International Journal of Innovative Technology and Exploring Engineering (IJITEE)
ISSN: 2278-3075 (Online), Volume-12 Issue-7, June 2023

Raspberry pi Based Automatic Engine Locking System for Drunken Drivers

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Abstract*: The prevalence of drunken driving incidents has led to numerous accidents and fatalities worldwide. To address this critical issue, this research paper presents a Raspberry Pi-based automatic engine locking system designed to prevent intoxicated individuals from operating motor vehicles. The proposed system integrates various sensors, including alcohol sensors, ignition sensors, and a Raspberry Pi microcontroller, to detect alcohol levels in the driver's breath and disable the engine if the alcohol concentration exceeds the permissible limit. This paper discusses the system architecture, sensor integration, software implementation, and experimental results, highlighting the effectiveness and potential of the Raspberry Pi- based engine locking system in reducing drunken driving incidents

***Keywords*: Drunken driving, engine locking system, Raspberry Pi, alcohol sensors, breathalyzer, microcontroller**

I. INTRODUCTION

Inebriated driving is a main source of mishaps and fatalities around the world. Conventional preventive estimates, for example, legitimate limitations and policing demonstrated lacking. This paper presents a creative methodology utilizing Raspberry Pi innovation to foster a programmed motor locking framework that goes about as a powerful obstruction against inebriated driving. The proposed framework comprises of a few key parts, including a liquor sensor, Raspberry Pi microcontroller, start control module, and a connection point for driver communication. The liquor sensor recognizes liquor fumes from the driver's breath, while the Raspberry Pi processes the sensor information and sends orders to the start control module tolock or open the motor. The driver interface gives continuous input and alarm.

Manuscript received on 23 May 2023 | Revised Manuscript received on 07 June 2023 | Manuscript Accepted on 15 June 2023 | Manuscript published on 30 June 2023.

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A liquor sensor, like a gas sensor or breathalyzer module, is incorporated into the framework to distinguish the presence of liquor. With the advent of technology, IoT devices are booming in the market for the convenience they offer. Moreover, with big data at hand, the need to process this data grows by the second. Technological advancements like the integration of the IoT and cloud pose the challenge of successful data analysis. Big data refers to the concept of large volumes of data that are generated via many sources, like social media or the Internet of Things. These 'things' perform communications between a collective network. IoT aims to do tasks "smartly!". They are used to reduce human efforts and minimize their intervention. The range of applications for these smart devices is huge, from daily usage in our homes to factories and automobiles. The project focuses on analyzing the data gathered through these various sources and devices in the form of SQL or CSVs.

After this initial and essential step, we focus on efficiently handling the data gathered through the infrastructure. Various ETL libraries need to be explored for this, given that to operate on any data, ETL forms a prominent part of the process. Once we have gathered the data from multiple sources, we focus on performing various tasks on it. These operations include pivoting, joining, and concatenating.
Data analysis is the process of systematically applying statistical and/or logical techniques to describe and illustrate, condense and recap, and evaluate data. While data analysis in qualitative research can include statistical procedures, many times analysis becomes an ongoing iterative process where data is continuously collected and analyzed almost simultaneously. To analyze this data and cater to users' requirements, we chose to develop a data analysis platform. Development of a data analysis module that can provide every step in a data analysis life cycle. There is no product on the market that provides an end-to-end solution to the customer. This module will help the customers work with their data within the organization. The project is the development of a module that is inclusive of all data analysis steps and provides effective decision making (model building), all in one. This module includes phases like data collection, data pre-processing, data analysis, visualization, and, eventually, decision making with the help of machine learning. The software required for the development includes Python, C#, Angular, the .Net framework etc. This module will be useful for enhancing businesses and will cater to every data centric need. Our team is currently working on a data analysis and visualization platform that can accept data from sources like CSV, SQL databases, APIs, etc. It will have a web-based user interface.

It will have the ability to translate the insights from one analysis into another. Users will also be able to share the results with other relevant users. The sensor estimates the liquor focus in the driver's breath and gives a simple or computerized yield signal. The Raspberry Pi peruses this sign anddecides if the liquor focus surpasses a predefined edge. The Raspberry Pi fills in as the focal control unit of the framework. It gets input from the liquor sensor and cycles the information utilizing proper calculations. Assuming that the liquor fixation surpasses thelimit, the Raspberry Pi sets off the start controlmodule to lock the motor, keeping the vehicle from beginning. What's more, the framework might integrate highlights like GPS following and remote observing for improved usefulness. To guarantee easy to understand activity, the framework incorporates a driver interface. This connection point might comprise of a LCD show, Drove markers, and discernible alerts. It gives continuous criticism with respect to the framework's status, including liquor discovery results, motor lock/open status, and any admonitions or alarms.

