DEVELOPMENT OF ALCOHOL AND DRIVER SEAT DETECTION SYSTEM WITH DRIVER WINDOW OPENING

MUHAMMAD SHAFIQ BIN SAMSUDIN
B091910188

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Muhammad Shafiq Bin Samsudin

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MUHAMMAD SHAFIQ BIN SAMSUDIN

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DECLARATION

I declare that this Choose an item. entitled “Development of Alcohol and Driver Seat Detection System With Driver Window Opening (VAWSS)” is the result of my own research except as cited in the references. The Choose an item. has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature :

Name : MUHAMMAD SHAFIQ BIN SAMSUDIN

Date : 11 JANUARY 2023

APPROVAL

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of the Bachelor of Mechanical Engineering Technology (Automotive) with Honours.

Signature :

Supervisor Name :

Ir. Ts. Dr. MOHAMAD HAFIZ BIN HARUN
Pensyarah Kanan
Jabatan Teknologi Kejuruteraan Mekanikal
Fakulti Teknologi Kejuruteraan Mekanikal dan Pembuatan
Universiti Teknikal Malaysia Melaka

Date : 11 JANUARY 2023

DEDICATION

This dissertation is addressed to both the beloved parents of Samsudin Bin Muhammad and Kamisah Binti Hasan, my family, my dear and fellow my friends for their support, and unceasing encouragement has lifted my soul and inspired me to pursue and complete this thesis VAWSS project to complete this bachelor degree.

ABSTRACT

Recently, cases of fatal traffic accidents involving inebriated drivers have been often reported in the news. This issue has not only endangered the safety of drivers but also other road users. In a state of drunk, human beings are not ready to work, think rationally and evaluate things accurately. A study conducted by the World Health Organization (WHO) in 2018, between 2010 and 2018 showed that there were 2364 drunk driving-related accidents resulting in 1196 deaths. On average, each year, a total of 132 people are killed and the ratio of drunk driver-related accidents is one person killed for every three days. According to the WHO report, Malaysia is one of the 35 countries that contribute to the high rate of accidents involving drunk driving. Drunk driving has been listed as one of the leading factors in fatal car accidents. To overcome this problem, drunk driving detectors have the potential to be explored to reduce the rate of road accidents. Many studies have been done to create vehicle driver alcohol limit detectors. However, there are still many shortcomings that need to be fixed. In this study, a drunk driving detection device was introduced using a microcontroller embedded into the vehicle start system. Alcohol sensors were used in this study to detect alcohol levels in human breath. The device will initially detect the level of alcohol in the breath and when the alcohol concentration is detected in excess of 50 milligrams per 100 millimeters of blood, the car's starting system is stopped so that the car cannot be started. Next, the driver's window will slide down automatically by 20mm for the purpose of ventilation in the vehicle cabin. With the use of this system, road accidents caused by drunk drivers can be reduced. In addition, a driver who is intoxicated can rest in the car cabin until he is awake from the state of intoxication without drowning in the car cabin.

ABSTRAK

Akhir-akhir ini kes kemalangan jalan raya yang melibatkan pemandu mabuk sehingga ada yang melibatkan kematian sering terpapar di dada akhbar. Isu ini bukan sahaja telah membahayakan keselamatan pemandu malah pengguna jalan raya yang lain. Dalam keadaan mabuk, manusia tidak bersedia untuk bekerja, berfikir dengan waras dan menilai sesuatu dengan tepat. Kajian yang dilakukan oleh World Health Organization (WHO) pada tahun 2018, antara tahun 2010 dan 2018 menunjukkan bahawa terdapat 2364 kemalangan yang berkaitan dengan pemanduan mabuk yang menyebabkan 1196 kematian. Secara puratanya, setiap tahun, seramai 132 orang terbunuh dan daripada jumlah ini nisbah kemalangan yang berkaitan pemandu mabuk adalah satu orang terbunuh untuk setiap tiga hari. Menurut laporan WHO, Malaysia merupakan salah sebuah negara dari 35 negara yang menyumbangkan kadar kemalangan melibatkan pemanduan mabuk yang tinggi. Pemanduan mabuk telah dicatatkan sebagai salah satu faktor utama kemalangan kereta yang membawa maut. Bagi mengatasi masalah ini, pengesan pemanduan dalam keadaan mabuk berpotensi untuk diterokai bagi mengurangkan kadar kemalangan jalan raya. Banyak kajian telah dilakukan untuk mencipta pengesan had alkohol pemandu kenderaan. Namun, masih banyak kekurangan yang perlu diperbaiki. Dalam kajian ini, peranti pengesan pemanduan dalam keadaan mabuk telah diperkenalkan dengan menggunakan pengawal mikro yang ditanam ke dalam sistem permulaan kenderaan. Sensor alkohol telah digunakan dalam kajian ini untuk mengesan tahap alkohol dalam nafas manusia. Peranti ini pada awalnya akan mengesan tahap alkohol dalam nafas dan apabila kepekatan alkohol dikesan melebihi 50 miligram per 100 milimeter darah, sistem permulaan kereta dihentikan supaya kereta tidak dapat dihidupkan. Seterusnya, tingkap pemandu akan meluncur turun secara automatik sebanyak 20mm untuk tujuan pengudaraan di dalam kabin kenderaan. Dengan penggunaan sistem ini, kemalangan jalan raya yang disebabkan oleh pemandu mabuk dapat dikurangkan. Selain itu, pemandu yang sedang mabuk boleh berehat di dalam kabin kereta sehingga sedar dari keadaan mabuk tanpa lemas di dalam kabin kereta.

