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Vehicle Black Box

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ABSTRACT— Millions of people die due to the accidents. The main purpose of this paper is to provide vehicle safety and a solution that automatically alert the driver to be cautious. In this paper we continuously monitor the vehicle performance using sensors and the behavior of driver with the use of IoT Technology. The Vehicle black box receives the information from various sensors like the breath analyzer, acceleration. When the driver alcohol consumption reaches maximum limit, the SOS messages are sent to emergency contacts. To meet the above requirements.
This report describes the accident cause of the vehicle and Sending alert or information to driver through CAN based communication protocol. The technology embedded in the system is capable of Sending alert/information to driver so that future complications can be avoided and safety can be ensured.
Keywords— SOS,CAN,

INTRODUCTION

In this project we propose to develop an experimental setup of STM32f407VG micro controller based vehicle black box using CAN and IoT based communication protocol. The system tells the cause of the accident and also detect the alcohol level of the driver and alerts driver and customer by sending alert signal/information. CAN and IoT based communication is used in this model. The main purpose of this wireless black box project is to develop a vehicle black box system that can be installed into any vehicle all over the world. This paradigm is often designed with minimum range of circuits. Wireless black box is basically a device that will indicate all the parameters of a vehicle crash and will also store and display its parameters such as temperature, alcohol limit etc. At the time of accident, the message will be sent from the system built inside the car to the registered mobile numbers such as emergency numbers of police stations, hospitals, family members, owner etc. We have used various types of sensors like alcohol sensor (MQ3), which is used to measure alcohol level. Alcohol sensors are located on the steering wheel which will indicate whether the driver is drunk. Accelerometer sensor is used to indicate tilt during the accident. All the parameters sensed by the sensors will send the signal to STM32f407VG. GSM module. The GPS will detect the position of the accident and send it to the contacts.
The technology embedded in the system is capable ofautomatically sensing the blind spot, alerting driver by CAN based communication

II. EARLIER WORK

This chapter summarizes the literature survey that was conducted as a part of the our project report. It covers pertinent established concepts and techniques related to Vehicle Black Box Using IOT. Simulation and real time implementation results using conventional and intelligent control techniques employed in various literature are analyzed. A detailed survey was conducted on various controllers employed their performance parameters are also taken in to consideration for best implementation of this project.

1.Alcohol detection in real time to prevent drunk driving:

In this paper, an alcohol detection system is presented along with its pros and cons. Highlighting the increasing number of accidents due to rash and reckless driving, it promotes the use of this system to minimize cases like these. A MQ-3 alcohol sensor along with the microcontroller STM32 will detect the driver's breath alcohol content. Some of the scenarios are listed as follows:
1..When the driver enters the vehicle in drunk state: In such a case, the sensor will sense the alcohol consumption as soon as the driver sits inside & the vehicle will not start.
2. When the driver intakes alcohol after the vehicle starts or while driving: The system is designed in such a way that it will check the consumption of alcohol one time .

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2.2 "Crash Risk of Alcohol Involved Driving:

A Case-Control Study" Drunk driving was recognized as a major traffic safety threat in the early twentieth century and still continues to be a major road safety issue. The case study inspected the relative accident dangers related with driver's blood alcohol conc. The obtained value, is characterized as the ratio of proportion of extent of crash drivers to the extent of, control drivers in a BAC grouping, compared to a similarly formed proportion of drivers with zero percent BACs.

2.3 Vital Signs:

Alcohol-impaired Driving among Adults" Approximately 1/3 of all vehicles, crash accidents involve drunk driving. In 2009, 10,839 people died in crashes in which at least one driver had blood alcohol concentration greater than or equal to 0.08 g/dL. Rates of self-revealed alcoholic driving have declined in the past years. However, still the rates remain disproportionately high among the youths, binge drinkers and individuals who do not wear seat belts. To reduce the excessive drink and driving cases, states and countries ought to consider increasing alcohol taxes, directing alcohol outlet density, and 4
enacting on these laws strictly. States without seat belt laws ought to consider enacting on them to help lessen fatalities due to drunk driving.

2.4 "IoT-Enabled Alcohol Detection System For Road Transportation Safety In Smart City"

In this paper, an alcohol level detection system was invented for road safety in smart cities using Internet of Things (IoT) technology. The system not only checks alcohol impaired driving by automatically locking down the car which the drunk person is operating but even enables the traffic experts to effectively discover the shutdown vehicles utilizing the coordinates of the vehicle by sending it to a web server. The advancements which are implanted in this framework are adequate to guarantee the shut down and furthermore a pick-up of the driver of the vehicle through the location sent by means of message or mail.

2.5 "Drunk-Driver Detection and Alert System (DDDAS) for Smart Vehicles"

This paper discusses design, live performance test of drink and drive identification and alert cum vehicle control prototype to reduce road accidents due to drinking and driving. The critical part of the system design is variation in distance from the source. The aim is to make the vehicle smart enough to find out the drunk state of the driver and take preventive actions before any mishap happens on road. Based on recent smart gas sensing and integration of satellites and mobile wireless communications technologies, the system senses the drunk state and on-vehicle audio alarm is turned on to warn people on road and vehicle control system is triggered to lock the ignition or stop fuel inflow to the car. Additionally with the help of GPS and GSM cellular network, location is sent to family, friend or police.