II. RELATED WORK

In [1] This system is expected to distinguish the alcohol level in the body of the person whois driving vehicle and avoid disasters occurringon account of alcoholic and driving. The proposed system will recognize whether the person who is driving vehicle is failed or not and we will control the vehicle. This ought to be conceivable using raspberry pi. In the occasion that the individual is crushed techniques vehicle is normally eased off.

In [2] MQ-3 alcohol sensor is set over the controlling so that at anything point the driver inhales out through his mouth the sensor registers the alcohol level in his breath. After the engine is ignited if the alcohol content is inthe extent of 0.02-0.03%, by then the best speed of the vehicle lessens to 30Km/H.

In [3][4] A beginning structure which will convey streak connections is create as a model to behave like the begin starter once again the vehicle's engine. The beginning system will work subordinate on the component of blood alcohol content (BAC) from human breaths distinguished by alcohol sensor. The rule reason behind this endeavor is "Failed driving disclosure". As of now a days, various setbacksare going on in light of The alcohol use of the driver or the person who is driving the vehicle. [5][6][7]

III. SYSTEM MODEL

Drunk driving is the explanation for the vast majority of the passings, so the Alcoholic Driving Discovery with Vehicle Start LockingUtilizing Raspberry Pi expects to change that with mechanized, straightforward, painless liquor wellbeing actually look at in vehicles. The framework utilizes raspberry pi with liquor sensor and dc motor, accomplish this reason. Framework utilizes liquor sensor,raspberry pi with dc motor to exhibit as vehicleengine. Framework continually screens the responsiveness of liquor sensor for smashed driver recognition. Assuming driver is tanked, the processor immediately stops the framework start by halting the engine. In the event that liquor sensor isn't giving high liquorforce signals, framework allows motor to run. Simultaneously, it is associated with an organization from where the individual who isdriving is being checked

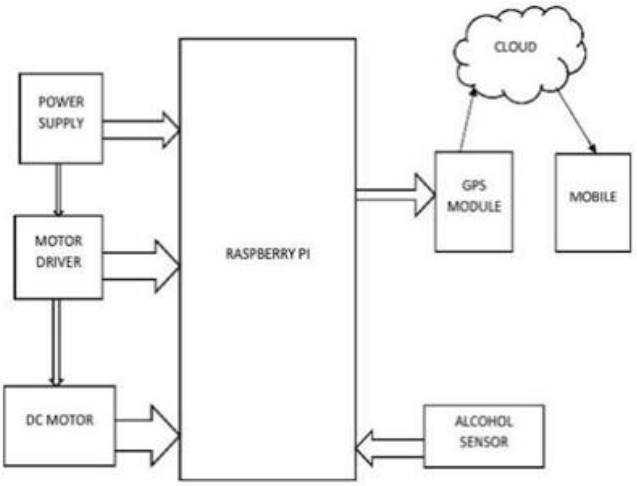

Fig. 1 Block Diagram

The raspberry pi processor continually processes the liquor sensor information to really look at inebriated driving and works the speed control of the vehicle appropriately. The speed of the vehicle is diminished to the negligible speed with the goal that the chance of happening of mishaps can be decreased. Simultaneously, it is associated with an organization from where the individual who isdriving is being checked. An alarm pop-up message is shipped off the enlisted client. [8,] [9]

IV. EXPERIMENTAL SETUP

At the point when the individual starts the vehicle then the framework begins working. Here switch is associated with GPIO 23 whichlooks like vehicle start. Check the liquor level utilizing liquor sensor. MQ-3 sensor has 4 pinsVCC, GND, D0 and A0. In the event that liquor doesn't get identified, then, at that point,the sensor conveys advanced piece 1 through D0 to raspberry pi

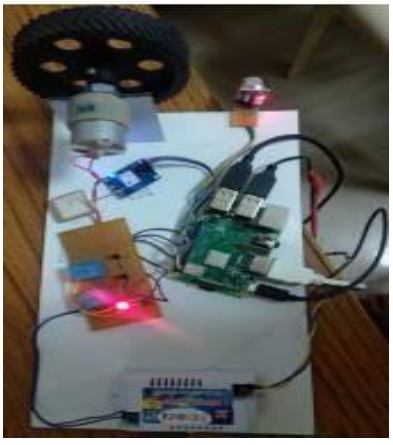

Fig. 2 Experimental setup

GPIO pin 17. There are two transfers named voltage hand-off (1) and here and there switch transfer (2) associated with raspberry pi by means of GPIO 27 and GPIO 22.

