microcontroller, alcohol sensor (MQ-3) for the sense of the alcohol presence, Liquid Crystal Display screen(20x4) and a direct current motor to show the system of the car in the demonstration. The alcohol sensor (MQ-3) is used to detect and monitor the breath of the driver and constantly sends the signals output in analog reading to the Arduino.

The Arduino microcontroller receive of alcohol analog signal from the alcohol sensor, the Liquid Crystal Display will show the value of alcohol reading detection as a note on Liquid Crystal Display screen, the buzzer will sound and also stops the direct current motor and the Red LED will blinking to show the immobilization of the engine

locking. In this project also use a two-push button, the green is to start run the motor to demonstrate the engine system running and the red is to stop the motor and reset the system. When the presence of the alcohol is detected before the push button is pressed, the motor does not run this is called engine interlocking. When the presence of the alcohol is after the motor running, the motor will immediately stop slowly.

1.2 Objective of project

1. To design and develop of alcohol sensor detection system with Arduino microcontroller.
2. To develop alcohol detection system with immobilization vehicle.

1.3 Statement of the Purpose

I proposed a project system that would be constantly monitoring the breath of the driver by placing the sensor on the steering wheel or dashboard of the car to make sure the blow of the breath is near to the sensor. When the driver try to drive the car in high alcohol condition, the sensor will detect the presence of the alcohol and it will send the signal to the system to stop the ignition system from the car is started and alert the driver that he is in drunk condition.

In another situation, the driver is not drunk before the engine was started, but the driver drinks the alcohol during driving. The sensor will detect the breath of the driver and will alert the driver that he is in drunk and the sensor will send a signal to the system to slowly stop the engine of the car and pull at the road side.

1.4 Problem Statement

Nowadays, we usually known in many cases of accident in the Malaysia's road is from the driver is in the drunk condition. The driver was drinking the alcohol and the alcohol reading in their body is in the higher level. But their instead want to drive the car. This will cause an accident with injured or death. When the driver drinks the alcohol, he will be unconscious for the five or ten minutes after drinking the alcohol because the alcohol in the blood cell is high. They will also be in uncertain mood and the ability to think critically. In Malaysia, many accidents from the driver in alcohol condition causes a death.

1.5 Scope of project

This project is a combination equipment of the hardware tools and the software part. For the hardware tools components is Arduino (UNO) as a microcontroller, LCD display (20x4), light emitting diode (LED), buzzer, moto driver, dc motor, CPU fan and alcohol sensor (MQ-3). The software parts are the Arduino apps, this software is to write the programs to operates the system. The function of the Arduino (UNO) as a microcontroller is to process the program that have been coded using the Arduino app to the operation of the output components. The alcohol's sensor (MQ-3) is used to monitoring the detection of the alcohol's level in the surrounding. When the alcohol reading is in drunk condition, the buzzer will be triggered for driver alert. The LED will show to stage, normal stage (green light) and drunk stage (red light). The LCD display is used to show the value of the alcohol and the CPU fan will powered up to demonstrate the blower. GPS GPRS SIM 808 is used as a send of alert message with real-time tracking

system of the location in state of the longitude and latitude to the authorized user to inform the driver is drunk.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this chapter, I want to discuss about the meaning of Alcohol and effect of the alcohol on the human body in detail. This chapter also discuss about overview of existing systems, microcontroller in general and alcohol sensor technologies. Furthermore, there are a some of the past works presented that is related to, article and journal that related to this project that will be discuss too.

2.1.1 Alcohol

Alcohol mixture of compound that have at least one of the hydroxyl functional group to a saturated carbon. The alcohol's term was referred to the primary alcohol ethanol, which is the main alcohol's present in alcoholic beverages.

2.1.2 Effect of alcohol in human body

Alcohol is very quickly absorbed around the body in the blood stream to all parts of the body. Alcohol stays circulating in the blood until the liver can break it down. In the liver, liver filters blood and breaks down the alcohol to the water, carbon dioxide and products the body uses for energy.

