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Monitor the critical parameter of vehicle system through IoT based Network

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Abstract- **The IOT Enabled Smart vehicle implements an easy way to monitor an individual's vehicle's parameters such as fuel level, Engine oil level, Engine's temperature etc. using IOT Technology. The fuel level is measured using liquid level sensor which is commonly used nowadays. The sensor will get the level of the fuel present. Digital Documents: This system also contains digital vehicle (PASSWORD PROTECTED) documents such as vehicle registration, Insurance, license etc.., which will allow the user to access documents anywhere anytime seamlessly. SECURITY The major advantage of our invention over the existing system is the level of its security it is robust in the safety. This system also includes a high accuracy GPS tracking system which will allow the user to Track his/her vehicle and to determine vehicles ACCELERATION instant by instant. RFID Keys (Digital Keys) the digital keys in this system will allow high security to the vehicle from unauthorized access, this security system is embedded in the IGNITION SYSTEM of the vehicle. Any unauthorized access of vehicle will be alarmed instantly to the user. The Mobile Application as world goes digital all of above aspects are integrated to mobile application the user can seamlessly view all the parameters as well as track his/her vehicle using this application. The rental taxis and cars can be monitored by the company using the mobile application and the driver behavior can also be determined as the data regarding the vehicle speed, location can be viewed using the mobile application in real time and in case of any doubtful events the owner can be immediately**

Keywords- **CC3200, GPS, RFID tag and reader, fuel level, Digital Key**

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I. INTRODUCTION

The design and development of a vehicle tracking and monitoring system especially useful for mining appliances in real-time has been reported in this paper. The system principally monitors vehicle moving and tracking appliances such as position, and speed and subsequently identifies alcohol detection. The novelty of this system is the implementation of vehicles internal and external parameter in different ways. The developed system is a low-cost and flexible in operation like mines and thus can avoid collision and traffic jam. The prototype has been extensively tested in real-life situations and experimental results are very encouraging for drivers and proprietors. A lot of vehicle theft occur and accident due to over speed, alcohol drunken by driver. GPS is increasingly being used in vehicle tracking and monitoring services. To resolve the problems like avoid speed and collision, traffic jams ARM processor-based vehicle monitoring is implemented as well providing information for the vehicle owner

II. LITERATURE SURVEY

According to the survey, the transportation system in India is enhancing to the Different level. Hence in this case to provide security and enhance features in the Private vehicles like two wheelers, we proposed this solution IOT Enabled smart vehicle. Everyone has proposed different ideas in their perspective and is being used by the public but all the proposed ideas is for four wheelers only.

In 2014, SeokJu Lee and Girma Tewolde and Jaerock Kwon Proposed a System with popular technologies that combines the smartphone and the microcontroller. They proposed a solution for tracking their vehicle from any location at any time. In this they used GPS and GSM for getting the Location and sending it to Microcontroller.
Using GPS, they fetched the location of the vehicle and sends the fetched data to the Microcontroller using GSM/GPRS. They Got Google API's to showcase the location in mobile Application. In this the Owner can continuously monitor his/her vehicle from anywhere at any time.
S.P.Metkar and Girish L.Deshmukh proposed a similar solution in 2015. They also used GSM and GPS with ARM7 processor and they monitored the vehicle. They provided security for the private vehicles and public transports.

In 2015, Mashood Mukhtar proposed a solution with Security system and Navigators. In his solution, he provided vehicle tracking system with GPS and GSM Modem and he offers some control features. He used GPS unit, GSM modem, two relays, two MCU. In his project, he introduced five features, vehicle's location tracking, Switch ON and OFF the vehicle's ignition by remotely and unlock and lock the doors of the vehicle using Remotely. This controls are done with an SMS from the Mobile.
In paper [5] author use Raspberry Pi as our GPU running Machine Learning algorithm [K-Nearest neighbor (KNN) and Naïve Bayesian algorithm] predicting the vehicle condition and life prediction of Engine, Coolant, etc. and planning to implement such a system which will be user friendly and user interactive. We propose two methods for data handling, 1] Develop Bluetooth low energy technology as the communication module for data transmission to the cloud database. 2] Alternatively, 4G Dongle can be used for transmitting data directly to the cloud and the mobile application from the Raspberry pi. The cutting-edge feature of BLE is its low power consumption and can also be integrated to many sensors at any point in time (scalable

