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Digital Driving System for Vehicle Monitoring

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Abstract

Automotive industry is one amongst the world's largest economic sectors by revenue and has made an oversized leap ahead over the previous number of years. The introduction of latest systems and technologies, the electronic methods became more advanced. Now present standard vehicle includes a outsized number of computers called ECU (Electronic Control Unit). These embedded devices are connected to actuators and sensors, are accustomed operate a good range of systems from seat and mirror temperature to brakes and engine damage. Low-voltage electrical and electronic connections to vehicles they have real communication. Currently automobiles have been developed by more of electrical parts for well organized operation. This paper focus on the implementation of a digital driving system for a semi-autonomous vehicle to enhance the user interface. It uses an ESP32 and IOT based data acquisition system that uses Analog-to-Digital Converter to bring control data from analog to digital format and see through LCD. The communication module utilized in this project for methodical data transfer is done by embedded networking by Controller Area Network (CAN) which has efficient data transfer. It also takes analysis of vehicle conditions like vehicle braking system, driver alcohol detecting, SMS will be sent to owner, security keypad with the assistance of sensors which could minimize road accidents and improve security. System contains controller block designed using ESP32 micro controller, alcohol and GSM module, CAN controller.

Keywords**:** *Controller Area Network (CAN), ESP32 Microcontroller, Communication Module.*

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1. Introduction

The Controller Area Network (CAN) is a robust, serial communication bus designed for flexible performance in harsh environments, and mainly for Multi-master communication system for connecting electronic devices to automotive and industrial applications. It is widely used in automotive industries.

The Controller Area Network protocol has many features such as low cost, easy to use, peer-to-peer network identification transmission rates are high. It is particularly used in Industry and Automobiles in a hazardous and reliable environment with the speedily changing computer and information technology, as well as the many technologies available to get cars, cars are greatly changing their capabilities and how they interact with drivers.

Few cars have equipping to decide whether to produce a human driver's warnings or to control the car freely. Therefore, it is important for human drivers to control the vehicle performance based on the requirements. Improved vehicle information systems provide dissimilar vehicle types and levels of skills to help the driver.

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The design of the car is allowed for a close relationship between the driver and the car by providing a visual instrument to drive and drive the car. Within these interactions, vehicle management relies entirely on the cooperation between the driver and the vehicle information systems through the communication network through the intelligent information network.

This paper discusses the development of such a vehicle control framework called the digital drive system, which consists of an integrated approach between the driver and the vehicle for understanding, decision making and control.

2. Literature Survey

Over the past years, numerous studies and have been conducted to improve the perception of motorized vehicles. Below are some research papers discussed,

Title 1: A Novel method for real-time tracking and tracking of vehicles using the Raspberry Pi.

The above paper was presented by M Anandhalli and V P Baligar, suggested a model where a device with Raspberry Pi and USB is used to get real-time traffic, calculations and tracking. This route detects cars without looking at their point and determines.[1]

Title 2: Context-Aware Driver Detection System in Intelligent Transportation Systems.

The above paper is presented by Hussein Zedan, Ali H. Al-Bayatti, and Saif Al-Sultan. It proposed the detecting behaviour of driver. VANET (Vehicular ad hoc networks) were used to detect behavior of abnormal drivers , also warn other vehicles on the road to minimize accidents. The model based on Bayesian dynamic networks (DBNs) was proposed in real-time to detect four types of driving styles as normal, intoxication, apathy, and fatigue. By looking at the 35 no'sof evidence for differences between dissimilar drives are recognized.[2]

Title 3: Detecting Anaconda's Respiratory Applications and Applying in Motor Vehicles for Trash Tracking or Driving Drivers

The above paper was introduced by Minoru Sakairi. In this paper it discusses a program of detecting of intoxication. Here Water-Cluster-Discover (WCD) sensor is designed which works effectively for ventilation. The WCD respiratory sensor detects respiration in the form of fluid .The WCD sensor containing an alcohol sensor that detects alcohol content and also detecting the electrical signals of respiration, confirming the sample is not an artificial source, but the human soul. This paper extends the research into a more efficient process such as top k-query in the context of access to appropriate data classification and decompression methods.[3]

3. Objectives

The main objective of the proposed model is to provide an efficient way for driver-vehicle interface and further to provide security to the vehicle.
The objectives are explained in the following:

- Detects the Alcohol whether if the driver is drunk or not, if just in case he's drunk it displays on LCD and automatically stops the car.
- Status of the vehicle are sent to owner through SMS using Wi-Fi module. In order that he will get to grasp about the car details.
- A password keypad is kept for the protection purpose of the vehicle.

