Accident and Alcohol Detection by using AI-Enabled Smart Helmet

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ABSTRACT
The development of ride-sharing services might be mentioned as the carrier of the new urban transportation, which can save both money and time. On the other hand, the most noticeable trait of this service is its crewing safety and security problems for both passengers and drivers. The introduction to Ride Guard explains it as a reflection of high-tech which bonds such technological ways as real-time monitoring, mobile response systems, and AI-powered analytics to facilitate safe and dependable transporting service for passengers. This research deals with the subject of the installation of Ride Guard, the main characteristics of the system, and the possible impact on the ride-sharing business. The purpose of Ride Guard is to create new guidelines for safety and reliability in the on-demand transportation industry by availing of innovative solutions.

Keywords: Decision Tree, Support Vector Machine, K-Nearest Neighbor, Logistic Regression.

1. INTRODUCTION

An accident is a distinctive, unforeseen, uncommon and unintentional outside example which happens at a specific time and place, with no apparent and deliberate cause but with marked effects. Carless driver is the most important factor of this type of accidents. The traffic authorities give a lot of instructions to the vehicle operators. Nevertheless, a number of them do not adhere to the laws. In recent years, almost all countries have been implementing the policy of motorcyclists wearing a helmet and avoiding the use of the vehicle by an individual who is under the influence of alcohol. However, the regulations are still being disregarded by the users. Apart from that, we have introduced an intelligent system, Smart Helmet, which automatically checks whether the person is wearing the helmet and has non- alcoholic breath while driving. Here we have a transmitter at the helmet and the receiver at the bike. There is a switch used to sure the wearing of helmet on the head. The ON condition of the switch ensures the placing of the helmet in proper manner. An alcohol sensor is placed in the vicinity of the driver's mouth in the helmet to detect the presence of alcohol. intelligent helmet system and accident control for motor cycles has been proposed which automatically checks whether the person is wearing the helmet and has non-alcoholic breath while driving. Here we have transmitter situated at the helmet and a receiver at the motorbike. There is a switch used to confirm the wearing of the helmet on the head.

The majority of the essential safety precautions used in the present ride-sharing and motorcycle crash prevention systems are manual checks and rules. Even though car safety technology have advanced, continuous tracking and connected device systems integration is still in its infancy. Current Manual Ride-Sharing Safety Systems. Ride-sharing services, such as Uber and Lyft, screen their drivers to make sure they have no criminal records and a spotless driving record. By allowing drivers and passengers to score and comment on one another, these systems assist the companies in identifying problematic behaviour. Passengers can rapidly contact emergency services by pressing the emergency button. For extra

protection, travellers can let friends and family know the specifics of their trip. To make sure they adhere to safety regulations, cars must undergo routine inspections. Complete insurance plans that provide coverage for both motorists and passengers in the event of an accident. A lot of nations have laws requiring motorcycle riders to wear helmets, which has greatly decreased the number of brain injuries sustained in collisions. Standard helmets offer minimal protection but lack built-in technology to track alcohol consumption or ensure appropriate use.

Using cutting-edge sensors and Internet of Things technologies, the suggested smart helmet system seeks to improve rider safety. An alcohol sensor built into the helmet will check for alcohol on the rider's breath and stop the car for beginning if alcohol is found. Accelerometers and gyroscopes will also be included in the helmet to track rider movement and instantly identify mishaps. In the event of an accident, a tracking device (GPS) will track location, facilitating quick emergency intervention. The system will enable dependable and instantaneous data delivery to a remote-control centre by utilising communication protocols such as HTTP and MQTT. In an emergency, this main platform will analyse the information and transmit alerts to pre-identified contacts, speeding up reaction times. The suggested strategy places a strong emphasis on proactive accident avoidance and improved rider safety through constant observation and smooth communication.

