IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

Drunk driving alcohol detection using an automatic car engine locking system

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Abstract

Due to the numerous accidents and fatalities it causes each year, drunk driving remains a serious threat to public safety throughout the world. Our research offers a novel solution to this pressing problem: the Automatic Car Engine Locking System (ACELS), which employs cutting-edge alcohol detection technology to stop drunk drivers from driving vehicles. Alcohol detection sensors are strategically positioned inside the car's interior to continuously check the alcohol content in on their skin or in the driver's breath. Modern alcohol detection technology is used by the system to deliver precise readings in real time. Biometric Authentication: To confirm the identity of the driver and avoid tampering, biometric authentication techniques like fingerprint or facial recognition are used. Engine Locking Mechanism: The system activates an automated engine locking mechanism to stop the vehicle from starting or continuing to run if the ACELS detects an elevated alcohol level in the driver's system that is higher than the legal limit.

Background: The danger that drunk driving brings to global road safety is widespread and catastrophic. Driving while intoxicated is still a major contributor to collisions, injuries, and fatalities on the road. According to estimates from the World Health Organization (WHO), 30% of all traffic fatalities worldwide are caused by alcohol-related incidents. Beyond the loss of human lives, drunk driving has far-reaching economic repercussions as well as psychological damage for victims and theirfamilies.

***Material and methods*:** Sensors for alcohol detection Use breathalyzers with high-quality sensors that can measure the amount of alcohol in the driver's breath with accuracy. Infrared spectroscopy or electrochemical fuel

cells are examples of common technologies. Use a trustworthy transdermal alcohol sensor to measure the driver's blood alcohol content

through the skin. Utilizing instruments that check the alcohol concentration of perspiration may be required for this. Engine Management System Connect the ACELS to the vehicle's electronic control system (VCU), which enables it to managethe engine. Make sure it works with different car makes and models.Include an actuator that, when activated by the ACELS, physically stops the engine from starting or shuts off the gasoline supply.

Results: The effectiveness of a Drunk Driving Alcohol Detection Using an Automatic Car Engine Locking System (ACELS) in decreasing drunk driving occurrences and improving road safety should be evident from the outcomes of itsimplementation.

***Conclusion*:** In the ongoing battle against drunk driving and the improvement of road safety, the implementation of a Drunk Driving Alcohol Detection System Using an Automatic Car Engine Locking System (ACELS) constitutes a crucial step forward. ACELS provides a comprehensive and efficient solution to the ongoing issue of drunk driving through the integration of cutting-edge alcohol detection technology, biometric authentication, and vehicle control mechanisms.

***Keywords*:** MQ-3 Alcohol sensor, Arduino Uno

ATmega328 microcontroller, Blood Alcohol Content (BAC), LCD.

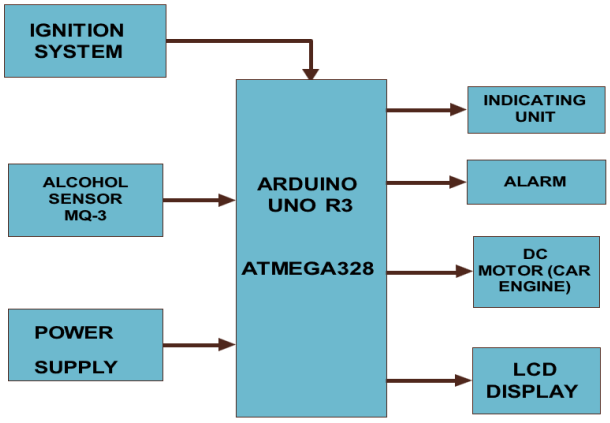
Introduction

Worldwide, drunk driving continues to pose a serious danger to road safety and exacts a heavy toll in terms of human lives lost, injuries inflicted, and monetary costs paid. Alcohol-impaired driving is a major contributor to accidents and fatalities on our roads despite decades of public awareness campaigns, stronger laws, and law enforcement initiatives. Technology innovation has emerged as a potent ally in the struggle against drunk driving as a response to this continuous problem..