The average rate liver can only break down alcohol at an of one drink per hour. The kidney filters the blood and balance the amount of fluid in the body and remove wastes form into urine. Alcohol makes the kidney work harder and they produce more urine up to 10% of alcohol leaves the body in the urine.

A very high alcohol in the body can cause to slow the breathing system, loss of consciousness. Some alcohol particle is evaporated from the blood through the lungs into the breath respiratory system.

Alcohol can be absorbed through the skin. Alcohol passes though the placenta from the blood's mother into the unborn baby. The baby is exposed to the same blood alcohol levels but cannot break it down like the mother can. Drinking alcohol at any stage of pregnancy can affect developments of the baby and have life-long effect.

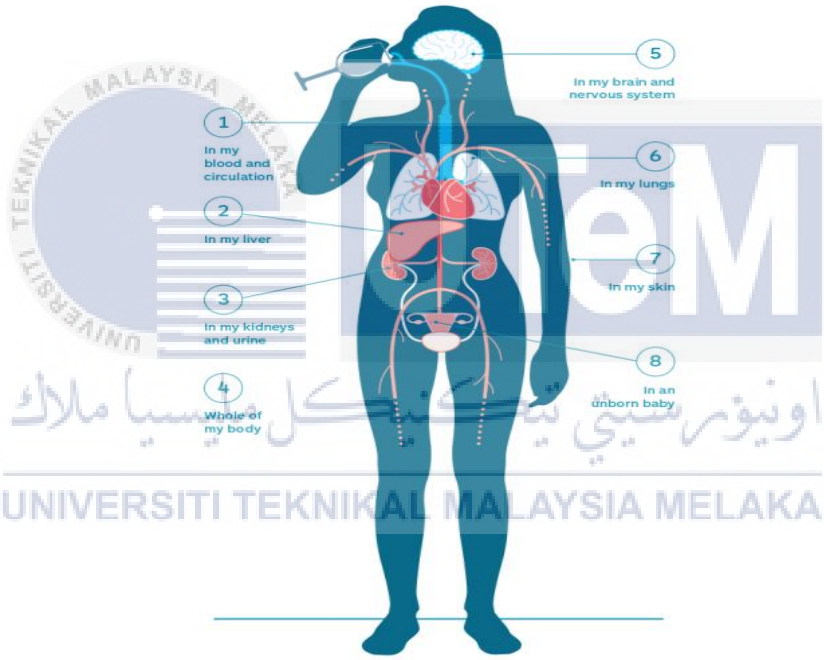

Figure 2.1: Structure of human body with the effect of alcohol

2.2 Overview of existing project

In this part, I would like to discuss about the project system that have been done which related to this project system in previous time. There are many researchers has been

done their research to find the appropriate way to optimize the use of alcohol detection system.

2.2.1 Alcohol detection in Bluetooth enable helmet for motorbikes

This project is to detect the rider that wearing the helmet, this helmet will detect accidents and detect whether the rider has consumed alcohol using the alcohol sensor MQ-3. The system is run when the accelerometer measures the change of the position rider and send the exact location coordinate using online application programming interface (API). The data gathered from the accelerometer and the pressure sensors, to train a support vector machine (SVM) to determine the condition of the riders. The Bluetooth application is used to connect the interface between phone and the helmet system. (P. Barhate, B. Nemade, V. Chaudhari, 2017)

2.2.2 Wearable biochemical sweat sensor for monitoring alcohol

This project is design to detect the metabolite of ethanol and ethyl glucuronide (EtG) in the human sweat. The sensor Detection of EtG from human sweat was achieved through chemiresistive sensing mechanism. In this method, an AC voltage was applied across the two coplanar electrodes and the impedance across the sensor electrodes was measured and calibrated for physiologically relevant doses of EtG in human sweat. The LED based reporting for the presence of EtG in the human sweat samples. The wearable sensor has ability to detect the alcohol consumption in the human sweat. (A. Paneer Selvam, S. Muthukumar, V. Kamakoti, V. Parasad, 2016)