

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



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

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A thesis submitted in fulfillment of the requirements for the degree of Bachelor of Mechanical Engineering Technology (Automotive) with Honours



Faculty of Mechanical and Manufacturing Engineering Technology UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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2023

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.



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.



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 drivingrelated 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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To my classmates and my housemates, thank you for the beautiful memories you all have given me. Thank you for being there for me through the good and bad times of our degree journey. Nothing could replace our moments together, and best of luck in your future endeavors.

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LIST OF SYMBOLS AND ABBREVIATIONS

Cases

dB : Decibel	
Hz : Hertz	58
kb : kilobyte	55
mA : Mili Ampere	55
mm : millimetre	58
UWV : University of West Virginia	
V : Volts	55
VAWSS : Vehicle Alcohol Window Seat System	iv
WHO: World Heath Organization	i, ii
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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 **UNIVERSITI TEKNIKAL MALAYSIA MELAKA** 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.

Year	Percentage of death from total road fatalities (%)
2010	0.71
2011	0.48
2012	1.97
2013	2.99
2014	2.89
2015	SALAYSIA 4
2016	3.31
2017	
2018	

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

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STATISTIC OF DRUNK DRIVING ACCIDENT IN MALAYSIA

	NUMBER OF PERSON				% OF DEATH
YEAR	DEATH	SERIOUS INJURY	MINOR INJURY	TOTAL	FROM TOTAL FATALITY
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.

1.4 Scope of Study

The number of road accidents caused by drunk driving has recently climbed dramatically. Drunk driving is exceedingly detrimental to public safety, as society has acknowledged. It's past time to devise a system that successfully discourages drunk driving. Because this sort of technology is not extensively applied yet, we are trying to develop it in order to avoid accidents and ensure the safety of drivers. The project includes coverage for the system:

- i. The alcohol level content is based only on market alcohol.
- ii. The alcohol level equation is used to calculate the driver's alcohol concentration.
- iii. The microcontroller contains the alcohol level equation.
- iv. The vehicle starting system is linked to a microprocessor.
- v. The power window system is linked to the starter motor system.
- vi. The opening of the driver's window causes increased cabin ventilation.
- vii. Detection of the driver's load while in the driver's seat prior to exhale. There is no load in the driver's seat so there is no exhalation reading value even if the exhalation is performed.

1.5 Expected Result

We are developing a mechanism in this project that will deactivate the vehicles starting system if the driver is under the influence of alcohol. Before it blows into the alcohol sensor, the driver's seat sensor will detect the driver's own load. Furthermore, the system obtains data in the form of detected alcohol concentrations in the driver's breath, which are created by an alcohol sensor linked to a microcontroller. The alcohol sensor will be in close proximity to the driver, allowing it to detect the alcohol content by monitoring the driver's breath. Any amount

of alcohol discovered to exceed 22g (legal limit) triggers the system to display an alcohol detection notice on the LCD screen, sound an emergency warning using a piezo buzzer and deactivate the vehicle system's start function entirely. The integrated window system then lowers the driver's window by another 20mm. The project proposes a method of preventing drunk driving accidents, hence lowering the risk of any incidents occurring.



CHAPTER 2

LITERATURE REVIEW

2.1 Overview

Driving is the controlled movement and handling of land vehicles such as automobiles, trucks, and buses. Drunkenness, in its wider definition, is a situation of intoxication caused by alcohol consumption that leads to a reduction in mental and physical capabilities. A drunkard is someone that is accustomed to being drunk; however, in philosophy and religion, drunkenness means not understanding what is being done but being in a conscious state. Driving under the influence of alcohol, on the other hand, refers to a crime committed by a person who drives or operates a vehicle while intoxicated, deeming the individual unable to operate the vehicle safely. Keeping yourself awake or not intoxicated before embarking on a trip is a precaution to protect your own life as well as the gets to live of other drivers. Figure 2.1 captures the driver driving while under the influence of alcohol.



Figure 2.1: Driver under alcohol influence by MIROS, (May 21, 2020)

2.2 Alcohol

2.2.1 Alcohol Definition

According to historical documents, humans have been consuming alcohol for ages (NIAA, 2020). Alcohol is both a chemical and a psychotropic substance (Gjerde et al., 2011). An alcohol is generated in chemistry when the hydrogen atom in a hydrocarbon bonding is replaced by a hydroxy group, which is composed of two oxygen and hydrogen atoms, as seen in Figure 2.2 (Ellickson et al., 1996). When alcohols connect with other atoms, secondary alcohols arise. Humans use three types of secondary alcohols on a regular basis: methanol, isopropanol and ethanol.



2.2.2 Type of Alcohol

Ethanol is the kind of alcohol that individuals can consume without becoming ill. The other two forms of alcohol have been employed for sanitation and industrial purposes rather than beverage manufacture (Aschan, 1958). Methanol, for example, is a component of gasoline used in automobiles and ships. It is used to make adhesives, paints, windshield wiper fluid and a variety of other items (Pontes et al., 2006). Isopropanol is a chemical used to manufacture wiping liquid, which is used for cleaning and disinfecting. People are usually injured by methanol and isopropanol because our organs metabolise them as harmful compounds that cause organ damage when taken in large quantities.

Ethanol is a kind of alcohol that is drank by billions of people every day (Anderson & Baumberg, 2006). Humans have utilised ethanol-based drinks to modify their mood for aeons (Ellickson et al., 1996). However, ethanol is also harmful to one's health. The human liver can digest ethanol, but only in tiny amounts. Because ethanol causes cancer, it progressively damages the liver, brain, and other organs (Brennan et al., 2020). Ethanol has also been proven to alter the cerebral cortex, influencing balance and decision-making (Park & Yang, 2017). Furthermore, drinking and partying, as well as other forms of alcohol abuse, can lead to the development of a serious alcohol addiction (NIAA, 2020).

2.2.3 Alcohol Beverage

Liquor contains several forms of alcohol. These varied beverages usually contain different fundamental components. Alcoholic beverages include ethanol, a psychoactive chemical that can cause loss of consciousness when consumed (Gjerde et al., 2011). The alcohol levels in the various forms of alcohol in this beverage vary. "The higher the alcohol level, the greater the danger of health issues occurring" (Steinhausen & Metzke, 2003). As a result, it is critical to understand the alcohol concentration of this beverage. Figure 2.3 illustrates various kinds of alcoholic beverages.



Figure 2.3: Types of alcoholic beverage by Tastessence, (2017)

2.2.4 Distilled and Non-distilled Alcohol Beverage

There are two types of alcoholic beverages: those that have been distilled and those that have not been (Pontes et al., 2006). "Distillation is a technique that concentrates alcohol by isolating from other fermented substances, whereas fermentation is the chemical transformation of sugar into ethanol by bacteria" (Lisle et al., 1978). "Non-distilled drinks are also known as fermented beverages." Distilled alcoholic beverages, on average, have more alcohol proof than non-distilled alcoholic beverages" (Boyaci et al., 2012). High alcohol by volume (ABV) beverages have a high proportion of alcohol. It is expressed as a percentage of alcohol by volume and is measured in millilitres per 100 millilitres of solution (Monico, 2020). The varieties of distilled and non-distilled alcohol drinks, as well as their ABV, are shown in Table 2.1.

CATEGORY	ТҮРЕ	ABV (%)
Non-distilled	Beer	4 - 6
	Wine	14
	Champagne	10 - 12
	Hard Cider	5
	Mead	10 - 14
AL MALAY	Sake	16
TEKNI	Gin	35 - 55
Fightanno	Brandy	40
سيا ملاك	تى تېك Whiskey ل ماليە	40 - 50
UNIVERSI	TI TEKNRum L MALAYSI	A ME 40 - 75.
Distilled	Tequila	40
	Vodka	40
	Absinthe	40 - 90
	Ever clear	60 - 95

Table 2.1: Distilled and Non-distilled Alcohol Beverage

2.3 Law Enforcement Against Drunk Drivers

Authorities will only imprison someone if they are proven to have a certain quantity of alcohol in their system. The quantity of alcohol found in the body is described in section 456 of the Road Transport Act 1987 as "22 micrograms of alcohol in 100 millilitres of breath, 50 milligrams of alcohol in 100 millilitres of blood of blood, or 67 milligrams of alcohol in 100 millilitres of urine" (S et al., 2017).