2. LITERATURE SURVEY

The International Conference on Smart Technologies and Management (ICSTM) 2016 Proceedings [1] Technology, Communication, Controls, Energy, and Materials. An intelligent helmet system intended to improve rider safety is presented in this research. It incorporates a number of sensors, including an accelerometer to detect falls, a GPS unit to track the rider's location, and a GSM module to send notifications in the event of an accident, and to track the rider's surroundings and conditions. International Conference on Inventive Computation Technologies (ICICT) Proceedings, 2016. In brief [2] In order to stop drunk driving, this study presents a smart helmet system with an alcohol sensor. In the event that the rider's breath contains alcohol, the technology makes sure the car won't start. The ignition mechanism of the car and the helmet communicate wirelessly. The International Conference on Energy, Communication, Soft Computing, and Data Analytics (ICECDS) Proceedings [3], Use of a smart helmet with features like GPS tracking, accident detection, and communication to notify emergency services is covered in this study. The system's main goal is to improve rider safety by integrating technology. International Journal of Pure and Applied Mathematics [4], a smart helmet system intended for real-time accident detection is examined. It has impact detection sensors and sends alert messages to established contacts with the accident location via GSM and GPS modules.

An International Journal of Scientific Research in Information Technology, Engineering, and Computer Science [5] survey report examined different safety control technologies and smart helmet systems. It looks at several methods and tools for improving rider safety, such as real-time monitoring, accident alert systems, and alcohol detection.

In order to prevent accidents [6], a smart helmet equipped with a variety of sensors is shown in this study. An intelligent helmet system [7] intended to stop drunk driving is presented in this article. An alcohol sensor built inside the helmet measures the amount of alcohol in the rider's breath. The helmet notifies the vehicle's ignition system to stop the car from starting if alcohol is detected. In case of an emergency, the system also has a GSM module that allows notifications to be sent to a predetermined contact. The creation of a smart helmet [8] with multiple sensors to prevent collisions is covered in this article. The helmet has a GSM module, an impact sensor, and an alcohol sensor. If alcohol is detected, the alcohol sensor keeps the car from starting. When an accident is detected by the impact sensor, the GSM module is triggered to send a safety alert to predetermined contacts along with the location. An Internet of Things-based system [9] for tracking cars and detecting accidents is presented in this research. The technology tracks the location of the car and detects accidents using GPS and GSM devices. The system notifies emergency contacts by alert message when it detects an accident, along with the location coordinates. The system's goals are to increase vehicle users' safety and response times.

3. Proposed Model

Determine Current Sensors and Technology: examination of the Literature: To comprehend the most recent advancements in smart helmet and Internet of Things technologies, a comprehensive examination of the literature is recommended.

Sensor Selection: Locate and pick suitable sensors, such as GPS modules, accelerometers, gyroscopes, and alcohol sensors (like the MQ-3).

Communication Protocols: For real-time data transfer, assess and select appropriate communication protocols such as MQTT, HTTP, and GSM.

3.2. Planning and Implementation

The helmet's physical design: Framework Design: Create the smart helmet's physical structure with the user's comfort and ergonomics in mind.
Sensor Placement: To guarantee accurate data gathering, identify the best locations for sensors (such as the GPS module on top and the alcohol sensor next to the lips).
Camera Positions: If possible, arrange the cameras to give a good view of the surrounding area.

3.3. Sensor Integration

Combining Sensors: Setting up Connections: Make sure all chosen sensors are wired and configured correctly before connecting them to the Arduino board.
Sensor calibration is necessary to guarantee precise data readings. This could entail calibrating accelerometers and gyroscopes as well as defining threshold values for the alcohol sensor.
Create an IoT Connection:Protocol Selection: Based on the dependability and latency needs of the system, select the proper Internet of Things communication protocol (such as MQTT or HTTP).

4. Experimental Setup and Results

Hardware Requirement

Power Supply: The L78xx and L79xx are also protected with foldback current limiter that can also limit the power dissipation to only a few milliwatts during the short-circuit condition in the output stage resembling almost just the voltage. The L78xx and L79xx are three-terminal devices (TRs) that are able to act as a voltage regulator by output of a constant or regulated voltage and zero current when there is a fault. The regulated power supply is made up of a transformer and a bridge rectifier which is a group of 4 diodes set up in such a way that they form a bridge.

