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AUTOMATION OF AUTOMOBILE USING IOT: A SURVEY

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ABSTRACT: *The main aim of this paper is to present the previous work of the vehicle tracking, controlling and monitoring system using various methodologies. Vehicle tracking and monitoring system are one of the challenging problems. As a vehicle is composed of many sensors, in order to monitor those sensors different technologies are used. With the emerging technological innovations, users are looking for an automotive system than the manually operated system. As the number of vehicle users increased, the number of accidents and thefts are increasing. Due to a convergence of multiple technologies, Internet of Things (IoT) has evolved in the field of networking, which helps objects to be sensed and controlled remotely. Automation of Automobile using IoT is a system that uses mobile or computer device for monitoring, tracking and controlling of the vehicle and also the driver activity is monitored through the internet from anywhere around the world by the owner. The owner can monitor different sensors in the vehicle and keep track of the vehicle using GPS (Global Positioning System) in the system and can store these datas in the cloud. If any unusual event occurs then a message will be sent to the predefined number over GSM (Global System for Mobile Communication) and update the same in the cloud.*

Keywords**:** *Vehicle Tracking, Vehicle Monitoring, Vehicle Controlling, Internet of Things and Cloud.*

I. INTRODUCTION

Vehicle tracking and monitoring systems were first implemented for the shipping industry because people wanted to know where each vehicle was at any given time [1]. This has been extended in almost all automobiles especially to track the vehicles in real time. In order to monitor and interact with one or more entities and make the connection to the Internet, technical communication devices are required. The devices can be attached to or embedded in the entities themselves – thus creating smart things. One such kind of technology which uses the internet to achieve these goals is the IoT (Internet of things). The term "Internet of Things "has in common that it is related to the integration of the physical world with the virtual world of the Internet [2].

II. VEHICLE TRACKING SYSTEM

Global Positioning System (GPS) is most widely used for the tracking system. The designed in-vehicle device works using Global Positioning System (GPS) and Global system for mobile communication/ General Packet Radio Service (GSM/GPRS) technology that is one of the most common ways for vehicle tracking [1].The real time tracking of vehicles, used for many applications including vehicle security and fleet management [6]. Prashant A Shinde and Prof. Y.B Mane represents a school bus tracking and monitoring system in which GPS is used to track the school bus which provides an accurate arrival time of the vehicle to a particular location or stop. Hence, the student can spend time for other activities rather than waiting for a school bus [3]. Abhid Khan and Ravi Mishra in their system represent the use of GSM and GPS technology together to allow the system to track the vehicles which provide most up-to-date information on the ongoing trips. The locations are reported by SMS message which takes an advantage of wireless technology in providing powerful transportation management engine [4]. An algorithm for bus arrival system for individual stops along service route with GPS technology was developed. The algorithm is implemented in an intelligent system that can automatically detect the running route and direction of a bus and predict its arrival times at the downstream stops under any operating conditions [5]. Muhammad Ridhwan Ahmad Fuad and Micheal Drieberg develop a system which integrates GSM and Google map. The GSM modem at the control center receives an SMS of the coordinates. This will update the main database and the position of the vehicle is displayed through Google map [6]. Tracking of vehicle has been made simpler with the advent of GPS technology. Real time tracking of many vehicles on cloud platform was developed and it makes easy to track many vehicles at a time using the GPS and GSM. [7]. Hui Tan presents that GPS positioning technology plays an important role in positioning, monitoring, and navigation [8]. The combination of GPS and GSM technology enables the user to track/locate the vehicle in ease and convenient manner [9].

III. VEHICLE MONITORING SYSTEM

Vehicle theft becomes a social real time problem now a day's [3, 11]. Hence, it's become necessary to monitor the vehicle and also driver activity in a certain situation to overcome the problems. Abdul-Wahid A. Saif, Haytham Sammak, Diya Matar and Omar AI-Midani presents a combined technology of GSM and GPS helps to monitor the car speed without assigning policemen and wasting man force. GPS helps to find the location of the car and GSM helps to

send the message to the nearest police station [10]. To monitor dangerous goods GPS with Radio Frequency Identification (RFID) technology is put forward for real time data acquisition, tracking and monitoring. The captured data is sent to the database center via CDMA [11]. The combination of GPS and GSM technology is used to monitor and track the school bus at real time and displayed on the web page and also monitors different sensors and update to the server over GSM [3]. GPS is used to get geographical coordinates at real time and GSM/GPRS is used to transmit the vehicle location to the database. A Smartphone application is developed to monitor the location of a vehicle and thus, user can predict the estimated time and distance of arrival [1]. Android Smartphone is used to monitor the vehicle. Here GPS/GNSS is used to get the vehicle position and send the datas over the cellular network. The designed system is feasible for the vehicle owner to monitor the vehicle [12].

