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IoT based smart BLACK BOX System

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Abstract - *The objective of this project is safety and security of vehicle user and get the insurance. The main aim of project to avoid accident using speed sensor, alcohol sensor, patti switch. speed sensor calculate the speed at which the wheels are rotating. This ultimately determines the speed at which vehicle is traveling. Speed sensor sends the speed information to the control . So that can regulate other function of vehicle. Alcohol sensor check the how much alcohol consume by the vehicle driver. Patti switch indicates that driver wearing a seat belt or not. Depending upon technology is implemented, the vehicle driver will get the notification on his app. If he an accident the data will be send through IOT to the app on mobile for an insurance. When sensor data is monitored and mining is performed it would be possible to predict the good health of vehicle.*

If we turn on GPS system then it sends a vehicle location through a message on mobile. Using this we can get vehicle location.

***Key Words*: PIC microcontroller, Gas sensor, Alcohol sensor, Patti switch sensor.**

1. INTRODUCTION

An accident is a unpleasant event that no one ever want to occur in their life. .It ruins the life of many people. The percentage of accident raised the eyebrows and caught the attention. It found that 80% of time is the fault of driver. So avoid the accident in today's world science has made amazing advances in a car. These cars are more advanced than ever.

We have design such a system in which all the parameters which are responsible for accident will get recorded & help us to prevent the accident and according to recorded data the vehicle driver will get insurance.

The project is developed to record the informational data such as alcohol level, speed, gas leakage and driver will wearing a seat belt or not etc. It can also use for vehicle mapping & alert with the help of GPS technology,

This system utilize the sensor data of car& predicts the health of car. The utilized data provides on local app which alerts the driver. If accident is occured IOT through the reason for accident is provided to the insurance company to get the insurance. According to the reason of accident the driver will get the insurance amount. If we turn on the GPS system it continuously provide the car location through message. When accident occurred it send the message that accident is occurred.

1.1 Literature Survey

The literature surveyed some different papers to get information about the existing work which have been done by T.Gayathri, Kargupta, Hillol

Vehicle health monitoring system **:**Vehicle health monitoring utilizes the sensor on data vehicle, mine the data & predicts the health of car. It provide an idea on when the vehicle would need maintenance. The model also can warn driver dozes off or in case of drunken driving. The purpose of this research paper is to give an overview of the existing vehicle health monitoring system. It gives the different ways in which vehicle health can be monitored. Vehicle monitoring can be distributed or on-board data mining. Computation or mining in vehicle are restricted by less memory and processor capacity, still an on board mining is more advantageous than fully distributed data mining system. This paper survey the existing model for efficient on board vehicle health monitoring system.

Uferah Shafi, Asad Safi have following information of Vehicle Remote Health Monitoring :In many industries inclusive of automotive vehicle industry, predictive maintenance has become more important. It is very difficult to diagnose failure in advance in the vehicle industry because the availability is limited of sensors and some of the designing exertions. An approach is presented in this article for fault reduction of four main subsystems of vehicle, fuel system, ignition system, exhaust system, and cooling system. When vehicle is on the move the sensor collected, both in faulty condition (when any failure in specific system has occurred) and in normal condition.

HARMAN Ignite Platform(2015)Vehicle health hand diagnostic dashboard: Before the advent of connected vehicles , consumers simply drove their new vehicle out of deals reacted to issue as they arose. After combining diagnostics and connectivity, managers and service providers are able to offer additional services to their customers. Ecosystem provide contextual and advanced services like early field warnings, predictive maintenance, remote diagnostics and repair, fuel management. This reduces operations costs of the vehicle, reaction time to issues, accident liability and fines and also enhances customer experience.

VEDAS(1) works on the concept of ubiquitous data mining. An in device , real time mining of data on a ubiquitous computing environment in accordance to the environment requirements by considering resource constraints of the device, exploiting context the information behaving autonomously, applying special privacy preserving methods in VEDAS and mine fleet, partial on board data mining is done.