Arduino

Originally, Arduino was developed for non-engineers and newbies in the field of computer building, prototyping, and experimenting. For a long time already, we have been working with the Arduino Uno. If we look into the CPU of the Arduino many computers for teaching will have a number of input/output (I/O) pins, a microcontroller, a memory chip, and a diode (if the computer is used for training purposes). The Arduino plugs into our laptop by the USB cable.

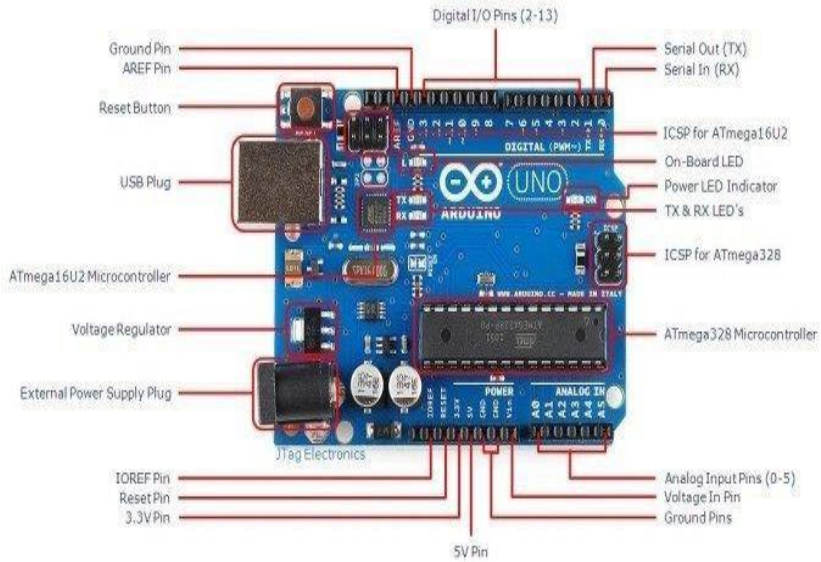

Figure 1: Arduino Board

Sensor

An alcohol sensor or alcohol detector also known as a breathalyzer is a gadget made to measure the concentration of alcohol vapor in the breath of a person. It operates on the principle of chemical reaction that occurs between alcohol molecules and a sensing element usually made of metal oxide or semiconductor materials. One of the applications of alcohol sensors is in accordance with law or enforcement for roadside breath tests, individuals for controlling their alcohol consumption levels.

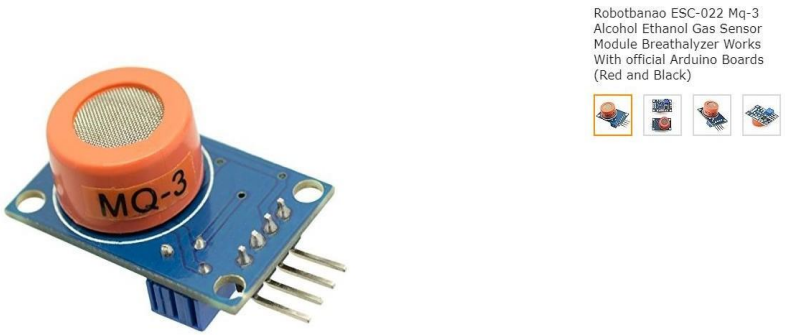

Figure 2: Alcohol sensor

RC

Radio Control (RC) transmitter is a handheld device designed to supervise RC vehicles remotely, like cars, drones, airplanes, boats, and a few others. They transmit signals wirelessly to the vehicle through a corresponding receiver, which interprets these signals into other actions like steering, acceleration, or braking.