4. Proposed System

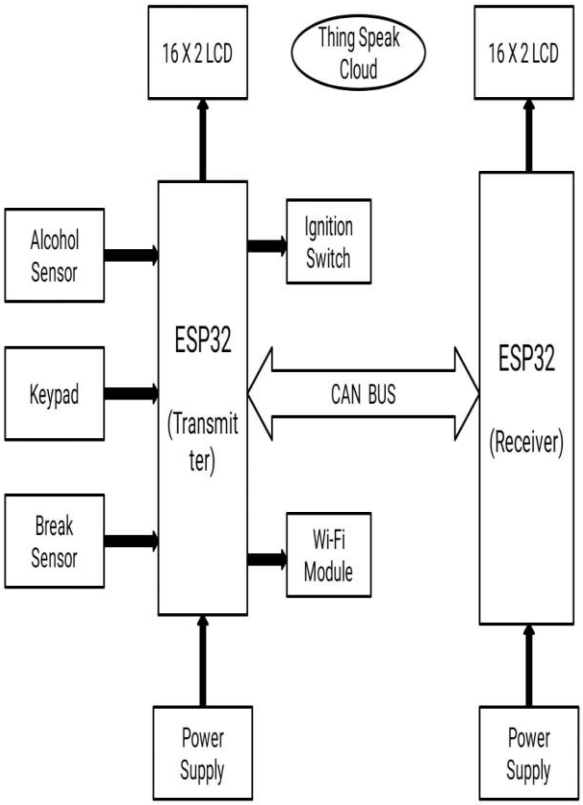

Figure 1: Block diagram of proposed system.

We are proposing a system with Controller Area Network (CAN) protocol for digital driving system for monitoring vehicle. We are using CAN protocol to speak between master and slave node and that we improving the current technology by adding GSM technology to induce SMS incase for accident alert. Using controller area network protocol we will reduce number of wires accustomed get sensor data. We are using alcohol sensor just in case alcohol consumption is found an alert message will be displayed on LCD, also password keypad will be implemented for the security of the vehicle.

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5. Methodology

In the existing system, there are no vehicle safety features and they monitor the vehicle's position and position in the remote area of the existing system. To overcome these barriers, we incorporate additional security and IOT concepts into the proposed system.

In the proposed system, it shows the development and implementation of a digital driving system for an autonomous vehicle. Controller Area Network protocol communication has been selected for attaining the purpose. The major issues are addressed in managing Risk Awareness and Alcohol Recruitment.

From the above Figure.1 block diagram,

- A vehicle is normally built with an analog driver-vehicle interface for the indication of many parameters. A microcontroller based data acquisition system that uses ESP32
- Controller area network is a low level network that provides connections between the simple devices like sensors, actuators and valves and high level devices like PLC controllers and computer.
- Alcohol sensor is semiconductor sensor for alcohol detection. It has a very good sensitivity and faster response of alcohol. This sensor is suitable for detecting alcohol concentration in breath, like common breath analyzer. It provides an analog resistive output based on alcohol concentration.
- Brake Sensor: In brake system there are two types1. Disc brake 2. Box brake. If a person is crossing through slope and could not put brake, then this sensor automatically works. The life of a person is saved.
- When the vehicles are moving in slope, the brake system works automatically (manually). In this the brake sensor controls those vehicles which are moving in slope through which it is connected to can protocol. And in controller area network it has only two wires they are, CAN_H and CAN_L. (H- high, L-low).
- The sensors which are connected to CAN are designed with electronic control unit that allows the devices to communicate each other i.e., it transmits the messages and also receive the messages which are sent.
- Through electronic control unit security keypad and Wi-Fi module are connected.
- If the password entered in keypad is correct, then car will be opened or else not.
- Status of the vehicle are sent to owner through SMS using Wi-Fi module. In order that he will get to grasp about the car details.

6. Results and Discussion

In this project, we are using Controller Area Network protocol to communicate between master and slave node and we improving the present technology by adding GSM technology to get SMS incase for accident alert.

- Using Controller Area Network (CAN) protocol we can reduce number of wires used to get sensor data.
- We are using alcohol sensor in case alcohol consumption is found an alert message will be displayed and car gets stopped automatically.
- For security purpose we use this security keypad which access the password so, if a person wants to enter into the car they need to enter the correct password.

7. Conclusion

In this project, digital driving system for vehicle monitoring is proposed based on Controller Area Network protocol.

Here is that the invention of a digital system called a digital-drive beam, which consists of an integrated path between driver and vehicle of understanding, higher cognitive process and controlling is discussed. In implementing a digital driving system, the goal is to attain the development of user friendly vehicle.

This project helps to achieve alcohol detection, status of the vehicle is sent to owner through SMS using GSM module and a password keypad is kept for the security purpose of the vehicle by which this system produces better performance measures on security and for the vehicle-driver relationship user friendly.

In regard to future scope this sort of prototype model at present is not implemented in reality use yet. We hope for implementing this technique in reality use in next future.

And in future, we can use Raspberry Pi 3 processor instead of the ARM CORTEX microcontroller, which has in built Wi-Fi module and operate with more speed. We can also put a USB camera in front of the car and take video of the scoreboards and notify the driver of the sound.

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