This research presents a novel approach that has the potential to drastically lower the prevalence of drunk driving and its disastrous effects. Our study focuses on creating and implementing an Automatic Car Engine Locking System (ACELS)- based Drunk Driving Alcohol Detection System. This solution seamlessly combines cutting-edge biometric authentication, vehicle control systems, and alcohol detection technologies to provide a holistic strategy for attacking the problem at its source. We will give an overview of the prevalent issue of drunk driving, the flaws of current preventative
strategies, and the urgent need for cutting-edge technological solutions in this introduction also go over the main goals and elements to lay the groundwork for a thorough investigation of its components, approaches, findings, and potential effects on traffic safety.
As we examine the ACELS inner features, it becomes clear that this ground-breaking strategy has the potential to not only save lives but also transform how we handle the problem of drunk driving. ACELS promises a paradigm shift in ensuring safer roads and a brighter future for all road users by prohibiting drunk drivers from operating automobiles and providing a proactive method of enforcing sobriety.

Block Diagram : The components and their interactions can be better understood by creating a block diagram for a Drunk Driving Alcohol Detection System with an Automatic Car Engine Locking System. This system condensed block diagram is as follows:

Power Supply Unit : Power supply units for an alcohol detection system for drunk driving An ACELS (Automatic Car Engine Locking System) must be dependable, steady, and able to supply power to various system components. Electrical system of a vehicle to draw electricity, ACELS should preferably connect to

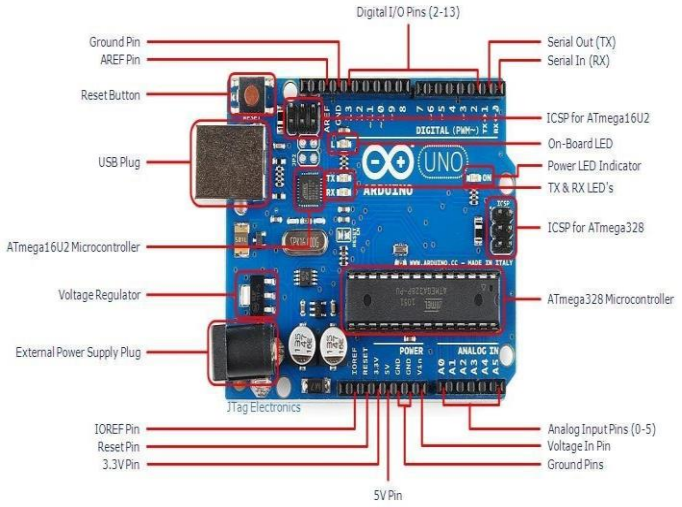


the car onboard electrical system. This guarantees that the system has a constant supply of electricity when the vehicle is in use. Battery backup Install an additional battery inside the ACELS unit to provide as a backup source of energy in the event of a brief interruption or vehicle shutdown. By doing this, you can make sure the system works even when the car is not running.

ATmega328 Microcontroller Unit : Using an Automatic Car Engine Locking System (ACELS) can offer a strong and adaptable framework for controlling and managing different components of the system. This system uses an ATmega328 microcontroller unit. The ATmega328 microcontroller, which is a member of the AVR family, is popular in embedded systems because of its dependability, low power consumption, and broad functionality.

MQ-3 Alcohol Sensor Unit :

The MQ-3 Alcohol Sensor is a gas sensor module that may be added to an ACELS (Automatic Car Engine Locking System) Drunk Driving Alcohol Detection System. This sensor can be a vital part of the ACELS to assure driver sobriety because it is specifically made to

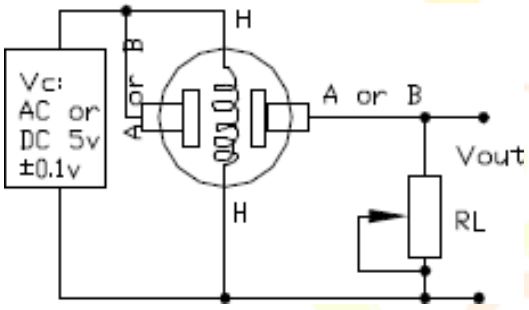


detect alcohol vapor concentration in the immediate surroundings.