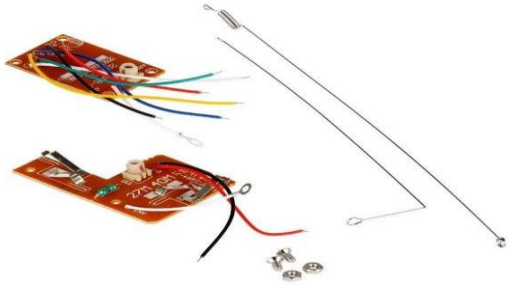

Figure 3: RC transmitter & transmitter

DC Motor

It is usually the case that toys that are battery-powered like this serviceable DC motor are utilized. As far as everyday home appliances go, the only item that may use them is the battery. The battery can either be inserted in the machinery to be powered by AC or the DC battery power, as in a two-way source. Universal motor design, which consists of a copper coil magnet developed instead of a ferromagnetic one, offers such greater flexibility of working with either DC or AC current. Universal motors get energy from the DC or AC power that you lead into them

Delivery of the direct current to the electromagnet results in the correct operation of the latter as a permanent magnet does and produces a magnetic field that is always directed in the same direction. The commutator turns the coil current around each time the coil changes position. However, when you supply alternating current, the flow of current in the electromagnet and the flow of current in the coil both reverses, exactly in step, so the force on the coil is always in the same direction and the motor always spins either clockwise or counter clockwise, So it doesn't matter what position the commutator is in at any given moment.

Figure 4: DC Motor

Software Requirement

Arduino Software

The Arduino software is an open-source Integrated Development Environment (IDE). It includes a code editor, a message area, a text console, a toolbar with typical function buttons, and a series of menus.

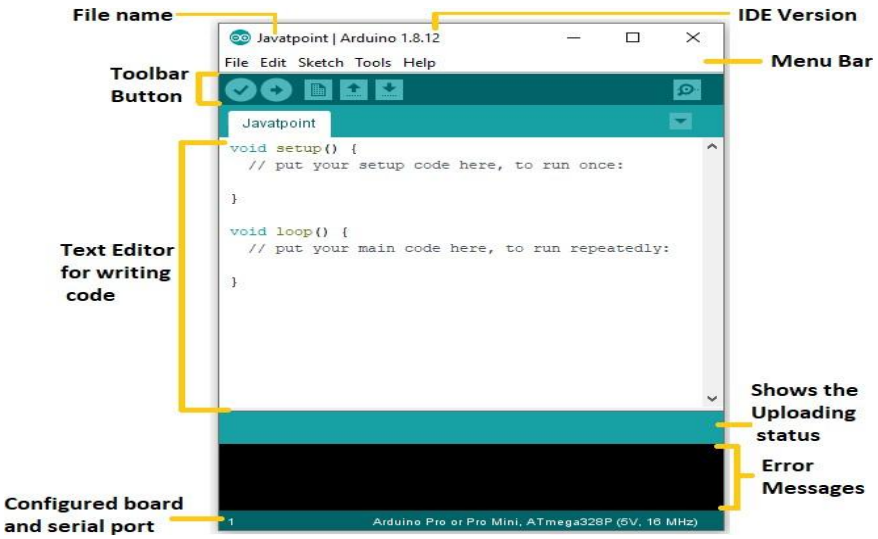

Figure 5: Arduino

The entire system program instruction is stored in it. We are having two sections in which one is at the helmet and the other is at the vehicle. The helmet section has an alcohol sensor which gives the information about the status of whether the helmet is occupied or not, if the rider will not wear the helmet as the imitation of the bike is off, the rider will have to start up the vehicle without wearing the helmet. And also, we have sensors like gyroscope and crash sensor. to know the status of accident.