"The alcohol content inside the blood (BAC) is the most straightforward to comprehend, since the quantity of alcohol in 100 millilitres of blood of blood must be 80 milligrams, or 0.08 percent" (S et al., 2017). The alcohol concentration in the body will not exceed 0.08 percent BAC if an individual consumes a "typical" amount of alcohol per hour, according to BAC track. This standard beverage is defined by Ones as 354ml of beer or 148ml of wine (NIAA, 2020). These figures might be perplexing because obtaining 0.08 percent BAC differs by individual owing to physical and metabolic factors.

"Having a breathalyser, a device used by police to determine the percentage of alcohol in a driver's breath, is the most accurate approach to find out this amount" (Rahim & Hassan, 2010). This brings us to Section 45B of the Road Transport Act of 1987, which allows police personnel to administer breath tests. A breath test may be performed to measure BAC, and it is the most commonly utilised approach due to the portability of the breathalyser. If a uniformed officer detects a violation of section 44, 45, or 45A, such as drunken driving, being responsible for a vehicle while inebriated, or being involved in a traffic collision, he or she may administer a public breath test.

"You can be convicted of just being in a vehicle if your BAC level is too high, as according sections 45 and 45A of the Road Transport Act 1987." (Rusli et al., n.d.). According to Section 43 of the same act, "anyone who drives without acceptable attention and care or without due consideration for other road users is breaking the law" (Rusli et al., n.d.). Drunk driving is punishable under this section, and if proven guilty, the offender faces an RM 10,000 fine as well as a maximum jail term of 12 months.

"The most direct way to prosecute a drunk driving allegation would be under Section 44 of the Road Transport Act 1987." (Abdul et al., 2021). 2021) explained that "Anyone who is under the influence of alcoholic beverages or drugs to the extent that he is unable to handle a vehicle on a public road, or who just has too much alcohol in his body that the proportions in his breath, blood, or urine exceed the prescribed limits and causes death or injury to another person, has committed an offence" (Priyanka & Kishore, 2017).

Simply worded, "you have committed an offence under section 44 if you drive a vehicle in a public location while inebriated to the extent of being unable to operate the vehicle or if your blood alcohol concentration (BAC) level exceeds the allowed limit" (Abdul et al., 2021). This clause is constructed in such a way that whether you are driving intoxicated or not, you are guilty as long as your BAC level exceeds the legal limit (Abdul et al., 2021). If you are discovered in violation of Section 44 of this act, you will face a cumulative punishment of not be less than RM8,000 not more than RM20,000, and also a minimum of three years in jail.

Sections 45 and 45A offer the police considerable discretionary powers and are directed more at those responsible for driving intoxicated or with BAC levels that exceed the permissible limit. It denotes if the individual in the scenario has a realistic chance of being in charge of the vehicle. If a police officer encounters someone in this condition and either observes him or her so inebriated that he or she will be unable to drive or is able to do a breath test and his BAC level is significantly higher than the legal limit, the individual may be held accountable under sections 45 and/or 45A. "Those found guilty under one or both of these clauses face a RM1,000 fine and up to three months in jail for the first offence" (S et al., 2017).

Subsequent crimes will result in a fine of between RM2,000 to RM6,000, along with up to 12 months in jail (S et al., 2017).

In summary, if you refuse a breathalyser or refuse to engage in a test, such as refuse to exhale for this reason, the police have the ability to arrest you. If you are found guilty of these charges, you might face an RM6,000 fine and a jail term of up to 12 months for first offence. Repeat offenders face "fines ranging from RM2,000 to RM10,000, and also imprisonment for up to two years" (Yadav & Velaga, 2020). In reality, if the court decides that the offender deserves to have his license taken away, the penalty might be temporary or permanent.

2.4 Factors Contributing to Alcohol Beverage Abuse

"Alcohol is a legal adult recreational substance that is widely used in the United States" (Finan et al., 2020). People consume alcohol to socialise, relax, and have fun (Rehm et al., 2020). "People of all ages routinely abuse it, resulting in significant health, legal, and social issues" (Ansari et al., 2020).

The first is the parent-child relationship's basis (adults). Adolescents have a significant impact on alcohol usage because they mimic their parents in many aspects of life. It investigates the fundamental link among adults and teenagers. Adolescents, in fact, are more likely to imitate adults in all parts of life as they seek to define their identity as adolescents on the cusp of adulthood.

The influence of peers is the second important factor that contributes to beverage abuse. During puberty, peer pressure is extremely powerful. Peers have a big influence on a person's personality, especially if they don't have much family support. Curiosity, temptation, identification with such a specific group, the need to create a separate identity or emotional and psychological freedom, to get rid of boredom, as part of the 'feel' syndrome good, reducing stress, enthusiasm for self-confidence, improved communication with the opposite gender, and obtaining a sense of maturity are all reasons that adolescents drink excessively.

A psychological crisis is the third. Someone uses alcohol to ease mental tension at first, then unwittingly consumes alcohol, further depressing his soul since he can no more be cared for. As a result, it is perceived to be a remedy, but it just serves to keep him trapped in his alcoholic addiction. Furthermore, unpleasant emotional feelings arising from a lack of love from family members can inspire a person to drink alcohol; some of them seem to have a selfish desire to give up themselves as adults and convey their liberty (adolescence) by consuming alcohol.

2.5 Effect of Alcohol Beverage Abuse

"The intoxicating main element in wine, beer, and spirits is alcohol" (Clay & Parker, 2020). It is a depressant, which meaning that once it enters the brain, it reduces the amount the body's functioning (NIAA, 2020). "It can also be difficult for the body to handle, placing undue strain on the liver, digestive system, cardiovascular system, and some other organs" (Zhao et al., 2014). "In 2017, more over half of all Americans above the age of 18 had drunk alcohol within the previous month" (NIAA, 2020). Almost 9% of individuals between ages of 12 to 17 have done so. "Alcohol use disorder (AUD) affects 15.1 million individuals in the United States aged 18 and up, accounting for 6.2 percent of this age group, according the National Survey on Drug Use and Health (NSDUH)." 2011 (OMS (Organización Mundial de la Salud).

2.5.1 Short-Term Effect

"Within minutes of intake, alcohol enters the bloodstream via blood vessels in the lining of the stomach and small intestine before reaching the brain, in which it has an instant effect" (Rehm et al., 2020). "The short-term effects of alcohol are dictated by how much is consumed, how quickly it is consumed, the individual's weight, gender, and body fat percentage, as well as whether or not they have eaten" (Clay & Parker, 2020). "The absorption rate is decreased when ingested with a meal, resulting in fewer adverse effects and less intoxication" (Clay & Parker, 2020).

The individual may first feel calm, easy-going, or ecstatic. When they consume additional alcohol, they may become intoxicated. "Slurred speech, clumsiness and trouble walking, weariness, vomiting, headache, sense and perception distortion, loss of consciousness, and memory lapses are some signs of intoxication" (Rehm et al., 2020).

According to (University of West Virginia, 2018), depending on their individual circumstances, a person may experience any of the symptoms described in Table 2.2. Although the human body consumes alcohol fast, it takes longer for the alcohol to be removed from the body. As a result of this, the body's systems are put under strain. It has the potential to cause illness and, in the worst-case scenario, death.
Number of drinks	BAC	Effect
1 - 2	≤ 0.05	 More peaceful Less constrained Delayed reflexes Decreased awareness
3 - 4	0.05 - 0.10	 Driving capabilities decreased Responsiveness, and decision-making abilities impaired.
5 - 7	0.10 - 0.15	 Sight, awareness, reflexes, and judgement impacted turned aggressive psychologically unreasonable
8 - 10 - 10	0.15 - 0.30 کل ملیسیا م	 Stumble Garbled conversation Eyesight could be confused. The driving abilities are significantly impaired Puke or Nausea occured
UNIV >10	ERSITI TEKN > 0.30	 KA• Lose consciousness LAKA Remain cognizant yet be ignorant of what happen in the surrounding The pace of breathing is sluggish.

Table 2. 2: Effect of alcohol based on BAC (UWV, 2018)

2.5.2 Long-Term Effects

"Alcohol has been related to over 200 illnesses and injuries, including dependency and addiction, liver cirrhosis, malignancies, and accidental injuries such as vehicle accidents, crashes, fires, assaults, and drowned" (Brennan et al., 2020). "Over 88,000 individuals death row in the United States every year as a result for alcohol-related causes" (NIAA, 2020). As

just a sense, it is also the third most common cause of avoidable mortality. "Long-term alcohol abuse has been linked to a variety of health problems, including liver failure, pancreatitis, congestive heart failure, peripheral neuropathy, stomach problems, cancer, innate immunity dysfunction, osteoporotic fractures, brain and nerve damage, nutrient deficiencies, and psychiatric problems like anxiety and depression" (Park & Yang, 2017).