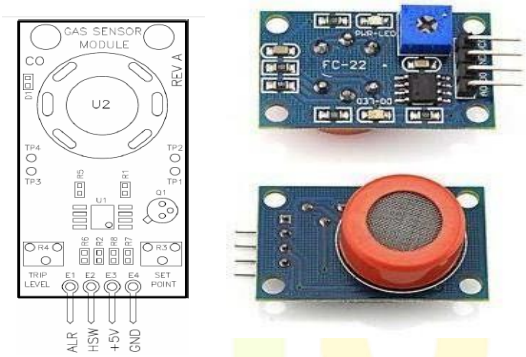
Table 1: Alcohol Sensor Technical Specification

Parameter Name	Sensor type	Detection gas	Concentration	Voltage	Load resistance (R_L)	Heater resistance (R_H)	Sensing resistance (RRR)	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%RH

Display the MQ-3 sensor & circuit diagram. The datasheet specifies that a value between 100k and 470k ohms should be utilized as the suggested value. Here, 200k ohm was applied.

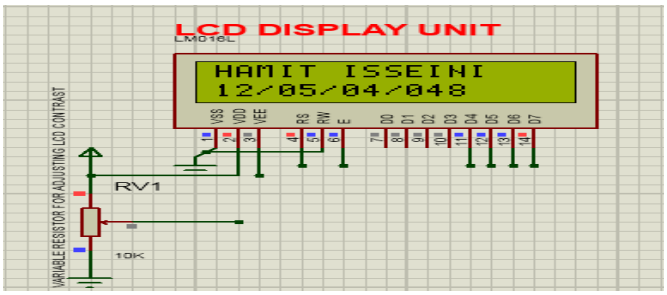


MQ-3 circuit diagram



Simplified circuit diagram of MQ-3 alcohol sensor

LCD Display Unit : An ACELS (Automatic Car Engine Locking System) Drunk Driving Alcohol Detection System may include an LCD (Liquid Crystal Display) unit as a key element. The driver and other stakeholders can get crucial information via this display, which also serves as the user interface. The power rating for LCD displays is as follows:



16x2 LCD display unit

Alarm and Indicating Unit : A Drunk Driving Alcohol Detection System Using an Automatic Car Engine Locking System (ACELS) must have an alarm and indicating unit. This device is in charge of warning the driver, passengers, and law enforcement agents of any potential problems with system functionality and alcohol impairment.

DC Motor : When a Drunk Driving Alcohol Detection System Using an Automatic Car Engine Locking System (ACELS) detects alcoholimpairment, a DC motor can be used to regulate the actual actuation of the engine locking mechanism or fuel cutoff mechanism.

System Flow chart : The sequence of events and key decision points within the system can be better understood by creating a system flowchart for a Drunk Driving Alcohol Detection System with an Automatic Car Engine Locking System. A simplified flowchart for such a system is provided below:

STEP 1: Turn the system on.

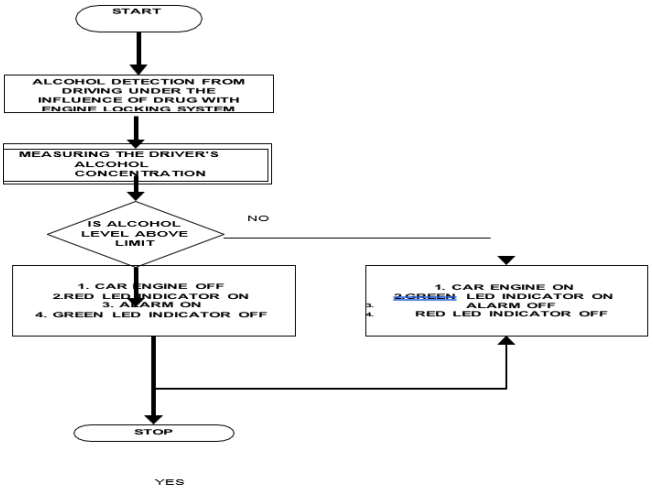
STEP 2: Determines the amount of alcohol consumed IF ALCOHOL IS DETECTED, GO TO STEP 3

STEP 3.1: Exit the vehicle's engine

Alternate STEP 4

STEP 5: Starting the car's engine

STEP 6: Return to step 1.

