Chapter 1

INTRODUCTION

The scenario indicates that most road events are triggered by drunk driving. Drivers drinking alcohol are not stable, so they drive belligerently. It takes place on the lane, which can both be dangerous for the lives of road users, including drivers. The vastness of the disruptive phenomenon is beyond limits.

The known section currently discourages drivers from driving when drunk so that the fine will stop them from alcohol. Any framework of drunken drivers may be a problem. Police and road safety officers are justified in that humans are innately incapable of even being present as a State within the same house and moment. This efficient scope of law enforcement officials inhibits each other's manual efforts. Drinkdrive to the edge. Consequently, an algorithm for alcohol screening is essential. This can work without time and space being confined Mission.

Accidents involving drunk drivers in Malaysia became more serious when 67 accidents involving three fatalities occurred in just five months. The figure was found to have exceeded the total number of cases in 2018, namely 60 accidents and three fatalities. In the meanwhile, in 2019, there were 56 cases of accidents with four deaths.

1.1 DOCUMENTATION

An alcohol detection system for a vehicle has an alcohol sensor, for which alcohol measurement preparation processing such as heating the alcohol sensor to a predetermined temperature is performed, so that the alcohol sensor operates under the stable operation state. The alcohol measurement preparation processing is started, before a driver actually gets in the vehicle. For example, the preparation processing is started, when a predetermined manipulation of a driver on the vehicle before entering the vehicle is detected. The manipulation may be unlocking or opening of a vehicle door

Fig 1.1 Alcohol testing at workplace

The proposed device would measure the many conditions that can cause an alarm to signify the driver's drunk or sober state when fitted on a steering wheel within the car. For the recommendation to improve the project in the future, particularly in preventing system cheats and device damage. Concerning anti-cheating, one common approach to cheating the device is to request another person to take a clean sample of a breath when starting the car. The recommended advancement and generations to work to mitigate this problem involve a face lock application for security to ensure that the car is the authorized driver taking the check procedure.

For methodology, the reason for the systematic methods of theoretical analysis involves the progress and flow of projects to be carried out, such as block diagrams, flow charts and project planning. This section is a significant part of the project's activity regarding the method and methods used to ensure the functionality of the project. The research methodology used in the analysis will also be defined and explained.

However a lot of work is done to provide the safe driving mechanism but a lot has remained in term of integration of these technologies for the optimal solution. Present work provides a way to deal with the most sophisticated and advanced system which prohibits the driving by a alcohol consumed person. The present work addresses the development of an alcohol sensor by using pre-existing technologies followed by app development on android studio [22-29]. The safeguards are provided with the help of GPS module, Triggering an alarm and Automatic ignition off etc. Alcohol sensor mechanism is developed with the help of MQ-3 sensor, Microcontroller (ATS 8051), LCD Display, Buzzer, Relay, DC Motor (For System Demonstration), GPS and GSM Module.

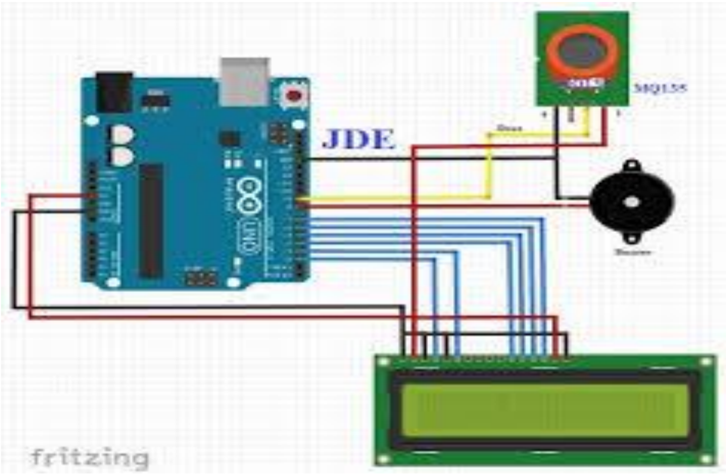

Fig 1.2 Digital setup of Arduino alcohol detector

Chapter 2

SYSTEM COMPONENTS

2.2 Core Components

Fig 2.3 Arduino uno

Arduino Uno is an open-source microsystem module produced by Arduino.cc and based on the ATmega328P microchip. The system contains digital and analogue input/output (I / O) pins connected to different expansion cards (shields) and other circuits. The board has 14 digital I / O pins (6 with PWM output) and six analogue I / O pins, which can be programmed over a USB B cable using Arduino IDE. It can be operated by a USB cable or external 9-volt battery but can handle 7 to 20-volt voltages. It's like an Arduino or Leonardo. It is distributed under the Creative Commons Share-Alike 2.5 permit and can be found on the Arduino website. Such programme versions also contain concept and product file.