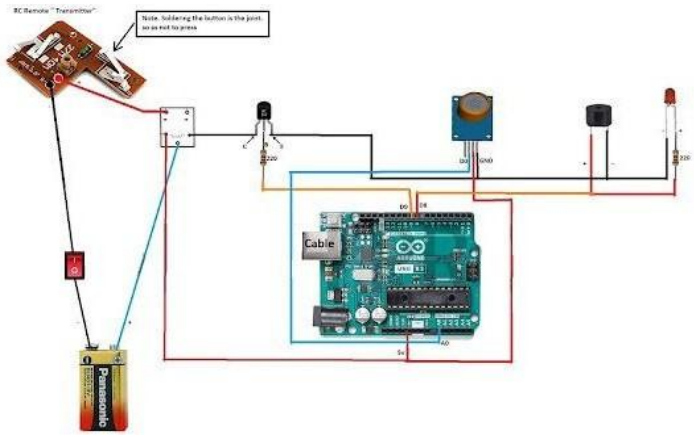

Figure 6: Transmitter side

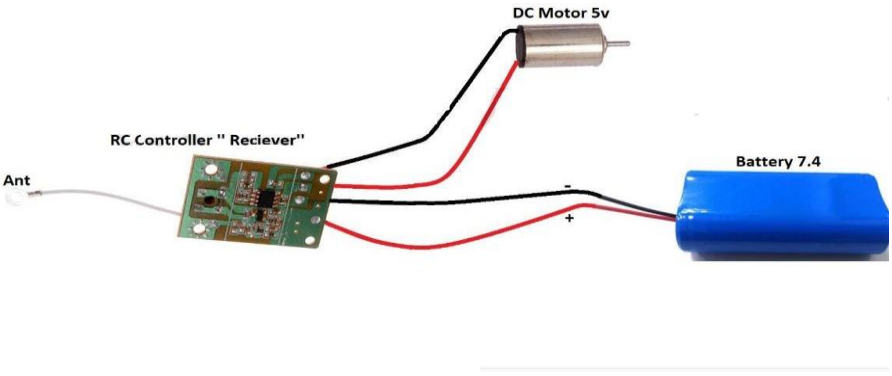

Figure 7: Receiver side

An alcohol sensor (MQ-3) built inside the helmet measures the amount of alcohol in the rider's breath when it is placed close to their mouth. The alcohol sensor continually checks the rider's breath for alcohol level as soon as they put on their helmet and turn on the car. The sensor indicates the existence of alcohol with a signal if it finds levels above a predetermined threshold.

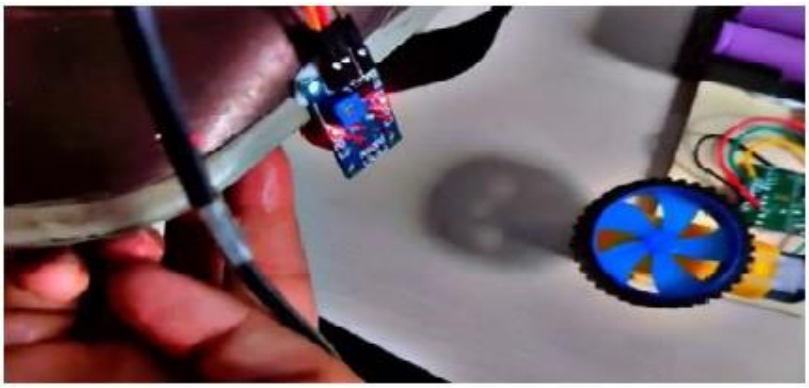

Figure 8: Detection Of Alcohol

The system consists of a receiver in the car and a transmitter within the helmet. Real-time data from the beverage sensor is wirelessly transmitted by the transmitter to the receiver. This guarantees that the motor vehicle's control system receives the alcohol recognition status immediately.