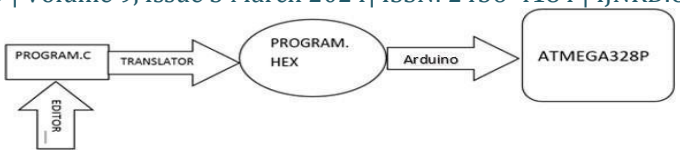


Flowchart of the entire system

System Operation : A set of actions and procedures are used in the Drunk Driving Alcohol Detection Using an Automatic Car EngineLocking System (ACELS) system operation to make sure that only sober people can operate the car.The ACELS system starts up when the ignition is turned on when the car is started. This entails turning on the connectivity modules, biometric authentication parts, and alcohol detection sensors.The detection of alcohol The alcohol content of the driver is continuously monitored via alcohol detection devices, such as breathalyzers or transdermalsensors(like the MQ-3).Real-time readings are provided by the sensors.

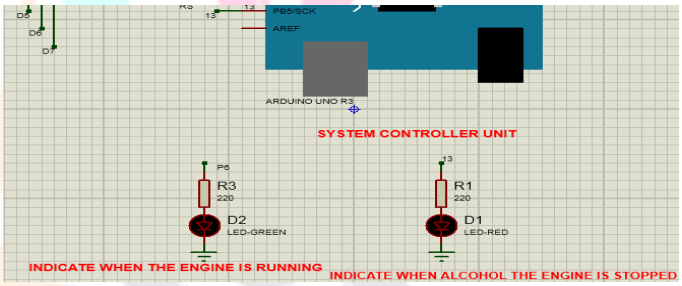
Biometric verification The ACELS starts the biometric authentication procedures simultaneously. To confirm the identity of the driver, this may entail face recognition or fingerprint scanning. Decision-Making and Data Processing Data from the alcohol sensors and biometric authentication modules are processed by the microcontroller unit (for instance, the ATmega328). It assesses whether the driver's blood alcohol level is above the limit and whether their identity has been confirme Threshold Evaluation To evaluate whether the driver is within acceptable sobriety levels, the system compares the alcohol concentration data to predetermined legal limits (e.g., Blood Alcohol Concentration or BAC standards).

Software Implementation : The software implementation for Drunk Driving Alcohol Detection Using an Automatic Car Engine Locking System (ACELS) entails creating a complex and trustworthy program to regulate and coordinate several system components.



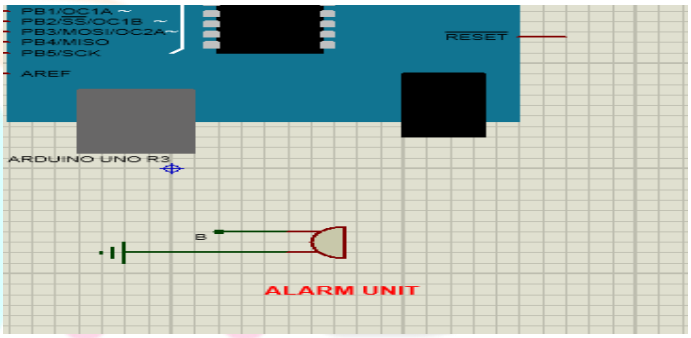
Device Programming

System Design and Simulation : A Drunk Driving Alcohol Detection System Using an Automatic Car Engine Locking System (ACELS) is designed and simulated through a number of stages, from conceptual design to in-depth system simulation. The primary purpose of an indicating unit in a Drunk Driving Alcohol Detection System Using an Automatic Car Engine Locking System (ACELS) is to immediately and clearly inform the driver ofthe status of the system, particularly when it detects alcohol impairment or problems with system operation.



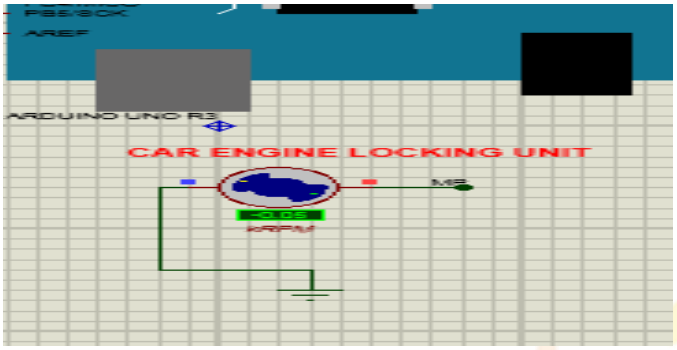
Indicating unit

Alarm unit : A Drunk Driving Alcohol Detection System Using an Automatic Car Engine Locking System (ACELS) must have an alarm unit. Its main purpose is to warn the driver if there is evidence of alcohol impairment or if there are any problems with the system.