"Women who consume extra alcohol than is recommended on a routine basis are more liable to suffer from liver failure, cardiomyopathy, and organ damage than men who do the same," according to studies (Clay & Parker, 2020). The number of young people who use alcohol is a big source of worry. "According to study, 20% of college students meet the criteria for AUD, and the illness affects about 623,000 adolescents aged 12 to 17 years" (OMS (Organización Mundial de la Salud), 2011). "Alcohol can have a substantial influence on the developing brain" from prenatal growth until the end of adolescence (Rehm et al., 2020). "If a pregnant woman drinks alcohol, her child may be born with foetal alcohol syndrome (FAS)" (Brennan et al., 2020). It was projected in 2015 that between 2 and 7 new borns out of every 1,000 were impacted (Laufer et al., 2017).

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2.5.3 Effects of Driving Under the Influence of Alcohol

Accidents can happen at any time. However, if the event occurred due to the driver's carelessness and neglect till the life of other people were endangered, this is not a topic or issue to be taken lightly. Many accidents have happened as a consequence of the greed of intoxicated drivers (who believe they are not drunk despite having drank bottles or shots of alcohol). To add to the misery, it involves the deaths of innocent citizens.

"Intoxicated drivers with an alcohol content (BAC) of 0.10 or above approximately seven times most likely to participate in a fatal traffic collision than drivers who may not consume any alcohol" (Zhao et al., 2014). A BAC of 0.15 or above increases the probability of

being involved in an accident car collision by more than 25 times. Simply said, the more alcohol you consume, the more likely you are to have an accident, and even more dangerously, a deadly accident.

Individuals will tell you that as long as you've seen the road and grasp the vehicle to manage the vehicle, you can drive. "It is true that you drive the automobile with your hands, eyes, and feet, but the hands, eyes, and feet must be controlled by their brain function" (Yadav & Velaga, 2020). "Safe driving necessitates awareness and the capacity to make quick judgments in response to changing events in a short period of time" (Alford et al., 2020). Alcohol has a serious impact on a person's driving abilities and level. One of the detrimental effects of alcohol on persons that has been revealed is response time. The reflex will be slowed by alcohol. This, in turn, will have an impact on your capacity as driver to adapt rapidly to changing conditions. Vision is also becoming increasingly blurry.

Alcohol has the impact of slowing down the action of both the eye muscles, changing visual stimuli and visual perception. Even alcohol can make your eyesight blurry. Night eyesight will also be compromised. Then there's the problem of recognising items. "When you are impaired by alcohol, you may find it extremely difficult to precisely determine the position of your car on the road, the positioning of many other vehicle on the traffic line, or even the location of any road signs" (Zhao et al., 2014).

As a result, no reasonable reasoning. Being inebriated can sometimes lead to illogical actions and negative outcomes. There is nothing improper with those of you who follow religion other than Islam using alcoholic beverages. However, it must be approached with caution. Unless you're under the drunk driving, do not drive. There are now several hired driver options provided that can securely transport you home without harming other people.

Drunk driving is not really harmful to oneself, but also to others. Such a thing, since the deluded driver would slow down that movement of the vehicle, causing the road to become clogged. Drivers who are inebriated tend to respond slowly, especially at junctions or traffic signals. Furthermore, irresponsible drivers risk the safety of those other road users. Drivers that are under the influence of drugs or alcohol will lose concentration and focus just on road as soon because they can cause an accident to others. As a result, "driving under fictitious conditions increases the risk of an accident of many other drivers on the road so because road is not just utilised by these drunk people, but they ride on the road with others" (Zhao et al., 2014). As a result, this object has the potential to take lives or injure others indirectly.

2.6 Alcohol Detector Device

There are several sorts of breath alcohol detection equipment available today, ranging from portable detectors to machines that offer officially accepted findings. "Portable breathalysers are less efficient than laboratory-test instruments, but they are economical and suitable for personal usage in terms of price-performance ratio" (Van Den Broek et al., 2021).

2.6.1 Breathalyzer

"A breathalyzer is an electronic instrument that measures a person's breath alcohol concentration (BrAC)," as seen in Figure 2.4. (Rahim & Hassan, 2010). "There is a direct relationship between a person's breathing alcohol content (BrAC) with alcohol content concentration (BAC)." Drummond-Lage and colleagues (2018) "During breathing, alcohol in the circulation vaporises and is transported out of the lung in the exhaled breath" (Holt et al., 1980).



Figure 2. 4: BAC track Breathalyzer

History of Breathalyzer Developement

"In 1931 the first practical roadside breath-testing device was the drunkometer developed by Rolla Neil Harger of the Indiana University School of Medicine" (Tabak, 2001). "The drunkometer collected a motorist's breath sample directly into a balloon inside the machine" (Drunkometer et al., n.d.). After that, the breath specimen was passed via an acidic potassium permanganate solution. The mixture changed colour if there had been alcohol in the sample taken. The bigger the colour shift, the larger the amount of alcohol with in breath. "The drunkometer was manufactured and sold by Stephenson Corporation of Red Bank, New Jersey" (Drunkometer et al., n.d.).

"The drunkometer created by Rolla Neil Harger of the Indiana University School of Medicine in 1931 was the first viable roadside breath-testing instrument" (Tabak, 2001). "A motorist's breath sample was taken straight into a balloon within the machine by the drunkometer" (Drunkometer et al., n.d.). The breath specimen was then put through an acid potassium permanganate solution. If the sample included alcohol, the mixture changed colour. The greater the coloring shift, the greater the quantity of alcohol in the breath. "The Stephenson Corporation of Red Bank, New Jersey, manufactured and distributed the drunkometer" (Drunkometer et al., n.d.).

"In 1954, Robert Frank Borkenstein employed chemical oxidation and colorimetry to estimate alcohol contents in his breathalyser" (Rosenbush et al., 2020). Since this procedure can generate inconsistent data based on meteorological pressure, sensor temperature, and relating body temperature, as well as the accuracy of the observations and also how they correlate with human BAC analysed through a blood donations draw, infrared spectroscopy became the benchmark for consecutive breath monitoring systems.

"In 1967, Bill Ducie and Tom Parry Jones in the United Kingdom developed and launched the first electronic breathalyser" (Tabak, 2001). "They founded Lion Laboratories in Cardiff" (Tabak, 2001). "The Road Safety Act of 1967 introduced the first enforced by law blood alcohol concentration limit to drivers as in United Kingdom, beyond which was unlawful to operate a motor vehicle, as well as the roadside breath sample, which was made available to law enforcement across the country" (Anderson & Baumberg, 2006). "In 1979, Lion Laboratories' Alcolyzer breathalyser, which had glass tubes that changed colour over a particular threshold of alcohol inside the breath, was certified for police use" (Holt et al., 1980). Figure 2.5 depicts Lion's Laboratories' 1979 Alcolyzer. Instead of nanocrystals, most later models use a hydrogen fuel alcohol detector, which provides a far more accurate roadside sobriety tests and eliminates the need for urine and blood testing at a police station.



Figure 2. 5: Alcolyzer by Lion's Laboratories (1979)

2.6.2 Breathalyzer's Sensor

Digital breathalyser testing now available in a wide range of configurations and at a variety of prices (Tabak, 2001). Some are very inexpensive but less capable of detecting abnormalities in customers' blood, and others are incredibly expensive and modern technology capable of giving tests that accurately represent blood assays. Digital testers can also be classified as breathalyser screening devices, which include the vast majority of mobile devices, or evidential lab testers, that are used for in-court investigative testing.

With most of the differences in look and price, today's various electronic breathalysers can be classified depending on the type of sensing media they employ. Microchip sensors, hydrogen fuel sensors, and ire sensor are the three categories. Microchip alcohol sensors are used in inexpensive but effective breathalysers. Hydrogen Fuel sensors, which are much more expensive but more exact, are used in increasingly sophisticated and commercial breathalysers. Infrared sensors are the most expensive and difficult type of tester used by skilled specialists in police departments and prosecution applications. Table 2.3 lists the sensors utilised in the development of an alcohol breathalyser, which include semiconductor, fuel cell, and infrared sensors.