technology). Our prototype is using the BLE Communication for OBD-II (On board Diagnostics) - Raspberry pi communication and Wi-Fi for cloud interfacing. We have integrated OBD-II in a FORD Manufactured car to extract the following data: Speed, air pressure, temperature, CO2 emission, GPS Coordinates, Fuel Level indicator sensor. The Raspberry Pi will run the Machine Learning (ML) algorithm and output the results and live prediction of vehicle condition to the mobile application.

III. EXISTING SYSTEM

The system has been designed for ARM processor vehicle tracking and monitoring will provide effective and real time vehicle location using GPS and GSM. A GPS based vehicle tracking will inform where you vehicle is and where it has been and how long it has been. The system uses geographic positions and time information from the global Positioning Satellites. The system has on board which resides in the vehicle to be tracked and a Base Station that monitor data from the various vehicles. This project ability is accurately detected the vehicle and monitoring the speed for avoiding collisions. Design provides public many conveniences in life but also bring many problems at the same time, for example traffic congestion, difficulty in monitor dispersive vehicle, theft and other series of problem.

IV. PROPOSED SYSTEM

The main objective here is to comfort and safe guard the user and to make the task of maintaining and monitoring his/her vehicle easier. This system aims towards intuitive mechanism and will rely on prevention before the worse things occurs. IOT allows everything to be sensed controlled and monitored remotely using internet enabled devices like computers, mobile phone, Tablets, wearable etc..., it is a technology where all the gadgets and physical devices where operated and monitored using internet. In this project we are implementing an easy way to monitor an individual's vehicle's fuel level, Tyre pressure level, Engine oil level using IOT Technology. The most important thing is security provided.

The system is adaptive to all kinds of vehicles as it works under 12 v power source where the data manipulation and master control is handled by CC3200 the Single-Chip Wireless MCU. The total power requirement of the MCU is only 3.6 v which makes it unique over its competitors. This system Integrates Every aspect of a vehicle where nothing can be hidden from the user the complete control and security is provided by this tool.

The proposed economical system uses raspberry pi 3 and GPS for tracking the accident location and an alert is sent not only to the registered device but to all mentioned users and we need not use a separate GSM module for sending SMS as the alert will be sent via internet as pushed notifications to the user and this system is more reliable. Here the sensor is integrated with the automobile and the sensor data is pushed to the raspberry pi 3 which acts as a communication gateway and the data is forwarded to the cloud database from which it is delivered to the corresponding application through which we can monitor the real time data. Below are the hardware requirements for the implementation of the monitoring system:

A. Requirements

- Raspberry pi 3, 4G WIFI dongle
- OBD-II Device with USB Cable
- Speed sensor, Temperature sensor, CO2 emission sensors, GPS Coordinates sensor, Fuel Level indicator sensor, Vibration sensor
- Compatible display

A. Raspberry pi 3 and OBD-II Interfacing

The Raspberry Pi 3, with a quad-core ARM CortexA53 processor, is described as 10 times the performance of a Raspberry Pi 1. This was suggested to be highly dependent upon task threading and instruction set use. Benchmarks showed the Raspberry Pi 3 to be approximately 80% faster than the Raspberry Pi 2 in parallelized tasks[5] . OBD is the ON
BOARD DIAGNOSTICS tool responsible for monitoring the vehicles engine, transmission, and emissions control components.

Vehicles that comply with OBD-II standards will have a data connector which uses the CAN protocol. Py OBD is an open source OBD-II complaint scan tool software. It can be used to interface with low-cost ELM-USB. Here we can integrate the OBD-II device with raspberry pi 3 from which the data can be pushed to our mobile application. Fig. 1 illustrates the design.