2.3.2 Alcohol Sensor

Fig 2.4 Alcohol sensor

The alcohol sensor MQ-3 is very sensitive. It was made of SnO_2 (Tin Dioxide). The composition is calculated so that alcohol is highly effective and benzene is minimal. It has an immediate drive mechanism to offer a vivid reaction, efficiency, and longer life. It has a simple style of interface. Port pins 1, 2 and 3 tend independently to the output on the sensor, VCC and GND. The sensor descriptions are shown in the table below.

Parameter Name	Sensor type	Detection gas	Concentration	Voltage	Load resistance (R_L)	Heater resistance (R_H)	Sensing resistance (Rs)	Slope	Temp humidity
	Semiconductor	Alcohol gas	0.04-4mg/l alcohol	±5.0V	Adjustable	31Ω ±3 Ω	2KΩ-20KΩ (in 0.4mg/l alcohol)	200–1000ppm	20±2; 65%±5%

Fig 2.5 Sensor table

The alcohol sensor detects alcohol concentration and reads Arduino to secure whether the level concentration is decreased.

2.3.3 BUZZER

Fig 2.6 buzzer sensor

The working principle of a buzzer depends on the theory that, once the voltage is given across a piezoelectric material, then a pressure difference is produced. A piezo type includes piezo crystals among two conductors.

Once a potential disparity is given across these crystals, then they thrust one [conductor](#) & drag the additional conductor through their internal property. So this continuous action will produce a sharp sound signal.

2.3.4 Liquid Crystal Display 16x02 (LCD)

Fig 2.7 LCD display

The liquid crystal display of the LCD1602 or 1602 in a dot matrix module shows letters, numbers, and symbols, respectively. It consists of a matrix position of 5x7 or 5x11; one character can be shown in each position. A dot pitch exists between two symbols and a space between the lines separating characters and lines. 2 types of 16 characters are revealed in Model 1602. LCD1602 usually has parallel ports, meaning several pins can operate simultaneously. The 8-port and 4-port LCD1602 can be separated. All digital ports are nearly fully filled when an eight-port connection is used. No ports will be open if you want to connect more sensors. Here, therefore, the fourport relation is used for better use.

2.3.5 Jump wire

Fig 2.8 jump wires

A jumper wires the wires that conduct electric in electric cable with a connector at each end. It is usually used in communication, connecting form two-part, components from the breadboard and so on. Types of jumper wire: • Solid tips • Crocodile clips • Banana connectors • RCA connectors • RF jumper cables.

2.3.6 LED light

Fig 2.9 LED light

We will use the light sensor to get light readings at a set interval (eg. Once per second). The light sensor will return values representing different levels of light eg. Between 0 and 1023 (where 0 means very dark and 1023 means very bright). You can specify a value that, when the sensor reading is less than this amount, an LED light will be turned on, and when the light is greater than this amount, then the LED light will be turned off.

Chapter 3

METHODOLOGY

The experimental set for the sensor is shown. For assembling of sensors, we are using pre-existing technologies. Microcontroller act as a heart of the system. The main eight components for development of sensor are MQ-3 sensor, Microcontroller ATS8051, Analog to Digital Converter, GPS and GSM Module, LCD Display, Buzzer, Relay, DC Motor (For System Demonstration) and there are other off components which are in use. The flow chart works when a person sitting inside a car on driver seat has consumed alcohol or not. If person has not consumed alcohol then car will run smoothly else, if MQ-3 sensor detects alcohol particles in the air then it will show the value of alcohol concentration on LCD display if value is more than recommended level the microcontroller give signal to buzzer circuit and buzzer is turned on and at the same time relay is turned off due to this ignition of the car is deactivated. Alcohol detection system with buzzer indicate project is extend by adding an ignition key at the input and a DC motor at a output. The input ignition key is given to the microcontroller. It is used to find out the car whenever a car is started whenever a key is inserted into the ignition lock at the that time the alcohol detection process is started as soon as alcohol detects sensors GPS and GSM Module comes into play it will helping us in sending the location to one of its family member.