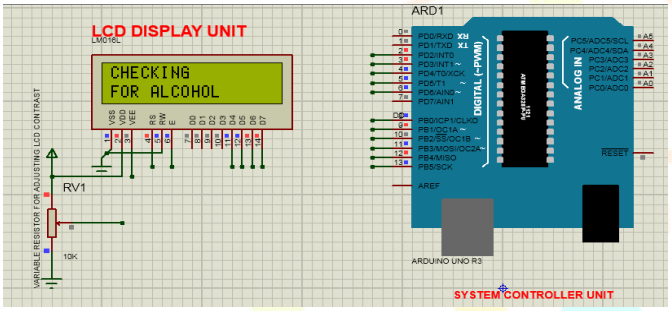
Alarm Unit

Engine locking unit : A Drunk Driving Alcohol Detection System Using an Automatic Car Engine Locking System (ACELS) must have the Engine Locking Unit. Its main purpose is to physically stop the engine from starting or running when there is evidence of intoxication or when other circumstances need it. Figure 8 shows a picture of this unit.The microcontroller's pin 9 is coupled to the DC motor, which runs on 1.5 to 6 volts.

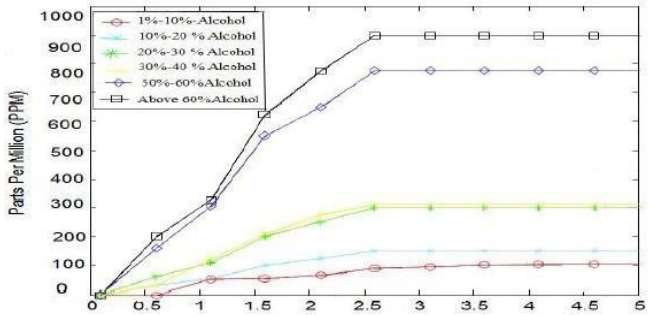


Engine locking unit

Alcohol checking stage : An essential part of an ACELS (Drunk Driving Alcohol Detection System Using an Automatic Car Engine Locking System) is the alcohol checking stage. It is in charge of precisely measuring the driver's blood alcohol level to ascertain whether they are intoxicated.



Measuring alcohol level



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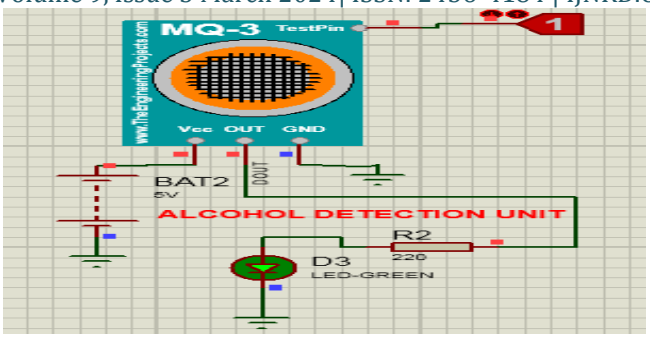
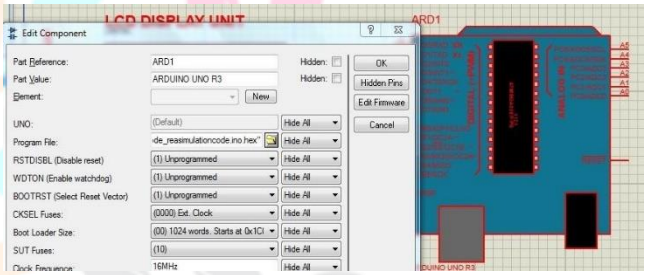


Detection stage

Location of hex file

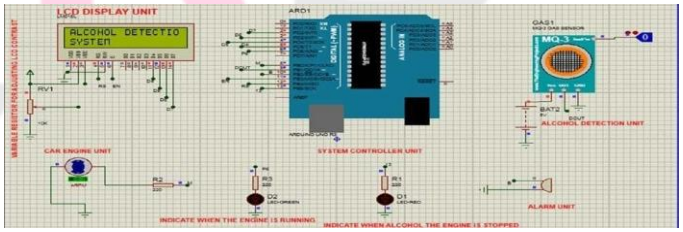
Below shows the circuit design for our suggested alcohol detection device.