2.6 "Road Accident Avoiding System using Drunken Sensing Technique"

Drunk Driving is responsible for almost one third of road accidents, the alcohol impairs person's ability to calculate distance, judgment, reaction time, and vision. The Alcohol sensor (MQ3) is integrated with microcontroller and detects the presence of liquor in human breath. An engine with spark plugs is made as a framework to act as ignition starter over the car's engine. The ignition system will operate based
on the Blood Alcohol Content (BAC) level in human breath identified by the alcohol sensor MQ-3.

III.PROPOSED METHODOLOGY

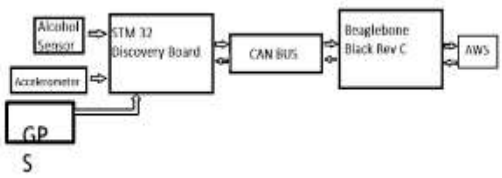

Fig 1 Block Diagram

The project consists of STM32,CANTxRx, and begalbone black and two sensor one is in built in STM32 (accelerometer sensor), and the alcohol sensor .The accident is detected by the STM32 and alcohol is detected by the alcohol sensor and the GPS module.

At the starting, the alcohol sample is taken first and the data will send to the AWS cloud . It will send the message if the alcohol level is detected beyond limit .

The accelerometer will continuous collect the data while moving the car and send the data to the cloud. If the accident occur the accelerometer will detect the accident and send the data to cloud as "Accident detected".

The system is based on Cortex-M3/M4 based STM32f407VG Microcontroller boards. The system is interfaced with alcohol sensor and in-

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built accelerometer sensor . The alcohol sensor will tell the amount of alcohol consume by driver and it will send data to the CAN bus. The accelerometer senor will also send the data to CAN . Then CAN will send the data to the begale bone and the data collected by the BB will be send to the cloud and store in aws.

A CAN network consists of a number of CAN nodes which are linked via a physical transmission medium (CAN bus). In practice, the CAN network is usually based on a Line Topology with a linear bus to which a number of electronic control units are each connected via CAN interface. The passive star topology may be used as an alternative. An unshielded twisted two-wire line is the physical transmission medium used most frequently in applications (Unshielded Twisted Pair — UTP), over which Symmet- rical Signal transmission occurs. The maximum data rate is 1 Mbit/s . A maximum network extensionofabout40metersisallowed.Attheendsofthe CANnetwork, BusTermi- natio n Resistors contribute to preventing transient phenomena (reflections). ISO 11898 specifies the maximum number of CAN nodes as 32.

IV. RESULTS

Below figure shows the implementation results of the project.

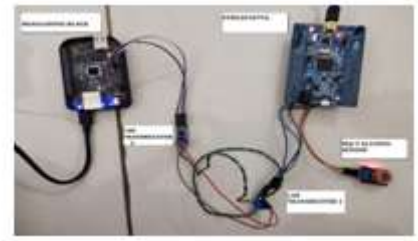

Figure 4.1: STM Result
"This figure shows that there is no accident and no accident detected"

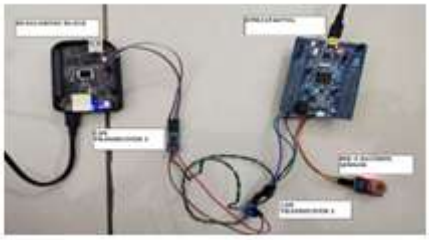

Figure 4.2: STM Result
"This figure shows that there is an accident but no alcohol detected"

MQ-30 is a cost effective semiconductor sensor that detects the presence of alcohol gases in a person's breath, from 0.05 mg/L up to 10 mg/L concentrations. The material used for sensing here is SnO2(Tin dioxide), whose conductivity in clean air is low and the conductivity increments with the concentration of alcohol gases present in breath. It is highly sensitive to alcohol and has some resistance to disturbance caused due to gasoline, vapour and smoke. The sensor provides both analog and digital outputs. MQ-30 liquor sensor can be effectively interfaced with Microcontrollers, STM32 Discovery Board, ESP32 Board and so on.

The alcohol sensor detects the concentration of alcohol in a person's breath, like a common breath analyzer. The circuit is quite simple and all it needs is a resistor. MQ-30 alcohol sensor has 4 pins but we use 3 pins only. The pins A and H are used for the heating purpose and the other two are used for power input and ground. The sensor has a heating framework inside which is made up of aluminum oxide, tin dioxide. It has heat coils to generate heat, and so it is used as a heat sensor module.

V. CONCLUSION

We are getting output as expected. We are able to take reading of alcohol consumption of the driver. Also vehicle accident detection is also working properly. After detecting all the parameter from stm32 we send the data using can bus to beagle bone black. At the end of beagle bone we used aws cloud platform. For sending the proper data to concerned person.

Following parts can be improved

In our project like implementation of GPS for sending accurate sensor after accident occurring. Also using camera we can re confirm that whether driver is checking the alcohol level or not.

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