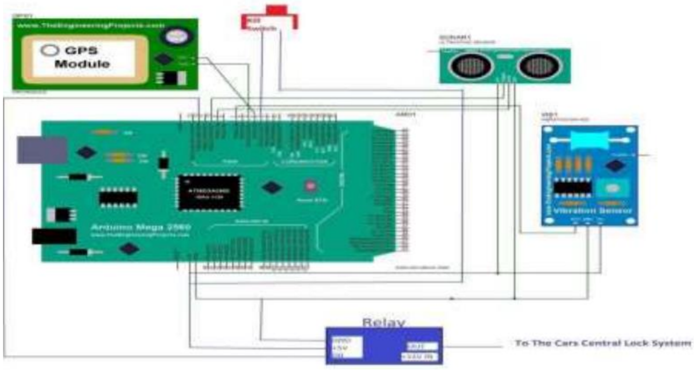

Fig 3.1 experimental set up of sensors

3.1 Prototype

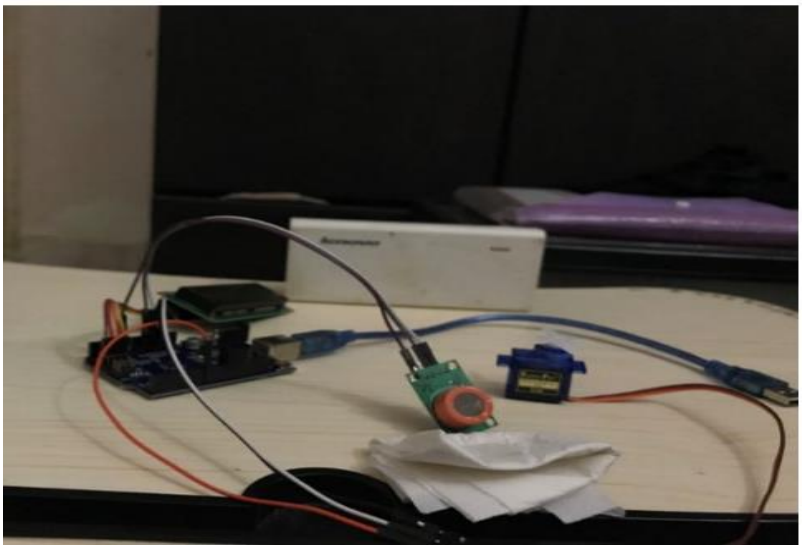

Fig 3.2 Setup Prototype

Figures 3.2 show the results of using the Alcohol Sensor to determine the existence of a silent in-vehicle breathalyzer detection system for the driver is currently unclear. It shows a reading of 85.94 for the alcohol level. Because the level is less than 150, it is safe to assume that using the alcohol sensor, no alcohol composition was discovered in the driver's exhaled air. As a result, it could be regarded as an alcohol level that has gone undetected.