Complete Alcohol detection and engine locking design

Final bread boarding of the system

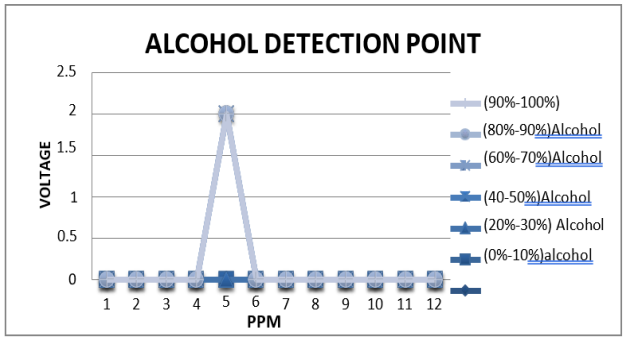
Graph displays the output voltages for alcohol detection in ppm that were determined using the aforementioned readings for various alcohol concentration samples. The response between the various samples and the alcohol sensor operating voltages is expressed in parts per million (PPM).



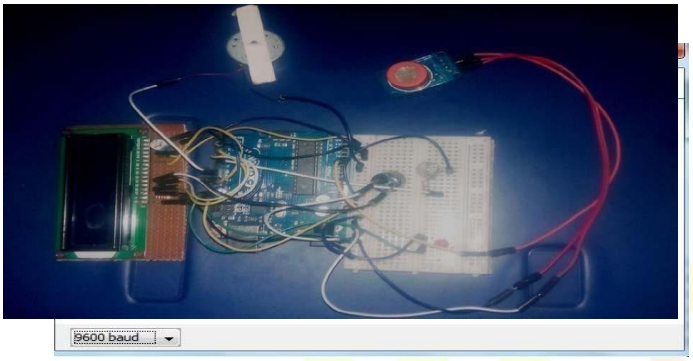
Response of ppm (In Percentage) via alcohol sensor output voltages value

The curve of the voltage level at which the detecting point takes effect is shown in Figure 17. Once the alcohol level drops below 2V, the car engine resumes functioning. It

stops at 2V.



Alcohol detection point



serial plot of the detection limit

Discussion : Examining the significance, advantages, difficulties, and factors to be taken into account while establishing such a system are all part of the discussion for Drunk Driving Alcohol Detection Using an Automatic Car Engine Locking System (ACELS).

Alcohol Sensor Accuracy : The reliability with which a Drunk Driving Alcohol Detection System Using an Automatic Car Engine Locking System (ACELS) can detect driver alcohol impairment is directly impacted by the precision of the alcohol sensors in the system. Several factors affect the accuracy of alcohol sensors, and achieving high precision is essential for the system's performance.

Sensitivity Level Characteristics : The ability of a Drunk Driving Alcohol Detection System Using an Automatic Car Engine Locking System (ACELS) to identify various degrees of alcohol impairment in a driver's system is referred to as its sensitivity level features. The sensitivity levels are essential for enabling the ACELS to recognize and react to various levels of alcohol consumption.

Level of Drunkenness: The level of drunkenness for Drunk Driving Alcohol Detection Using an Automatic Car Engine Locking System (ACELS) typically depends on the specific legal standards and regulations set by the governing authorities in a given region or country. The threshold for what constitutes "drunk" or "impaired" driving can vary significantly between jurisdictions.

Conclusions : In conclusion, the creation and usage of a Drunk Driving Alcohol Detection System Using an Automatic Car Engine Locking System (ACELS) mark a significant advancement in the ongoing fight against drunk driving, oneof the most ubiquitous and avoidable causes of traffic accidents. A complete and cutting-edge system called ACELS was created to prevent and identify drunk driving, improve traffic safety, and perhaps save countless lives.

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