1.2 Block Diagram and discription

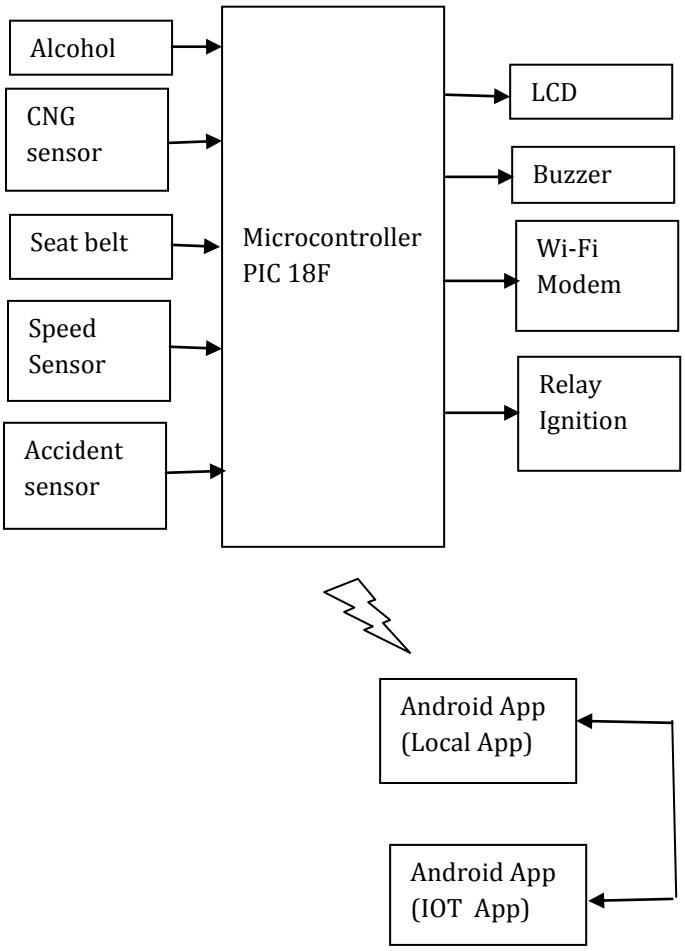

Fig -1: Block diagram of proposed system

In the proposed system we are designing a system which will continuously monitor the vehicle parameters and send them on Android APP on internet of things (IOT). All the sensors are interfaced to inbuilt ADC 10 bit. The µC will scan all the parameters and send them on Android APP using MQTT protocol.

1) PIC MICROCONTROLLER:

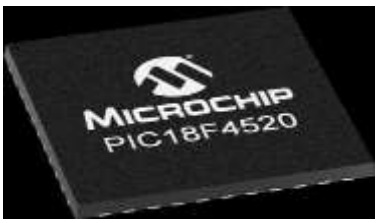

Fig -2: PIC microcontroller

PIC18F4520-I/P isa40-pinFlash-based32KBmicrocontrollerwith13x10-bitA/D Converter,2xcomparators,UART,A/E/USART,SPI,I2C1-MSSP(SPI/I2C) and ECCP peripherals.

Specification:

CPU

- Upto10MIPSPerformanceat3V
- Compiler optimized RISC architecture
- 8x8SingleCycleHardwareMultiply

System

- Internaloscillatorsupport-31kHzto8MHzwith4xPLL
- Fail-Safe Clock Monitor-allows safe shutdown if clock fails
- Watchdog Timer with separate RC oscillator
- WideoperatingVoltagerange;2.0Vto5.5VnanoWattPowerManagedModes
- Run, Idle and SLEEP modes
- Idlemodecurrentsdownto5.8uAtypical
- Sleepmodecurrentsdownto0.1uAtypical

Analog Features

- 10-bitADC,13channels,100Ksamples per second
- Programmable Low Voltage Detection Module
- Programmable Brown-out-Reset Module
- Two Analog Comparators multiplexing Peripherals
- Master Synchronous Serial Port supports
- SPI™andI2C™masterandslavemode
- EUSART module including LIN bus support
- Four Timer modules
- Upto5PWMoutputs

2)ESP:

Fig -3: ESP

Espressif Systems' SmartConnectivity Platform (ESCP) enables sophisticated features including:

- Fast switch between sleep and wakeup mode for energy-efficient purpose
- Adaptive radio biasing for low-power operation
- Advance signal processing
- Spur cancellation and RF co-existence mechanisms for common cellular, Bluetooth,DDR, LVDS, LCD interference mitigation.

Specifications:

- Operating Voltage 2.5V ~ 3.6V
- Package Size QFN32-pin (5 mm x 5 mm)
- Operating Current Average value: 80 mA
- Operating Temperature Range –40°
-

3) MQTT PROTOCOL

This is simply made for the connections with the remote locations. It is an ISO standard and publish-subscribe-based messaging protocol. It works on top of the TCP/IP protocol.

Whenever an accident is detected the µC will send all the data to local APP which will further send the data to IOT based server. On the android APP we have a graphical user interface to display the data. The data is analyzed and then an appropriate notification is displayed on APP, and if the accident is detected then the message will send on the registered mobile numbers. Depending upon the data the APP will continuously monitor the data pattern and as and when any parameter crosses the set point the APP will either display or send a notification to user to take appropriate action so that the vehicle / Engine health is maintained.

The main benefits of vehicle health monitoring

1. Reduces unscheduled vehicle downtime through automated remote diagnostics and alerts
2. Just-in-time vehicle maintenance' saves money on unnecessary maintenance
3. Reduces the risk of accidents, fuel expenses, insurance liability and fines by effective driver behaviour monitoring
4. It integrates with existing backend solutions facilities OTA updates and remote diagnostics.
5. Helps in deploying new services and generating aftermarket service revenue opportunities
6. Improved management of overtime and cost accounting of jobs through regular review of trip data and overtime dashboard report

Table -1: Comparison with existing techniques

SRNO	Authors	Paper	Advantages
1.	T.Gayatri	Vehicle Health monitoring And prediction system	Real time vehicle monitoring
2.	Kargupta, Hillol, et.al.	A distributed data streaming and mobile system for real time vehicle monitoring system	Vehicle failure prediction

2. CONCLUSIONS

With this increasing graph of using smart phones and wireless communication, it is become easy to use this technologies for real time solutions.

Despite of the limited resources, these technologies are being used along with machine learning approaches to solve big problems in automotive industry. Our first contribution to this paper is data generation and feature selection. Sensor data of many car manufactures has been used. WE have selected those sensors which can cause a system to break down. And the second contribution is to built a user friendly vehicle fault prediction, vehicle remote health monitoring system.

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