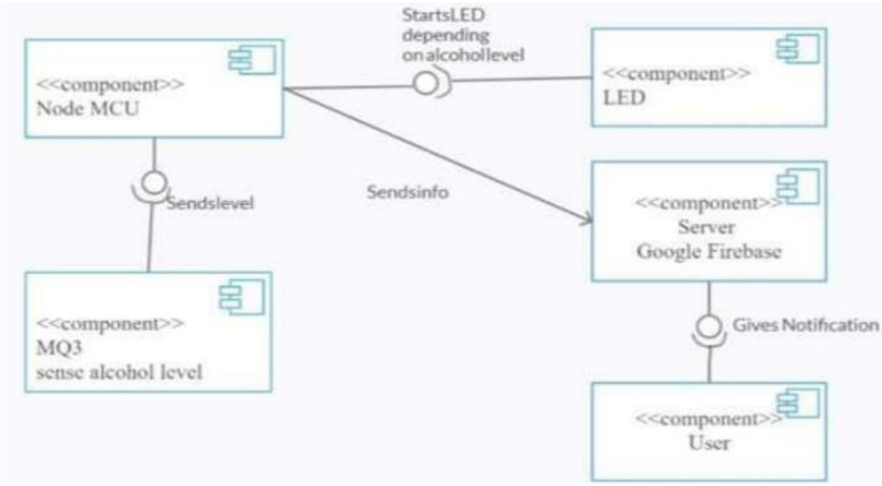

Fig 3.3 component diagram

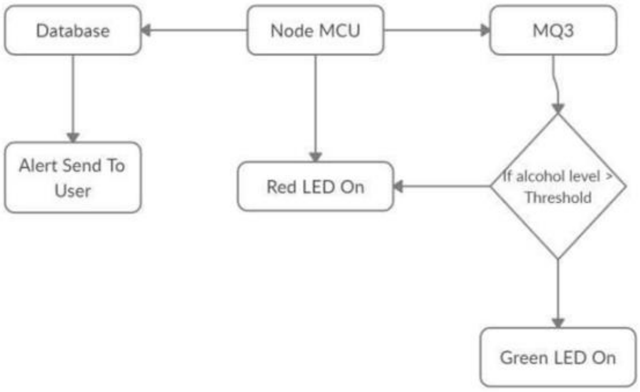

Fig 3.4 Activity diagram

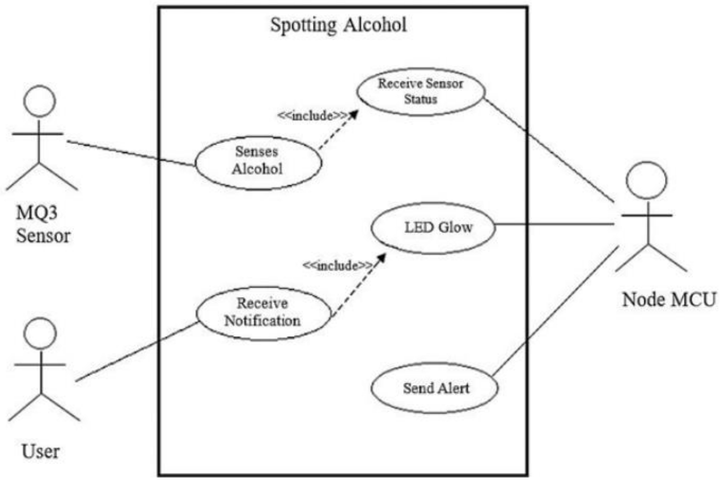

Fig 3.6 User Case Diagram

3.2 Importance of testing

- Software Testing Saves Money Testing has many benefits and one of the most important ones is cost-effectiveness. Having testing in your project can save money in the long run. Software development consists of many stages and if bugs are caught in the earlier stage it costs much less to fix them. That is why it's important to get testing done as soon as possible. Getting testers or QA's who are technically educated and experienced for a software project is just like an investment and your project will benefit budget wise.
- Security Another important point to add is security. This is probably the most sensitive and yet most vulnerable part. There have been many situations where user information has been stolen or hackers have gotten to it and used it for their benefit. That is the reason people are looking for trusted products that they can rely on. As a user of many products and apps, I am always looking for products

that I would give my information to with confidence and know that it will be safe; perhaps so do you. Our personal information and what we do with it should stay as private as possible, especially using services where it is a vulnerability to us, for example, banking information, security details etc. How testing can help your product security:

- The user gets a trustworthy product
- . Keeps user’s personal information and data safe.
- Vulnerability free products.
- Problems and risks are eliminated beforehand.
- Saves a lot of troubles later on.

3.3 product quality

In order to make your product vision come to life, it has to work as planned. Following product requirements is imperative, to an extent, because it helps you get the wanted end results. Products always serve users in some ways, so it’s very important that it brings the value it promises, hence it should work properly to ensure great customer experience. Development of an app, for example, has many processes included and testing gets a glimpse of every bit – it checks if the apps graphics are aligned properly, tests the main functionality, checks if menus are intuitive, etc.

3.4 types of testing

3.4.1.Automated testing:

As we’ve pointed out before, there are some cases where manual testing is the better option. However, some QA tests are either too tedious or too complex for human testers. That’s why smartly executed automated testing, alongside manual tests, can help assure quality and release better products, faster. A few automated testing best practices and challenges include:

The thoughtful design, build, and maintenance of accurate test scripts

The alignment and integration of existing engineering workflows with your automated testing process

The creation and maintenance of your test automation framework, including infrastructure

- The management of test runs and setups
- Rigorous reviews to validate test results and defects

- Careful monitoring and rapid response to noise and flaky tests.