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CHAPTER 1

INTRODUCTION

1.1 Overview

Drunk (adjective) appears to indicate unable to speak or act normally due to excessive consumption of alcohol, according to Cambridge Dictionary. Moreover, a drunk person is someone who takes big amounts of alcohol on a frequent basis and would be unable to stop. Intoxication from alcohol is related with languid and poor judgement, loss of focus, slower respiratory and cardiac rates, visual issues, weariness, and disorientation. The harsher the effects of alcohol on the body become as you take more alcoholic beverages. "A Blood Alcohol Concentration (BAC) of 0.08 is certainly the threshold for drunkenness in the United States" (Abdul et al., 2021). "If a person is caught driving with a blood alcohol concentration above this threshold, they can be arrested" (Abdul et al., 2021).

"Driving," on the other hand, "pertains to the controlled operation and movements of a vehicle, like as cars, vans, lorries, trucks, and buses" (Yasin et al., 2021). "Since the 15th century, driving skills have grown as well, necessitating physical, mental, and safety qualities" (Eboli et al., 2017). Understanding how to drive demands not just to understanding how to operate the vehicle, but also understanding how to apply the laws of the road to guarantee effective sharing with other drivers on the road (Eboli et al., 2017). A good driver also knows how to drive properly and understands the basics of vehicle handling. A driving test is used in some countries to examine both theoretical and practical knowledge of traffic laws, with others who pass obtaining a driver's license (Harper, 2019).

"Drunk driving" is described as "driving the vehicle with a blood alcohol concentration (BAC) of at least 0.08 percent" (Crombag et al., 2020). "Drinking while driving, commonly known as driving under the influence (DUI) or driving while intoxicated (DWI), can lead to harmful situations even with a minimal amount of alcohol" (Harper, 2019). Though some drivers do not reveal noticeable symptoms, this doesn't really make them any less risky (Rehm et al., 2020). It's worth remembering that any type of beer taken while driving is illegal and can result in severe repercussions (Abdul et al., 2021). Any alcohol content in your blood can impair your ability to drive safely (Yadav & Velaga, 2020). Alcohol misuse has a variety of impacts, such as the possibility of harm accidents or accidents. "The ability to focus, make an informed decision, and react rapidly to changing circumstances are mostly needed during safe driving" (Harper, 2019). However, alcohol can affect these abilities, placing you and others in risk.

Drunk driving is the primary causes of accidents. Drunken drivers are irrational, hence driving can unpleasant, and it also serious destruction to the properties and lives of intoxicated drivers and other road users. Thusly according Ones, "an intoxicated driver is 13 times more likely to have an accident than like a sober individual" (MIROS, 2012). "According the World Health Organization (WHO), Malaysia is among 35 countries with highest rate of driving drunk accidents. As according statistics, there were 2,364 driving drunk incidents between 2010 and 2018, with 1,196 individuals deceased" (NHTSA, 2017). In 2019, 919 individuals were convicted for driving while intoxicated, compared to 862 in 2018 (Rusli et al., n.d.) These numbers indicate that the situation has become more serious.

1.1.1 Statistic of accidents involving DUI in Malaysia

Malaysia now has Asia's third highest road collision death rate. This terrible circumstance is becoming increasingly regular, and society is pressing authorities to enhance the legislation governing this violation. According to Royal Malaysian Police (RMP) data, drunk-driving deaths accounted for just 0.85 percent of overall national statistics. In 2018, 191 drivers and bikers were found guilty of driving and bicycling underneath the influence of alcohol, resulting in 54 deaths. Vehicle drivers dominated the list of DUI-related accidents with 74. In 2017, there have been 58 deaths, accounting for 0.86 percent of all road incidents.