TYPES OF SENSOR	DESCRIPTION	DIAGRAM
Semiconductor	"When subjected to alcohol, semiconductor sensors monitor a variation in inherent capacitance. The sensor is heated to a relatively high temperature. The analyzer detects the amount of oxidization of alcohol on the sensor's contact. This variation in	NA DO DI
	surface impedance corresponds to different degrees of alcohol findings."	Figure 2. 6: Semiconductor gas sensors
Fuel cell	"A fuel cell is made up of a wafer with each present significant in platinum and placed between two layers of sulfuric acid dilution. Each edge of the wafer has an electrode connected to it. When alcohol crosses the wafer's barrier, it is transformed into acetic acid, releasing extra electrons. The quantity of power produced is dependent on the number of alcohol molecules contained."	Figure 2. 7: Fuel cell gas sensor
Infrared	"When alcohol vapor is introduced into such an infrared light source, certain quantifiable alterations in energy and frequency are generated. These variations in energy and frequency induced by alcohol molecules are contrasted to atmospheric values recorded without alcohol. The real alcohol concentration may then be determined with great accuracy."	Figure 2. 8: Infrared gas sensor

Table 2. 3: Description of Breathalyzer's Sensor (ASD, 2013).

2.7 Vehicle Starting System (VSS)

2.7.1 Revolution of VSS

Nowadays, we take for granted that our automobiles will start on their own. To start the automobile, simply enter the keys into to the ignition then turn the key. Older vehicles, such as those manufactured in the late 1800s and 1910s, were notable for their mechanical complexity and limited utility (Schenk et al., 2017). Just getting these ancient antiquities to work was a difficult operation since the method needed a number of sophisticated phases that the operator had to accomplish in the correct order. Hand cranks were perhaps the most common type of engine starter in the early days of the automobile. This was accomplished via rotating a crank, which has been frequently located at the front of the vehicles. To start the engine, merely twist the lever, which would activate the ignition system to allow combustion engines to begin. After a set number of rotations, the piston will begin to run on its own, and the crank may be removed from the engine.

Hand crank starters were simple and reliable, but they also had a lot of shortcomings which made them less of ideal. The most important drawback of starting an engine is that it would be potentially dangerous to the user. For instance, if an engine begins to rev right back during in the cranking technique, the operators may be hit by the hand - cranked and injure himself. Regardless of the fact that most of these cranks included an overload system, there was still a risk of injury if the lever was permitted to continue moving after the engine started. Putting aside the fact than they needed a certain level of physical power to rotate, hand crank starts had another significant disadvantage. Figure 2.9 depicts the hand crank in use in 1913.



Figure 2. 9: Hand cranking on old car by Reed L. (1913)

Following World War, I, practically all manufacturers began producing automobiles with starters, allowing anyone, regardless of the physical capability, to begin a vehicle by pressing a button on the dashboard. It wasn't till 1949 that Chrysler invented a key-operated ignition on again and starter activation button (Michelotti & Silva, 2016). Several newly developed enhancements were implemented into the 1946 Dodge Deluxe models. Among these was the development of the popular push-button starting mechanism. The solenoid was activated by the splash button just on 1946 Dodge Deluxe depicted in Figure 2.10 following, which then ignited its starting (Ghersi et al., 2016). For the first time since 1928, there was no possibility to start the engine directly by manually turning (Trinidad & Dixon, 2009).



Figure 2. 10: Push Start button on 1946 Dodge Deluxe (Reed Brothers Dodge, 1952)

2.7.2 Common Modern VSS

The starting mechanism converts electrical energy in the rechargeable battery into mechanical energy, which is utilised to start the car forward (Kumar et al., 2018). The activation key or quick launch, a neutral protection switch, a starting relay, an ignition coil, and batteries are all important components of a starting system (Michelotti & Silva, 2016). "Power is delivered from of the cells to the starting actuator via the ignition switch when the key is moved toward the initial position in the ignition system and then when the starting button is pressed" (Michelotti & Silva, 2016).

Certain autos have a pro neutral safety switch built. When the key is turned on and the car is in drive, the neutral safety switch stops data from accessing the battery, preventing the engines of running (Laxman & Austina, 2014). The starter solenoid, which is mounted upon that ignition system, is an electrical switch that turns on the starter motor. "When the solenoid is triggered by electrical, the coils within it produces an electromagnetic field that draws and pulls a plunger either in direction." At one end of this ejector, a shift lever is located" (Kumar et al., 2018). The lever is attached to the drive gear and clutch component when the starting motor is turned on.

It is a little yet powerful electric motor that generates a high amount of electricity for a short time period (Michelotti & Silva, 2016). It is used to start the motor. Whenever the starter motor is turned on, it makes contact with the flywheel ring gear, generating torque that spins the flywheel, which cranks the engine. When the starting motor is turned off, torque is generated as well as the engine cranks. When a motorist changes the ignition switch from the beginning position towards the run position and then releases the ignition switch, it is deactivated. The starting motor's internal return springs force the drive gear out the of line with the flywheel, causing the starter motor to shut down entirely. Figure 2.11 depicts a standard current vehicle starting systems schematic diagram.



Figure 2. 11: Vehicle starting system schematic diagram

2.8 Vehicle Window System

Window regulators are car components that enable the driver to change the height and angle of his or her vehicle's glass windows. In certain cases, the regulation is manually operated by a hand crank that the regulator's operator must spin. Electronic window regulators are now more commonly situated on the arm rest of the car door closest to the window, and they are activated by pushing a button on that arm rest. The majority of automobiles include an electronic window regulation system that allows the driver to control the movement of all the windows in the vehicle. This effectively allows drivers to adjust the windows in the front and back seats without having to use the buttons positioned near each of the car's passenger windows.

A window regulator's wear and tear are identical to that of any mechanical component over time and with continuous operation. A power window regulator's fault is usually traced back to the little motor that governs the functioning of the window itself. When the motor wears out, the regulator's reaction time to a button press will be much less responsive than previously. Often, simply replacing the motor is enough to restore full operation. However, there are times when the issue with the regulator is even more difficult. A new regulator should be fitted in these cases. When this happens, it's probable that the entire regulator has to be replaced. Depending on the kind of vehicle, replacing an electronic window regulator might be a costly endeavour.

2.8.1 History of Window Regulator or Hand Crank Window

Individual controls are still found near each window in the majority of vehicles, allowing users to open or close the nearest window without having to ask the driver to do it for them. The bulk of window regulators were operated by hand until the mid-1900s. As illustrated in Figure 2.12, the cranks were strategically placed along the door panel, allowing anybody seated close to the window to simply hold the crank and spin to open and close the window. With each turn of the hand crank, a plate supporting the glass window slid up and down, allowing the window to be pushed into the proper position. Because of the design of the crank, it was possible to move the window to a position that was comfortable for the driver and passengers, whether it was closed or entirely open.

By the 1960s, the power window regulator had attracted a lot of attention due to its unique appearance and effectiveness. Thanks to this new technical breakthrough, it is now possible to open and close automotive windows simply sliding a switch or pressing a button on a control console rather than turning a hand crank. Originally, this feature was offered as an add-on to a number of models. By the end of the 1970s, however, the majority of automotive manufacturers considered power windows to be a basic feature in their vehicles. Later, the power window regulator gained traction in the marketplace. Customers became interested in the notion of being able to raise and lower the rear window, which was added to the list of desirable features that also included windows positioned between the driver and passenger sitting regions. This feature was once classed as manufacturer option. However, it is now frequently incorporated as a common part on most new automobiles.



Figure 2.12: Hand crank window system

2.8.2 Vehicle Power Window System (VPWS)

The power window is a living legend in today's society, and it ought to be acknowledged. Most of us rely on this device every day, and life would be tough without it. The majority of the people refer to windows which can be moved up and down by pressing buttons as power windows (Bullock, 1972). This is a significant advancement over manually controlled car windows. By 2008, numerous car manufacturers have eliminated manually crank windows from the majority of their vehicles due to the increasing usage of electric windows. Because the majority of vehicles already have electronically controlled windows, some drivers have lost their comprehension of the indication from another motorist, in that they use their hand to simulate turning a window crank to communicate that they wish to speak with someone in the vehicle (Sekyi-Ansah et al., 2020).

2.8.3 History of Power Window System

Power windows were initially featured in the 1940s as a premium feature on the Packard 180 series, which launched in 1940. They were first utilised in vehicles by Packard, although it's unknown who was the true brains behind the concept. Since before World War II, engineers have been working on energy technologies that led to the creation of these innovations. Whenever. When a hydroelectric system was utilised to open and close the car roofs, it sparked the invention of the first power window.