3.4.2.Security Testing:

Privacy and security are the 2 major requirements of an app. However, in Banking, healthcare, this becomes the primary requirement. Testing of the data flow for encryption and decryption mechanism is to be tested in this phase. Access to stored data is also tested in this phase.

3.4.3.Field Testing:

Field testing is done specifically for the mobile data network and not in-house but by going out and using the app as a normal user. This testing is done ‘only’ after the whole app is developed, tested and regressed (for bugs and test cases). It is basically done to verify the behaviour of the app when the phone has a 2G or 3G connection. Field testing verifies if the app is crashing under slow network connection or if it is taking too long to load the information.

3.5 Report

The circuit can sense the alcohol after particular level thus minimizing the chances of accident. The alcohol is detected by the sensor; it sends the signal to the Microprocessor which in turn sends the signal to the owner of that vehicle. This takes place until the alcohol is not below the critical level

3.6 Drawbacks and Limitations

- The limitation for this IOT kit that it can be poisoned.
- Also the IOT kit is not suitable for areas where CO and CO2 produced.
- Also the drawback is that needs 24/7 power supply and works only when +5v power supply.

3.7 Enhancement

This application already provides the alcohol level, buzzer feature, double alert notification. We enhance this application by add more features like more strong sensor and GPS, to get the location of the car. Also can add engine locking for safety. It would help the user to know where his/her car is, in which condition, and is it in good hands, and in case important contacts. Also could take necessary precaution needed for it. Also add login module and store data in dynamic database (Firebase). Also user will have more specific information and more clarity about their car and driver safety. Also, we can add a chat module for customer care, as when and if the kit does not work or has a problem. Then they could contact us for help. Finally, there can be one more feature added to this system i.e., token that can be collect on cloud database which can be used to send the information by the car owner to the police office.

3.8 Test Cases:

Test ID	Test Case Description	Input	Expected Output	Actual Output	Pass/Fail
1	MQ3 Sensor Working.	Sense the alcohol level.	Glow the appropriate LED.	Glows the appropriate LED successfully.	Pass
2	ESP8266 Node MCU.	Output of Sensor, buzzer, LED.	Read correct input of sensor, control of LED, & buzzer.	Successfully read's and controls.	Pass
3	Sensor: If alcohol level<threshold.	Alcohol.	Red LED should glow.	Red LED On successfully glows	Pass
4	Sensor: If alcohol level>=threshold.	Alcohol .	Green LED should glow.	Green LED On successfully glows	Pass
5	Buzzer: Should beep when alcohol detected.	Instruction given by Node MCU.	Should beep.	Beeps successfully.	Pass
6	Notification	Firebase sends the sensor value To app.	A pop up notification should appear.	Notification successfully received.	Pass
7	Firebase console data:	Node MCU data	Values from Node MCU should display on firebase console accordingly	Correct values displayed on firebase console	Pass
8	Application: Working of buttons	Click on the buzzer on/off button.	The buzzer on the IOT kit should get turned on/off.	Successfully the buzzer turns on/off.	Pass
9	Application: Call button	Click on the call button	Phonebook of device should open with phone number.	Successfully open with correct number.	Pass

3.9 Results and Discussion

Fig 3.7 The alcohol level could be considered an undetected alcohol level.

Figure 3.7 show the results of using the Alcohol Sensor to determine the existence of a silent in-vehicle breathalyzer detection system for the driver is currently unclear. Figure 1 shows a reading of 85.94 for the alcohol level. Because the level is less than 150, it is safe to assume that using the alcohol sensor, no alcohol composition was discovered in the driver's exhaled air. As a result, it could be regarded as an alcohol level that has gone undetected.

Fig 3.8 Alcohol level for NORMAL condition

Figure reveals a Liquor Sensor reading of 87.89 that could be classified as "NORMAL" because the alcohol level is between 150 and 400. Therefore, the motor locking of the servo motor will not be engaged, and the driver can drive freely.

Fig 3.9 The alcohol level is between 300 to 400 for DRUNK condition.