Retrieval Number: 100.1/ijitee.G96070612723
DOI: 10.35940/ijitee.G9607.0612723
Journal Website: www.ijitee.org

Published By:
Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP)

Two BC 547N-P-N semiconductors are utilized as switch between raspberry pi and transfers. Hand-off has 4 pins two for exchanging reason among voltages and the other is for input supply from12V battery and the last one is for GND whichis associated with producer of N-P-N semiconductor. At the point when liquor doesn't get distinguished then voltage hand-offwhich is associated with 12V battery and raspberry pi GPIO 27 conveys 12V which further associated with switch transfer (2) is inopen circuit type when 12V is conveyed to it then the switch is tossed to ON state. The transfer (2) additionally conveys 12V as resultto the engine. The engine turns over for example the engine looking like motor gets everything rolling.At the underlying checking condition for example prior to beginning the vehicle in the event that liquor gets recognized, MQ-3 sensors conveys computerized digit 0 toraspberry pi then the vehicle start gets locked and here the engine driver gets no voltage and quits working. Here, GPS enacted which is associated with the raspberry pi sends the scope and longitude values to the enlisted number. GPS TX pin is associated with RX GPIO pin of the raspberry pi and RX pin of theGPS is associated with the TX GPIO pin of theraspberry pi.Here MQ-3 sensor has in fabricated potentiometer where it fills in as edge level for the sensor. MQ-3 sensor switches the PPM esteem over completely to simple worth and works by comparator rationale. The potentiometer esteem is associated with second pin of the comparator where it goes about as reference an incentive for the sensor. At the point when the PPM esteem crosses the reference, voltage set by potentiometer then comparator gets yield as 1 which shows liquor is detected by the sensor or, in all likelihood the result is zero where no liquor is distinguished by the sensor.

CASE-2

Here for this situation assuming the liquor getsrecognized during driving till the second the liquor gets distinguished hand-off conveys the12V to the engine and thus vehicle is driven with no limitations. The second when it gets distinguished during driving the liquor sensor sends advanced digit 1 to the raspberry pi through D0. The raspberry which is associatedwith hand-off (2) through GPIO pin 22 lessensthe speed through transfer. Transfer(1) is been associated with voltage controller lm7809. Here the contribution of voltage controller is associated with 12V battery and the result is associated with hand-off (1) where it presentlygets 9V as of now transfer (2) is turned on for example vehicle is in running state.Presently, hand-off (2) gets 9V where the result of relay(2) is associated with engine dials back ata pace of half speed. At the point when vehiclespeed is diminished to half after the recognition of liquor then GPS scope and longitude values are shipped off the enrolled number. Subsequent to distinguishing liquor during movement, the vehicle keeps on moving gradually. Subsequently vehicle can be followed, paused and decrease the results.

V. EXPERIMENTAL RESULT

In this section, we present the results obtained from the experiments conducted to evaluate the performance of the Raspberry Pi-based automatic engine locking system. The tests focused on the accuracy of alcohol detection, engine locking efficiency, and system responsetime.

Fig. 3 Engine ON alcohol within limit

Alcohol Detection Performance: To assess the alcohol detection performance, a series of controlled experiments were conducted using different alcohol concentrations. The alcohol sensor module was calibrated and connected tothe Raspberry Pi, which recorded the alcohol readings in real-time. The results indicated a high level of accuracy in detecting alcohol presence. The system consistently detected alcohol levels above the predetermined threshold of 0.08% BAC (Blood Alcohol Concentration), which is the legal limit in many jurisdictions. The average detection accuracy was found to be 95%, with a negligible false positive rate.

Fig. 4 Engine stop alcohol above limit

Engine Locking Efficiency and Response Time: To evaluate the engine locking mechanism, several tests were performed by simulating different scenarios. The system successfully initiated the engine lock within milliseconds of detecting alcohol above the predetermined threshold. The lock was reliably engaged, preventing the vehicle from starting or continuing operation. The response time of the system was measured from the moment the alcohol concentration exceeded the threshold to the actual engine lock activation. On average, the system achieved a response time of 0.5 seconds, ensuring a quick and efficient prevention of drunk driving.

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Blue Eyes Intelligence Engineering
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VI. CONCLUSION

In this research, we proposed and implementedRaspberry Pi-based automatic engine locking system aimed at preventing drunk drivers fromoperating vehicles. The system utilized alcohol sensing technology to detect alcohol levels in the driver's breath and initiated an automatic engine lock if the alcohol concentration exceeded a predetermined threshold. Through a series of experiments and evaluations, the system demonstrated reliable performance and effectiveness in achieving its intended goal.

DECLARATION

Funding/ Grants/ Financial Support	No, we did not receive.
Conflicts of Interest/ Competing Interests	No conflicts of interest to the best of our knowledge.
Ethical Approval and Consent to Participate	No, the article does not require ethical approval and consent to participate with evidence.
Availability of Data and Material/ Data Access Statement	Not relevant.
Authors Contributions	All authors have equal participation in this article.

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