General Motors introduced a hydroelectric system to operate the windows on its automobiles in the late 1940s. Cadillac implemented the technology in its 75 Series limos in 2007, making them the first to have a motorised window that could lift and descend between both the driver's compartment and the back seat. By the end of the 1970s, almost every car had power windows as a standard feature.

13.0

Rockers and toggle switches were used to regulate power windows when they were first introduced. However, this looked to be a possible threat for children, since they may accidentally activate the switches while looking out the car window.

While the first power windows were controlled by a hydroelectric system, today's power windows are controlled in a completely different manner. An electric motor is now in charge

of the procedure, which is coupled to a variety of gears. While it functions similarly to a manually controlled window, it is powered by a motor instead of human efforts. Due to cables linked via the driver's door, the driver may activate all windows from the driver's side switch, as illustrated in Figure 2.13.



2.8.4 Mechanism of the Power Window System

Power windows are controlled by switches and cables and are powered by the vehicle's battery or electric circuit. The power windows will not work if the vehicle's ignition is not turned on. In contrast to hand crank windows, power windows do not have handles. They don't have a manual mode of operation. The driver is normally in charge of the power windows, which may manage all of the windows.

"The power windows will work correctly when the driver's door is supplied by an optimal 20-amp circuit breaker" (Sekyi-Ansah et al., 2020). The power is transferred from the circuit to a point of contact, where the wire harness from all four windows join together for a single connection, using a window switch control panel. The battery or electric motor, as well as the vehicle's grounding system, are then connected to the two ends of the power connection. When

the switch is pressed, one of the two ends is disconnected from the vehicle grounding and reconnected to the vehicle's centre point. This makes it possible to deliver energy to the remaining windows.

However, in terms of technological sophistication, the power window systems employed in today's vehicles are rather advanced. The majority of modern vehicles come standard with a variety of power-assisted amenities, such as power windows, doors, and mirrors. When this happens, automakers find connecting all of the wires in a single assembly extremely difficult. As a result, all of the wires have been merged into a single module, and all of the controls have been monitored. Because all of the cables have been aggregated into a single module, the driver only needs to push a button to transmit electricity to all four windows.



Figure 2.14: Power Window System Circuit in MATLAB

2.8.5 Power Window System Safety Features

Many children's necks have been trapped in terrible instances with power window features, resulting in suffocation, and the usage of power windows has been questioned. Because the switch is located in an awkward location on the arm rest, children attempting to stick their heads out the window may mistakenly activate the switch in certain designs. The installation of a driver-controlled lockout button helps prevent this by preventing backseat occupants, particularly youngsters, from accidentally activating the switches. Beginning in 2008, manufacturers in the United States were required by law to put child safety systems in their automobiles in order to improve children's safety. In 2009, the US Department of Transportation made a temporary decision not to require all autos to have automatic reverse power windows that detect an object when closing. Although the majority of automobiles equipped with this feature also have autonomous reversing capabilities, the proposed requirements are for automatic up window systems. All new autos must use lever switches rather than rocker or toggle switches, according to a legal agreement between the federal government and all manufacturers.

2.9 Seat Load Sensor

When a person sits on the seats, the pressure sensor sends the weight of the occupant to the ECU. The data is subsequently sent by the ECU towards the cushion, that has its own control signal. The passenger airbag is activated or deactivated by the vehicle's computer based on this information. The OCS does more than simply detect weight. The seat load sensor as shown in Figure 2.15.

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Figure 2.15: Seat Load Sensor

CHAPTER 3

METHODOLOGY

3.1 Overview

There are now various ways for detecting alcohol in the human body that have been used and confirmed to be effective in closed compartment situations. However, each developed system will have its own set of advantages and disadvantages, necessitating the engineer's thorough analysis for an improvement. This project focuses on the issue of drunk driving and seeks the most advanced technology for an alcohol detection device. The methods used to construct a new enhanced system are detailed in this part titled Development of Alcohol and Driver Seat Detection System with Driver Window Opening. Taking an interest in the topic of alcohol detection devices and driver seat detection has been done to measure the alcohol content of drivers. In the methodology, every aspect of the approach is carefully scrutinized to achieve the project goals. The overall flow chart for the methodology of this project is shown in Figure 3.1.



Figure 3.1: Overall flow chart for the methodology of the project

3.1.1 Research Background

Researchers should perform extra study on the structure of existing alcohol detection and driver seat detection systems on the market before developing and creating new innovations. Discussion and examination of how the system works, as well as its effectiveness in detecting the percentage of alcohol concentration existing within the confined enclosure, are also crucial. The benefits and drawbacks of each component have been examined in order to find prospective changes in order to discover new methods to improve the research in the future. Background research is used to establish the best efficient alcohol sensor system. Nonetheless, this is based not only on the systems capabilities in the context of the alcohol detecting warning project, but also on the projects primary goal. It is possible to develop a suitable solution by considering as many variables as possible. Many pieces of information obtained about this area of research come together to build a more comprehensive point of view, which will assist in the selection of the best option for the new upgraded system. However, the constructed system will be rigorously evaluated to demonstrate its ability to manage an acceptable result that is compatible with the project's objectives.

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3.2 Product Benchmarking

Product was benchmarked during a literature review on alcohol detection driver seat detection systems. It was not only to identify prototype ideas developed by several researchers, but also to compare and develop a superior prototype sufficient to meet the project's objectives. At the Concept Design stage, several prototype designs, component designs and concept designs were assessed as ideas for a new prototype that would be offered in this project and then tested. In addition, an appropriate coding algorithm and chemical equation were reviewed. These tactics were also employed to develop an algorithm that would help in the enhancement of the prototype's mobility. More and more data collected during the literature reviews, the

better and wider the viewpoint that can be used to choose the optimal prototype to use for the system being developed in this project.

3.3 Concept Design

When combined with the vehicle, the product development concept becomes the primary and most significant aspect of the whole system's structure. This device's design concept is straightforward and sensible, and the use of simple current innovation makes it easier to fit in any type of car. The flexible design idea describes a new system with high compatibility with any car, which implies that it is not just luxury vehicles that can be installed with this device, but any other type of vehicle that has a requirement for an alcohol detection system.

3.4 Product Design Development

This section is dedicated to the advancement of Alcohol and Driver Seat Detection System with Driver Window Opening System. These criteria include conducting required market research before to real creation to get the greatest potential results for the end product while minimize product shortages and constraints. In order to achieve this goal, a method that uses all of the components united to build a system in the most efficient way is required. To do this, the design development process must be separated into three segments: market overview, component design and component development. All of the components are parallel to each other.

3.4.1 Market Survey

The identification of system components is essential, as is the comparison of those components with existing market items. The overall cost of this product was estimated using

the best pricing for Arduino UNO, buzzer, DC motor, servo motor, seat load detector, and LED that was found. Furthermore, the cost of the newly created alcohol detection device has been thoroughly evaluated. This ability is essential to ensuring that when it comes to automobile use, this new system provides the most value for money feasible. Table 3.1 shows the various types of Arduino boards that are currently available for usage. These parameters are chosen based on the system's size and the tasks that it must do. When the price element is configured, the capacity to give alcohol detection devices to any type of vehicle may be extended, providing the most effective manner of alerting drivers.

SPECIFIC ATION	Arduino UNO	Arduino Mega	Arduino Leonardo	Arduino Due
Processor	16MHz At mega 328	16MHz At mega 2560	16MHz At mega 32u4	84MHz AT91SAM3X8E
Operating Voltage	5V	5V		3.3V
Input Voltage	7-12V	7-12V	7-12V	7-12V
Input Voltage	6-20V	6-20V	6-20V	6-16V
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Digital I/O Pins	(6 PWM	(15 PWM	(7 PWM	(12 PWM
	output)	output)	output)	output)
Analogue Input Pins	6	16	12	12
Flash Memory	32kb	256kb	32kb	512kb
SRAM	2kb	8kb	2.5kb	2 banks: 64kb and 32kb
EEPROM	1kb	4kb	1kb	-
DC current per I/O pin	40mA	20mA	40mA	130mA
Price	RM 80-100	RM 160-175	RM80-105	RM 180-220

Table 3.1: Type of Arduino Board.

3.4.2 Component Design

The initial step is to determine which components are required for project, as well as the system's flow. Figure 3.2 illustrates how the new system works and Figure 3.3 shows the block diagram of the system.