Figure depicts an alcohol level reading ranging from 150 to 400 milligrams per litre. In the driver's exhaled breath, the sensor detects a bit of concentration of alcohol. As a result, a "DRUNK" message will appear on the screen, and the buzzer will begin to buzz loudly to alert the driver. The buzzer will continue to ring incessantly. The purpose of the system is to protect the folks when driving a vehicle by reducing the number of accidents caused by the engine locking system.

PPM (PART PER MILLION)	PERCENTAGE (%)
0	0
100	10
200	20
300	30
400	40
500	50
600	60
700	70
800	80
900	90
1000	100

Fig 3.10 Sensitivity level Characteristic

LEVEL OF DRUNKNESS			
Alcohol level (raw value)	50-100	100-149	150-400
Lcd display	Normal	Normal	Drunk
Buzzer	off	off	on
Motor locking	off	off	on

Fig 3.11 Level of drunkness.

3.10 DISCUSSION

The design of an alcohol detection using Arduino with motor locking was carried out to decrease car crashes. Two scenarios in this project for alcohol concentration are from 50 to 100 and 150 to 400. Keep in mind that the Liquid crystal display (LCD) also shows the concentration of alcohol even there no alcohol was detected.

Chapter 4

PROGRAMMING

```
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
#include <SoftwareSerial.h>

LiquidCrystal_I2C lcd(0x27, 16, 2); // Adjust the I2C address as needed
SoftwareSerial gsm(7, 8); // RX, TX for GSM

const int alcoholPin = A0;
const int motorPin1 = 9;
const int motorPin2 = 10;
const int buzzerPin = 6;
const int ledPin = 5;
const int threshold = 300; // Replace with actual threshold value

void setup()
 {
  pinMode(alcoholPin, INPUT);
  pinMode(motorPin1, OUTPUT);
  pinMode(motorPin2, OUTPUT);
  pinMode(buzzerPin, OUTPUT);
  pinMode(ledPin, OUTPUT);

  lcd.init();
  lcd.backlight();
  gsm.begin(9600);
```

```
  digitalWrite(motorPin1, LOW);
  digitalWrite(motorPin2, LOW);
}

void loop() {
  int alcoholValue = analogRead(alcoholPin);

  lcd.setCursor(0, 0);
  lcd.print("Alcohol Level: ");
  lcd.print(alcoholValue);

  if (alcoholValue > threshold) {
    digitalWrite(motorPin1, LOW);
    digitalWrite(motorPin2, LOW);
    digitalWrite(buzzerPin, HIGH);

    lcd.setCursor(0, 1);
    lcd.print("Alcohol Detected");

    // Blink the LED while alcohol is detected
    for (int i = 0; i < 10; i++) {
      digitalWrite(ledPin, HIGH);
      delay(500);
      digitalWrite(ledPin, LOW);
      delay(500);
    }

    sendLocation();
  } else {
```

```
    digitalWrite(buzzerPin, LOW);
    digitalWrite(ledPin, LOW);
    lcd.setCursor(0, 1);
    lcd.print("Safe to Start  ");
  }

  delay(1000);
}

void sendLocation() {
  // Simulate sending an SMS by printing to Serial Monitor
  Serial.println("Simulating SMS:");
  Serial.println("AT+CGNSINF"); // Command to get GPS location
  delay(1000);

  Serial.println("AT+CMGF=1"); // Set SMS to text mode
  delay(1000);
  Serial.println("AT+CMGS=\"+1234567890\""); // Replace with actual
contact number
  delay(1000);
  Serial.println("Alcohol detected. Location: Latitude, Longitude"); //
Simulated GPS data
  // gsm.write(26); // ASCII code for Ctrl+Z to send the SMS (not
applicable in simulation)
}
```

CHAPTER 5

CONCLUSION

Based on the finding of this research, the approach was used to screen for the existence of liquor throughout the driver's exhaled air. There are three objectives accomplished in this proposal to create a device in such a sense that it only senses the concentration of alcohol on the driver's breath, to reduce accidents by using this project caused by alcohol upper limit, and to stop and deter innocent people, accidents cause death or fatal injury and ensure driver safety by the locking of the engine. This can be assumed that the device checks for contaminated drivers efficiently. A secure trip is feasible, lowering the number of wounded in car crashes and the number of drunk driver accidents. The project can be upgraded by incorporating GPS and GSM vehicle tracker technology to identify the location of a drunk driver's car.

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