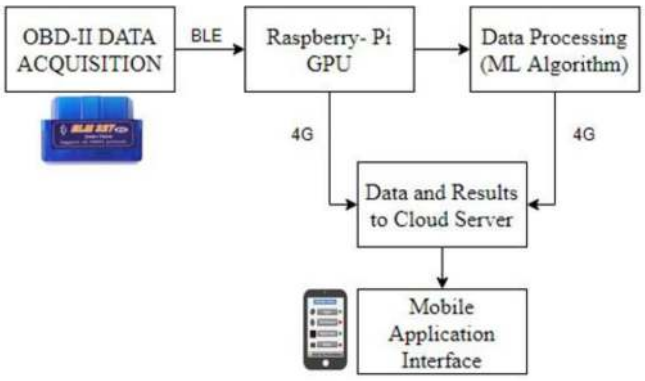

Fig 1: Design of Model

B. Naive Bayes

Bayesian classifiers are statistical classifiers and are used to predict the class membership probabilities such that it can estimate whether a given tuple belongs to a certain class. Bayesian classifier is based on the Bayes theorem. Here X is considered as "evidence" and H be some hypothesis such that the data tuple X belongs to a specified class C.

Here we use Bayesian classification to predict the class label of a tuple. The training data contains the engine temperature, oil level, tyre pressure. The class label attribute, safety, has two distinct values namely yes, no(0,1).Let Ci correspond to two classes 1 and 2 where C_1 corresponds to class safe and C_2 corresponds to class unsafe .The tuple we wish to classify is
X = (engine temperature=normal, tyre pressure = normal, oil level=normal)
We need to maximize
P=(X/Ci) P(Ci) , For i=1,2 (2)
P (Ci) is the prior probability for each class.
P (Safety=yes) = 136/600=0.226
P (Safety=no) = 464/600=0.77
The following conditional probabilities is then estimated:
P (engine temp=normal/safety=yes)
P (engine temp=normal/safety=no)
P (tyre pressure=normal/safety=yes)
P (tyre pressure=normal/safety=no)
P (oil level=normal/safety=yes)
P (oil level=normal/safety=no)
Using these probabilities, we can obtain
P(X/safety=yes) = P (engine temp=normal/safety=yes)*P (tyre
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pressure=normal/safety=yes)*P (oil level=normal/safety=yes)
Similarly, P(X/safety=no) can be calculated.
To find the class Ci, that maximizes P(X/Ci) P(Ci),we compute
P(X/Safety=yes)* P (Safety=yes) = 0.226
P(X/Safety=no)* P (Safety=no) =0.090

TABLE III. RESULT

KNN	ACCURACY=93%
NAIVE BAYES Can be used to predict the class of tuple	For X= [engine temp=normal, tyre pressure=normal, oil level=normal] we estimate P(X/Ci) P(Ci) for safety=yes as 0.226 and for safety=no as 0.090 and therefore the classifier predicts safety=yes.

V. RESULT AND CONCLUSION

As the data can be obtained in real time this system can be implemented in order to monitor the automobile and ensure the safety of the people. The data collected from the vehicle can be used to evaluate the condition of the vehicle using machine learning algorithms such as KNN algorithm and Naive Bayes algorithm and alerts can be sent in case a particular threshold limit is exceeded. The rental taxis and cars can be monitored by the company using the mobile application and the driver behaviour can also be determined as the data regarding the vehicle speed, location can be viewed using the mobile application in real time and in case of any doubtful events the owner can be immediately alerted. Emission rate of the cars can be monitored as various sensors monitoring the emission rate can be integrated with the raspberry pi thereby saving the environment from CO2 emission and eventually global warming. Alerting people in times of emergency.

VI. FUTURE SCOPE

An average automotive has about 60-100 sensors on board. The proposed solution is highly scalable and many sensor data can be analysed. This stands out to be a platform for many automotive enthusiasts as the data can be highly used to build connected cars. Other algorithms can be used in order to maximize the accuracy of the results. The concept of connected cars can become a near reality when we can channel live data and accurate location of individual vehicles. Nowadays, autonomous cars have been using a similar technology with all the on-board sensors. We can leverage the IoT concepts for live and parallel computations of multiple vehicles simultaneously. The raspberry pi has been proposed as a prototype and more robust processors will be used on the actual product for running the algorithms. Also, the proposed solution can act as an automatic vehicle health feedback for the manufacturers to improve their quality thereby arranging for regular vehicle service when it is really required and not in a random manner.

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