Figure 3.3: Block Diagram

3.4.2.1 Arduino UNO

This Arduino Uno is a microcontroller designed by Arduino that's also built mostly on Microchip ATmega328P microprocessor. The board has a number of digital and analogue input/output pins that can be used to connect to various development board (shields) as well as other circuits. The board features 14 digital input/output pins (six of which are capable of PWM output), 6 analogue input/output pins, and is programmable through a type B USB cable that used the Arduino IDE (Integrated Development Environment). It may be powered by a USB connection or an exterior 9-volt battery, and it handles voltages ranging from 7 to 20 volts. It's comparable toward the Arduino Nano and Leonardo. The physical of the Arduino UNO are shown in Figure 3.4.



Figure 3.4: Arduino UNO

The term "UNO" meaning "one" in Italian, and it was selected to represent the first version of Arduino Software. The Uno board was the first of a sequence of USB-based Arduino, and it, along with earlier versions of the Arduino IDE, served as the benchmark versions of Arduino, that have since progressed to later releases. The board's ATmega328 is preconfigured with such a loader that allows fresh code to be uploaded without the need of an interactive element. While the Uno uses the standard STK500 protocol, it varies from all previous board in that it does not include the USB-to-serial driver chip. Instead, it employs an

Atmega16U2 (Atmega8U2 through to R2) configured as just a USB-to-serial converter. The specification of the Arduino UNO shown in Table 3.2.

Specification	Details	
Operating Voltage	5V	
Input Voltage (recommended)	7-12 V	
Input Voltage (limits)	6-20 V	
Digital I/O Pins	14 (of which 6 provided PWM output)	
Analogue Input Pins	6	
Flash Memory	32kb (Atmega328P) of which 0.5kb used by bootloader	
SRAM	2kb (Atmega328P)	
DC current per I/O pin	20mA	
Clock speed	16MHz	
فنيكل مليسيا ملاك	اوىيۈم,سىتى تىڭ	

Table 3. 2: Specifications of Arduino UNO

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3.4.2.2 MQ-3 Alcohol Sensor

The MQ3 sensor is one of the most popular in the MQ sensor category and also one of the most economical. In this application, MOS (Metal Oxide Semiconductor) sensors are employed. Because metal oxide sensors detect changes in sensing element resistance when exposed to alcohol. Alcohol concentration may be calculated by putting it into a voltage divider network. The MQ3 alcohol sensor, illustrated in Figure 3.5, operates at 5 volts direct current and consumes around 800 milliwatts. It can detect alcohol concentrations in the range of 25 to 500 parts per million (ppm). When measuring gases, the term concentration refers to the amount of gas present in the air divided by the volume of air. The two most common units of measurement in scientific knowledge are parts-per-million and percent concentration. Parts per million are used to represent the ratio of one gas to another (ppm). When it comes to alcohol, for example, 500 ppm means that out of a million gas molecules, 500 are alcohol and the remaining 999500 are other gases.



3.4.2.3 Light-emitting Diode (LED)

The LED bulb is a component that, when activated, emits a strong beam of light. This light will activate if the detected alcohol exceeds the legal limits, alerting the passengers of the automobile cabin that the driver's blood alcohol content has surpassed the legal limits. There will also be two LED lights used, the first of which is green, which signifies that the motorist passed the alcohol test. The other is a red LED that warns that the motorist failed the breath test. If the driver continues to drive after having drank an explicit amount of alcohol in the cabin, it will result in a dangerous situation. Figure 3.6 shows the LED that will be used in the system. During the warning indication phase, this LED performs its function.



Figure 3.6: Two colour of LED lamp

3.4.2.4 Buzzer

The piezoelectric buzzer, shown in Figure 3.7, is another component of the VAWSS system. When engaged, this device produces noise or buzzes. Buzzers are classed into three varieties, to mention a few: active buzzer, passive buzzer, and piezoelectric buzzer. The piezo-electronic buzzer is essentially made of a piezo-electrical substance with two electrodes. It is the simplest and most easy buzzer. Its purpose is to attract someone's attention on themselves. As a result, the buzzer on this VAWSS system will ring to notify the motorist if they are driving while inebriated. To work effectively, this buzzer requires the usage of an oscillator, such as a microcontroller. The buzzer is affordable and can produce a loud, high-quality sound without consuming a lot of electricity. Table 3.3 details the characteristics of the piezo buzzer that will be used in this VAWSS system.



Figure 3.7: Piezoelectric Buzzer

Details	UNIT	Large Piezo Buzzer
Min. Sound Output at10cm	dB	95
Rated Voltage	V DC	12
Operating Voltage	V DC	3~24
Resonant Frequency	Hz	3900±500
Max. Current Consumption	mA	10
Tone Nature	-	Continuous
Alarm Diameter	mm	22
Alarm Height	mm	10
Price per piece	RM	2.00
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Table 3.3: Details of the piezo buzzer used in VAWSS system

This piezo buzzer is being used by the VAWSS project to create the desired sound for

the system. When the amount of alcohol measured by the MQ-3 sensor exceeds a predefined threshold level, it will activate. The driver seat sensor, in addition to the MQ-3 sensor, is used to determine the driver's position. When the system detects a high BrAC level between the driver inputs, the buzzer will ring. The Buzzer is similarly affordable to acquire and simple to use with the Arduino UNO, which is now in stock at local electronics stores.

3.4.2.5 Direct Current (DC) Motor

A direct current (DC) motor is an electrical motor that rotates and converts direct current electrical energy into mechanical energy. A direct current (DC) motor is an electrical motor that rotates and converts direct current electrical energy into mechanical energy. It is one of several kinds of rotary electric motors. They are divided into two types: magnetic field forces and other types of magnetic field forces. Most direct current motors include an internal mechanism, which can be electromechanical or electronic, that changes the direction of current in a section of the motor on a regular basis. A direct current motor's speed may be varied across a wide range by varying the supply voltage or raising the current intensity in the primary winding. The universal motor, as shown in Figure 3.8, is a small and lightweight brushed motor that operates on direct current and is used in combination with other components. Table 3.4 contains more information about the 6V DC motor.

The most popular type of motor used in Arduino projects is a DC motor. Most direct current motors have only two leads: one positive and one negative. When these two wires are connected directly to a battery, the motor starts rotating. If the leads are switched, the motor will start rotating in the other direction. This DC motor will function as the vehicle starting system in this VAWSS project since this project scope is not directly connected with the vehicle system.



Figure 3.8: 6V DC motor

ITEM	SPECIFICATION
Rated Voltage	6V
No. load speed	$12k \pm 15\%$ rotation per minute
No. load current	\leq 280 mA
Operating voltage	1.5 V to 6.5 V
Starting Torque	\geq 250 gcm (depends on blade used)
Starting current Insulation Resistance	≤ 5A > 10 Ω
Rotation Direction	Clockwise at positive terminal
Shaft gap	KNIKAL MALAYSIA MELAKA 0.05-0.35 mm

Table 3.4: 6V DC motor specifications

3.4.2.6 C40R Servo Motor

Figure 3.9 shows a servo motor, which is a small motor with an output shaft. This shaft may be positioned to certain angular locations by sending a coded signal to the servo. As long as the preset signal is present on the input source, the servo will retain the shaft's angular position. If the coded signal changes, the angular location of the shaft changes. Despite their small size and poorly manufactured control electronics, the motors are surprisingly powerful. A basic servo, such as the Cytron C40R type, generates an amazing torque of 6 kg.cm given its size. It also uses electricity based on the mechanical load. As a result, a lightly loaded servo consumes less energy.



Table 3.5 shows the C40R servo motor parameters. A common servo has an angular motion control range from 0 to 180 degrees. The motor's output power is related to the distance it must travel. If the shaft must turn a long distance, it will operate at maximum capacity, and vice versa. The angle is sent through the control wire. Pulse coded modulation is used to compute the angle. The duration of the pulse determines how fast the motor spins. A 1.5 millisecond pulse causes the motor to rotate 90 degrees, as seen in Figure 3.10. The motor will spin the shaft closer to 0 degrees if the pulse is less than 1.5 milliseconds duration. The shaft spins closer to 180 degrees if the pulse is greater than 1.5 milliseconds.