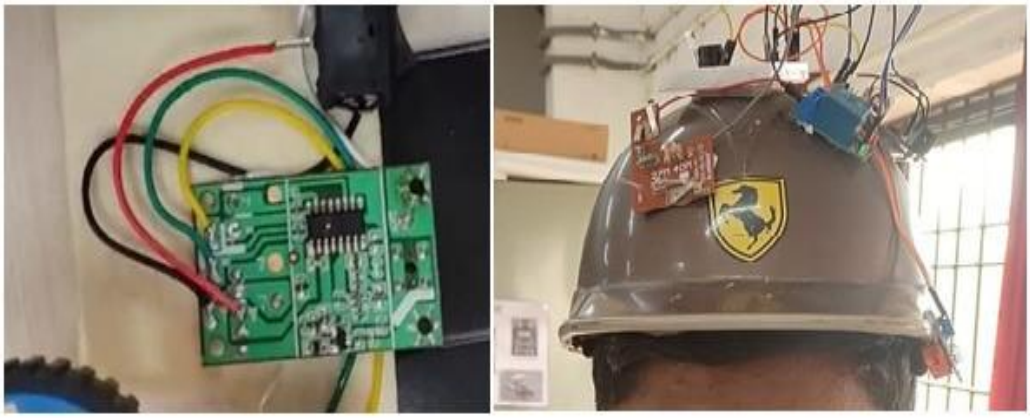

Figure 9: Transmitter And Receiver

A vehicle may function normally because its DC motor is immediately in the "ON" state. The receiver instantly transmits an indication to idle the DC motor upon receiving an alert from the transmitter signifying high alcohol levels. If it is determined that the rider is intoxicated, this action stops the car from starting.

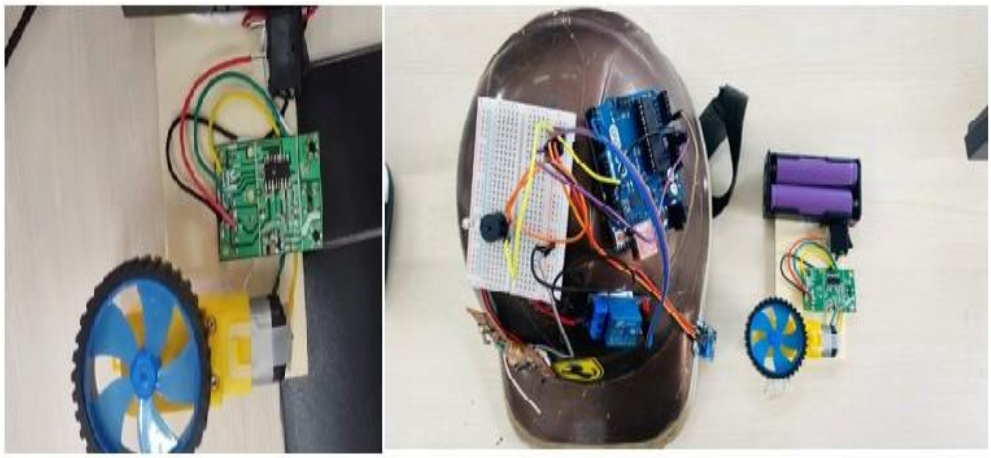

Figure 10: DC motor status & SmartGuard Result

The alcohol monitor in the helmet measures the amount of alcohol a person has consumed before they attempt to ride the bike. This data is subsequently transmitted from the wireless transmitter to the

vehicle's receiver. The car cannot operate because the receiver disables the DC motor as soon as it receives the signal.

5. CONCLUSION

Alcohol detection system based on a smart helmet is an effective solution for preventing drunk driving and promoting responsible use of alcohol. It uses a snoopy yet valid method to track alcohol levels and thus prevent drivers from driving while intoxicated or contacting drivers to notify them about with the help of the GPS. The technology is also more affordable because the hardware and software framework is widely available while integrating additional hardware is not difficult to implement. It should be noted that the system is both non-intrusive and reliable in a scenario it comprises of a detector which sends alerts in the form adequate to the condition of the driver. Other facilities e.g., creative software, audio systems, adapter modules are not a priority. So alcohol detection is simple and it is not necessary to monitor the driver's condition while driving vehicles.

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