A total of 212 drivers and motorcyclists related to traffic accidents were discovered to have drank alcoholic drinks. "Road collision data collected over the last decade has already revealed that the highest percentage of mortality from total fatalities related of DUI was 3.41 percent, or 229 recorded deaths" (Fadilah et al., 2012). Every year later, 237 individuals were killed on the roadways, contributing about 3.31 percent of total traffic fatalities in the United States (NHTSA, 2017). However, data reveal that now the percentage of drivers/bikers involved in DUI-related crashes varies year to year. In 2014, in example, there were 266 documented instances. The next year, the percentage of drunk-driving crashes increased to 420, and the rising trend continued in 2016, with 461 occurrences. A year later, the figure falls at 212. Table 1.1 shows the proportion of deaths from total collisions from 2010 to 2018, and Figure 1.1 shows the data for driving under the influence accidents in Malaysia reported by the Royal Malaysian Police during 2019.

Table 1. 1: Percentage of death from total crashes 2010-2018 (Tamrin, 2019).

Year	Percentage of death from total road fatalities (%)
2010	0.71
2011	0.48
2012	1.97
2013	2.99
2014	2.89
2015	3.41
2016	3.31
2017	0.86
2018	0.85

STATISTIC OF DRUNK DRIVING ACCIDENT IN MALAYSIA

YEAR	NUMBER OF PERSON			TOTAL	% OF DEATH FROM TOTAL FATALITY
	DEATH	SERIOUS INJURY	MINOR INJURY		
2010	49	3	31	110	0.71%
2011	33	23	35	91	0.48%
2012	136	50	60	246	1.97%
2013	207	47	73	327	2.99%
2014	193	56	84	333	2.89%
2015	229	95	96	420	3.41%
2016	237	113	111	461	3.31%
2017	58	81	73	212	0.86%
2018	54	74	63	191	0.85%

2017 fatalities : 46 motorcycle, 3 pedestrian and 9 others

Figure 1. 1: Statistics of drunk-driving crashes in Malaysia (*RMP*, 2019)

1.2 Problem Statement

"After even a number of tragic road traffic accidents involving drivers suspected of drunken driving with alcohol, drunk-driving has lately become a contentious subject in Malaysia" (Zhao et al., 2014). According to the Transport Ministry (2018), "from 2011 to 2018, a total of 1,147 persons died in alcohol-related events in Malaysia." Malaysia's government has decided to adopt stronger regulations with harsher punishments, such as reducing the number of locations where alcohol may be sold, halting sales, and finally closing down the country's alcohol business.

"In terms of the permitted blood alcohol content (BAC), Malaysia is also one of the world's most liberal nations" (OMS (Organización Mundial de la Salud), 2011). Malaysia's blood alcohol level (BAC) is 0.08, but Taiwan and Japan have much lower BACs of 0.05 and 0.03, respectively. According to studies, getting a greater blood alcohol concentration (BAC) reduces one's attention and reactivity on the road, especially after ingesting beer (Zhao et al., 2014).

Based on established alcohol sensing devices, they simply detect the alcohol content and present the result mostly on LCD display. Some sophisticated existing projects has disabled the engines system or perhaps the starter system such that the car will not start to avoid drunk driving. However, when such vehicle engine system has failed, the entire vehicle system fails. With no sufficient ventilation in the car interior, the intoxicated driver would become irritated and fall asleep. This might result in drivers drowning in their own automobiles. This VAWSS project is developed to bridge gaps in the existing technology in order to prevent drivers from dying while half-conscious in the car cabin. When the driver may rest in a safe location until they are sober, the number of accidents involving intoxicated drivers is reduced, and the drivers' safety is also ensured.

1.3 Aim and Objective

The aim and objective of this is made based on the results of the increasing trend of road accident cases caused by drivers who drive vehicles in a state of intoxication. Several practical measures have been identified and it is the aim and objective of this project to reduce the trend of road accidents due to drunk drivers.

1.3.1 Aim

The aim of my thesis is to reduce the number of accidents caused by drunk driving while also ensuring the safety of the drivers. Driving under the influence of alcohol has impacted and killed the lives of countless individuals. In this environment, inebriated drivers inevitably endanger themselves and other road users. As a solution, we are presenting an innovative and updated approach to prevent accidents caused by intoxicated driving in a safe manner. The suggested device prevents the vehicle from starting, and the driver from driving after drinking. We will install an alcohol sensor (MQ-3), a driver's seat load detector, a microcontroller (Arduino UNO), LED and a buzzer in the vehicle's start system and power window. The technology attempts to safeguard the safety of everyone within the car as well as those of people surrounding.

1.3.2 Objective

The objective of the present research as follow:

i. To develop the vehicle alcohol sensing system integrated with vehicle starting system.
ii. To improve the ventilation system in the vehicle cabin through automatic window openings of 20mm.
iii. To detect the driver’s load while in the driver’s seat prior to exhaling.