Figure 3.10: Servo motor Pulse Coded Modulation

Specifications	Servo model
ST C	Cytron C40R
Speed (s/60°)	0.19
Torque (Kg.cm)	6.00
Signal To Control Angle	TTL PWM
Operating Voltage (VDC)	4.8-6.0
Operating Frequency (Hz)	50.0
Moving Range(degree)	0-180 <u>- 180</u>
Wiring (Black/Brown Wire)	Ground
Wiring (Red Wire) TEKNIKAL MAL	A4.8-6.0 MELAKA
Wiring (Orange/Other Wire)	PWM signal
Dimension (mm)	~ 40.2x19.8x36
Weight (g)	38.0

Table 3.5: C40R servo motor specifications

Because this project scope is not directly connected with the vehicle system, this servo motor will function as the vehicle power window system in this VAWSS project. This motor will be used to demonstrate a 20mm (estimated window regulator motor degrees) opening of the driver's window to increase vehicle interior ventilation.

3.4.3 Alcohol Content Equation

When a motorist blows into an alcohol breathing detector, any alcohol in the driver's respiratory breath is oxidation at the anode, resulting in the creation of acetic acid:

 $CH3CH2OH(g) + H2O(l) \rightarrow CH3CO2H(l) + 4H+(aq) + 4e-$

At the cathode, atmospheric oxygen is reduced:

 $O2(g) + 4H+(aq) + 4e \rightarrow 2H2O(l)$

The overall reaction is the oxidation of ethanol to acetic acid and water.

 $CH3CH2OH(1) + O2(g) \rightarrow CH3COOH(aq) + H2O(1)$

The electric charge generated by this reaction was accelerated and exhibited as detecting resistance using an alcohol sensor, MQ-3, and a microcontroller. The collected sensing resistance data was then computed as an estimate of total blood alcohol content (BAC). Furthermore, according to the datasheet, the greatest concentration of alcohol that the sensor can detect is 0.4 mg/L, which equals 20,0000hm of detecting resistance. As a result, the prohibited limit for driving in Malaysia is 0.05 mg/L of alcohol content, which is equal to 2,500 ohm of sensing resistance. In the programming code, this number has been established as a threshold to separate VAWSS system reaction between legal and illegal driver's alcohol content.

3.4.4 Conceptual Prototype Development

Tinker CAD software was used to create design concepts inspired by the various projects listed in the literature review. The software was used to build the pre-planned circuit. The concept of the prototype from (Kumar, 2018) was adopted, as illustrated in Figure 3.11, with some extra components such as a DC motor and a C40R servo motor. To simplify the circuit, the LCD display was removed. The system's other components have remained intact, but the system's flow has been completely changed. The Tinker CAD platform is utilized to show the idea design, as shown in Figure 3.12.



Figure 3.11: Drink and Drive Detector prototype (Kumar, 2018)



3.4.4.1 Simulink Block Diagram

Every new device that makes use of such a microcontroller, including an Arduino, must be written in C++ or the other programming language. Matlab Simulation application was used to programme the microcontroller in this project. It is the fundamental component and expertise required to regulate the sensor and its components in terms of the system parameters. The software is the brains of this project, since the Simulation model must be uploaded in accordance with the system's requirements with each component to work. The system will produce based on a predefined block diagram model. If the model is incorrect, the computer will not operate properly.

The Matlab Simulink software, together with the Arduino simulations add-on packages, must be installed in order to build the programme code and deliver it to the microcontroller.
For newbies to learn from, there are various examples of simple arduino models available on the web as well as on the Arduino websites. In this VAWSS system, the simulink block model will measure parameters including such Leds, piezo buzzer, DC motor, and servo, and then calculate the sound and light warn signal, and also component reaction about the driver's alcohol content in the cabin. This portion happens during data processing and determines whether or not to trigger the LED light indication, buzzer sound, and motor movement. Figure 3.13 shows the block diagram model for VAWSS system.



Figure 3.13: VAWSS Simulink Block Diagram Model

3.4.4.2 Conceptual Prototype Construction

To develop the prototype, all of the hardware and software listed in Table 3.6 were merged. The Arduino Due has been connected toward the MQ-3 Alcohol Sensor, Buzzer, LED, Servo motor, and DC motor. The MQ-3 Alcohol Sensor's VCC pin will then be connected to a 5V pin, the ground pin to a breadboard, as well as the output pin to the input pin (A0) on the Arduino UNO board. The buzzer's positive terminal is grounded and attached to PWM pin 2. The LED is then divided into two types: red and green. The red LED was linked to PWM pin 3 and the green LED was attached to PWM pin 5, and both LEDs were grounded.

Following that, connect the servo motor's three pins to 5V, PWM pin 4 and ground. Because the Arduino board's 5V pin is restricted, the breadboard was utilized to access either 5V and ground pins. Finally, the most difficult component was indeed the DC motor. This is due to the fact that a DC motor could be directly connected to the board; otherwise, it would not operate correctly. As a result, transistors and a resistor were added. The positive terminal of the motor was connected to the 5V pin, whereas the negative terminal was connected to the transistor's collector pin. A resistor connects the transistors base pin to PWM Pin 6. From the transistor emitter pin to the board ground pin, each DC motor was grounded. After assembling all of the components, the prototype was connected to a computer in order to incorporate programming language from of the MATLAB Simulink program. Figure 3.14 depicts the final conceptual prototype.

No.	Type of Component	Component Name
1	Software	Matlab Simulink
2		MQ-3 alcohol sensor
3		Buzzer
4		LED
5	Hardware	DC motor
6		Servo motor
7		Driver seat load sensor

Table 3.6: List of Software and Hardware Components



Figure 3.14: VAWSS Conceptual Prototype

CHAPTER 4

RESULT AND DISCUSSION

4.1 Overview

This chapter discusses the outputs of the testing that was done on the conceptual prototype of the VAWSS system. This discussion is followed by a discussion of the results in reference to each of the project's goals. A graph reading was obtained using Integrated Development Environment (IDE) to kick off the discussions, which was then followed by a conceptual prototype test and discussion. This was all done in accordance with the chronology of approaches that were created for this project.

The testing of a conceptual prototype of the newly created VAWSS system is essential, not only for determining whether or not the prototype is operating correctly, but also for determining the prototype's pluses and minuses, which may have been overlooked in the past. In order to determine how accurate the device is, this prototype was put through a series of tests and compared to a Breathalyzer model AT6000.

4.2 Graph Output Result

4.2.1 Graph when idle (no alcohol input)

The outputs of the data collection are shown in Figure 4.1. These outcomes were obtained when the alcohol sensor was not connected to any source of alcohol. Being in this state is also referred to as being idle. When there is no alcohol detected in the system, the reading from the BAC, which is expressed as a percentage is always 0.00%. In this particular instance, the system does not turn on the buzzer, red led and servo motor. In the meantime, the green led flashes to signal the available alcohol limit and the dc motor is operating to indicate that the vehicles starting mechanism is operational. Both of these indications take place simultaneously.



Figure 4.1: Data obtained when idle condition

4.2.2 Graph when alcohol content below permissible limit

Figure 4.2 shown the data obtained when the alcohol source is placed on the alcohol sensor but the reading remains below the illegal threshold. The reading begins at 0% and rises up to 0.01% in the 4th second before gradually dropping back down. In this state, the system does not activate the buzzer, red led and servo motor. Meanwhile, the green led flashes to indicate the accessible alcohol limit and the dc motor runs to indicate that the vehicles starting system is not turned off.

Alcohol Detection Under 0.05%



Figure 4.2: Data obtained when below 0.05% BAC

4.2.3 Graph when alcohol content exceeds permissible limit

The results shown in Figure 4.3 were obtained when the tester had a blood alcohol level of more than 0.05%. In the 6th second, the MQ3 sensor detects an alcohol content of 0.05%. At the start of the test, the reading is 0.00% whenever the sensor is idle. "The rate of increase in BAC depends on individual drinking patterns such as the speed and frequency of drinking and also the amount of alcohol contained in each drink" (A. W. Jones, J.G Wigmore, and C.J.

House., Sep 2006). However, as the drunk tester blows his breath on the sensor, the reading gradually rises. The reading rises up to 0.06%, which is already higher than the permissible level and causes a response from the system. After that, the green led will turn off and the red led will begin flashing to show that there is a warning. The buzzer is also activated while the dc motor is turned off to represent the vehicles starting system being cut off to prevent the driver from driving the vehicle in dangerous conditions. This is done to prevent the driver from being in control of the vehicle while it is in operation. Lastly, the servo motor will rotate of 90 degrees to indicate that the power window will open the driver window by 20 millimetres. This action will increase the airflow within the vehicles cabin, which will protect the driver from a lack of oxygen.



Figure 4.3: Data obtained when alcohol content exceeds 0.05% BAC

4.2.4 Graph when seat sensor detect load

The data obtained is shown in Figure 4.4 and it was obtained as a result of the driver seat sensor, which measures driver load. Before the driver proceeds to the next step in starting of the vehicle, this sensor will detect the load that they are carrying and then proceed to the next step. On the graph where the result of this test was obtained, the value 1 at the node can be seen displayed. From the start of the test until the end, the number 1 of node is displayed, indicating that the driver is currently seated in the driver seat. The driver subsequent action will obtain no results as long as the load sensor in the driver seat is unable to detect it.



Seat Sensor vs Time

Figure 4.4: Data obtained when driver on the seat

4.2.5 Graph when servo window open

Figure 4.5 shows the data collected when the servo window is open and the red led is turned on to indicate the presence of a threat. The servo window will open 7th seconds after the MQ3 sensor detects a BAC reading that is higher than the predetermined level. The servo motor does not start until it receives a command from the red led, which indicates a warning anywhere between the start and middle of the test. The servo window will open 7th seconds after the command is received and the BAC reading is determined to have exceeded the limit. The servo window on the driver side can be opened to a 90-degree angle.



Angle of Window Opened vs Time

4.3.1 Inside Vehicle Cabin Testing KNIKAL MALAYSIA MELAKA

This test is essentially focused with the realistic view within the vehicle cabin, which is where the system is put to the test to see how well it functions in a real-world setting. The evaluation was conducted in the evening using a 2017 model year Perodua Myvi Gen-3 vehicle. The tester will be positioned in the front passenger seat with the windows rolled up completely around them. As shown in Figure 4.6, this prototype has been put through its paces and compared to a breathalyser test model AT6000 in order to determine how accurate the device actually is. The results of the tests are shown in Table 4.1.





Table 4. 1: Inside vehicle cabin test result

No. of test	BAC readings by VAWSS (%)	BAC readings by AT6000 Breathalyzer (%)	Percentage of error	VAWSS System Reaction
1	0.00 <mark>UN</mark>	IVEF0:00TI TE	EK10.00% L N	 Green LED flash DC motor running (Vehicle can be start normally)
2	0.02	0.02	0.00%	 Green LED flash DC motor running (Vehicle can be start normally)
3	0.06	0.05	10.00%	 Red LED flash Buzzer beeps DC stop running (VSS disabled) Servo Motor moves by 90 degrees (VPWS opened the driver's window by 20mm)
4	0.04	0.04	0.00%	Green LED flashDC motor running (Vehicle can

				be start normally)
5	0.10	0.10	0.00%	 Red LED flash Buzzer beeps DC stop running (VSS disabled) Servo Motor moves by 90 degrees (VPWS opened the driver's window by 20mm)

There is a total of five research participants taking part in the examination. The amount of alcohol consumed by each tester has an effect on the amount of alcohol they register in their system. According to the findings, four out of the five results demonstrate that the VAWSS has an error rate of zero percent, while the other result demonstrates an error rate of ten percent. There are no hiccups in the simulation of the VAWSS system's response to the reading of the alcohol content because all of the necessary actions are carried out correctly.

ونوم سيخ تتكنيك ملسباً ملاك 4.4 Discussion

SAIND

The improvement of Vehicle Alcohol Window Seat System by Alcohol Detector Device (VAWSS) has succeeded in detecting alcohol content in human breaths in a variety of conditions based on the data collected. This demonstrates that the new system is very compatible and suitable for use in every car in order to reduce the number of road accidents not only in Malaysia but also nationally. Throughout all of the tests, the prototype met all of the criteria required by each condition. There is no triggered false signal. Furthermore, the VAWSS system can effectively perform all testing and comparison between aftermarket alcohol measuring devices. As a result, it is critical to develop a very useful technology like this because it will benefit people more.

However, it has been observed that the reading of alcohol is slow on increasing and decreasing alcohol content, particularly during the recovery process of the VAWSS devices, implying that the sensors were having some difficulty in the recovery process. Another observation is that the servo motor continues to move slightly for no apparent reason at times. In practise, this action could cause long-term damage to the power window. It is possible that the motion of the servo motor is caused by insufficient current flow at times. This could be avoided by using a more powerful power source, such as a car battery. However, in terms of performance, the VAWSS system is an appropriate device to be installed in any type of vehicle in Malaysia so that drunk driving issues can be gradually eliminated in the future.



CHAPTER 5

CONCLUSION

5.1 Conclusion of The Project

Vehicle Alcohol Window Seat System Improvement the Alcohol Detector Device (VAWSS) has demonstrated the ability to eliminate the issue of drunk driving accidents on the road. This newly developed device has great potential for the future, as it will raise passenger awareness of the dangers of drunk driving. On the other hand, because it is low-cost and compatible with any type of vehicle, this system should be widely used to reduce the number of road accidents in Malaysia. The sensor is the most important consideration in developing an alcohol detection system. This is due to the fact that failing to select the appropriate type of sensor can result in a complete failure to provide accurate information to the passenger. As a result, the right sensor for the current work is considered low-cost and reliable.

In order to create the developed technology in a manner that is superior to that which existed in the past, this project takes into consideration a great deal of information. The procedure for the project was adhered to very specifically so that there would be no errors or steps skipped that might have an impact on the end result. As a direct consequence of this, a model comprising the criteria necessary to achieve the goals of the project has been developed. The findings of the practical tests indicate that the primary objective of the current study was successfully accomplished by the product that was being tested. In conclusion, the creation of the VAWSS has the potential to have a sizeable influence on Universiti Teknikal Malaysia Melaka (UTeM) due to the fact that it is one of the pressing matters that may pique the interest of a large number of individuals. The idea behind this system is also an advancement on the one being worked on before, as it will make it possible to continue conducting research and making discoveries related to the project in the future years.

5.2 Recommendation of Future Work

The VAWSS system has interior for development in the future with regard to the quality of its sensors. This can be partially attributed to the MQ-3 semiconductor sensor, which is responsible for the recovery system's sluggishness. In the event that a sensor with superior performance to the one currently in use becomes commercially viable, the VAWSS system will exhibit increased dependability regardless of the environment. In addition, for the purposes of commercialization, the product will use a circuit printed board to maximise space usage and casing size. This is because the circuit printed board will use copper connections to connect each component printed on the moulded board, thereby trying to minimize the use of bulky wire. Additionally, the size of the casing VAWSS system will be automatically optimised. Aside from that, components of the Internet of Things (IoT) like GSM and GPS modules ought to be incorporated in order to be in step with the fourth wave of the industrial revolution. This modification, which looks more advanced in the future, has the potential to have a significant effect. For instance, if a driver is found to be under the influence of alcohol, the system will send a warning message along with the driver's precise location to an emergency number that has been pre-programmed. This number could belong to the driver's family or the local police department. In addition to that, incorporating the system into the body of the vehicle itself makes it more suited to be used in a vehicle. That way, we will be able to determine with absolute certainty whether the technology can be applied to a real vehicle or whether there are still aspects of the system that need to be refined before it can be considered a realistic one. In conclusion, the implementation of the VAWSS system would result in a better future for Malaysia because it would result in a gradual reduction and eventual elimination of the number of road accidents caused by drunk driving.

5.3 Project Potential

This project has a significant possibility of breaking into the automotive market, especially since the VAWSS provides a high level of safety to drivers before they start driving. This can also help to avoid vehicular accidents. VAWSS will need to be improved and expanded in terms of the functions it can perform in the future to ensure driver safety.



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Tuan

PENGKELASAN TESIS SEBAGAI TERHAD BAGI TESIS PROJEK SARJANA MUDA

Dengan segala hormatnya merujuk kepada perkara di atas.

2. Dengan ini, dimaklumkan permohonan pengkelasan tesis yang dilampirkan sebagai TERHAD untuk tempoh LIMA tahun dari tarikh surat ini. Butiran lanjut laporan PSM tersebut adalah seperti berikut:

Nama pelajar: MUHAMMAD SHAFIQ BIN SAMSUDIN Tajuk Tesis: Development of Alcohol and Driver Seat Detection System with Driver Window Opening (VAWSS)

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3. Hal ini adalah kerana IANYA MERUPAKAN PROJEK YANG DITAJA OLEH SYARIKAT LUAR DAN HASIL KAJIANNYA ADALAH SULIT.

Sekian, terima kasih.

"BERKHIDMAT UNTUK NEGARA" "KOMPETENSI TERAS KEGEMILANGAN"

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