IV. VEHICLE CONTROLLING SYSTEM

Theft is increasing and thus vehicle safety place an essential role for public vehicles. Vehicle tracking and locking (controlling) place an important role when the vehicle theft occurs. GPS is used to find the location of vehicle and GSM is used to send SMS to send the control signal to lock the vehicle engine. The vehicle can able to restart and open the door of the vehicle only from the signal that is received by the controller from the authorized person [13]. Dual tone multi-frequency [DTMF] based decoder and GSM network is used to control the vehicle movement i.e. moving forward, backward, Left and Right [14]. In the case of burglary and drunk and driving cases where the owner needs to monitor the vehicle and to controlling like locking and opening the door remotely GSM is used [7]. Automatic turning off the ignition by the controller when the alcohol detection in the vehicle is sensed by the sensor and send the distress message with the location to the police or family member over GSM [15].

V. INTERNET OF THINGS

Stephan Haller said that the term “Internet of Things” has in common that is related to the integration of the physical world with the virtual world over Internet [2]. There are many physical objects that one wants to interact with. Humans want more comfort in almost all the field. The word “Smart” has been populated in almost all the field like Smart homes, Smart phones, Smart cities, Smart cars etc.. For the betterment of the human comfort and his needs many technologies like Wireless Sensor Networks (WSN), Machine to Machine Interface (M2M) etc. has developed yet Internet of things took transcend overall. The concept of IoT started implementing from home automation to automotive industries. Many automotive industries like BMW, Mercedes-Benz, Audi etc. investing lots of money for future cars with IoT. Vaibhav Hans, Parminder Singh Sethi and Jatin Kinra presents a system with IoT and cloud based technology for car parking in cities [16]. Vinay Sagar K N and Kusuma S M presents a Home automation system using IoT where different sensors are monitored and stored and controlled via internet with Gmail As a cloud [17].

In IoT the concept of cloud storage will makes a significant role. As IoT is connecting of many things storing of different datas and controlling from anywhere in the world cloud storage is predominant. Storing of huge datas in which digital datas are stored in logical pools where u can access it around the world. Cloud providers use “Pay as you go” concept. Many providers provide free space for certain GB then the cost as per the requirement of space. Microsoft Azure, IBM Bluemix, Cloud Foundry etc. provides a cloud platform for building, running and managing apps and services and Gmail provides up to 15GB free space to store anything.

VI. REVIEW ANALYSIS

After studying the methods for vehicle tracking, controlling, monitoring and alerting the GPS, GSM/GPRS system place a wider role for real time tracking, monitoring and controlling of vehicles like car, buses, trucks and cargo. The GPS is used to locate the vehicle. GSM/GPRS is used to send the location of a vehicle and also controlling the vehicle remotely.

Looking into tracking of multiple vehicles or a single vehicle database is used to store the location of the vehicle. Cloud is also used to store the data like the location of vehicle [7], sensors data. Also for monitoring the temperature, Smoke/Gas leakage [3], alcohol [7, 15] etc different controllers are used. A Smartphone app is also developed for tracking the vehicle, monitoring and controlling the vehicle. The concept of IoT in home automation [16] and car parking system [17] uses Gmail and Cloud Foundry as cloud storage respectively. Microsoft Azure is used in cloud based multiple vehicle tracking systems [7].

There are many controllers that are available in the market. Based on the requirement and application controllers are choose. As of the study Arduino, ARM Controllers and Raspberry pi are most widely used in vehicle automation nowadays.

VII.CONCLUSION

By studying different cases it is observed that vehicle tracking, controlling and monitoring place an important role in a various system like in School buses, Public vehicles, Personal Vehicles. Hence, automation of automobile places a predominant role. One must keep an eye on driver activity to avoid accidents due to different reasons like drunk and driving or due to sleepiness etc. Vehicle Controlling or locking focuses on, if the vehicle is being used by the third party and also when theft occurs. GPS/GSM is used for tracking, monitoring and controlling the vehicle and storing datas on particular database in the system may lose due to many reasons and cannot access globally. This can be avoided by cloud storage. IoT helps to interact with many sensors and modules in the vehicle and stores those datas on cloud and can be accessed anywhere in the world.

VIII. FUTURE WORK

The system "Automation of Automobile using IoT" uses the combination of Raspberry pi and Arduino Mega controller for sensing different sensors value and controlling. Cloud computing helps to manage, process and stores the data using remote servers rather than a personal computer. The best and common example for cloud is the Gmail provided by the Google's App Engine. Fig 1 shows the entire block diagram of the system to be implemented. The Speed of the vehicle is being controlled by the based on the distance between the present vehicle and surrounding vehicle using distance sensor to measure. Vibration sensor used to detect the accident occurrence if so the data is sent to the predefined number. An Alcoholic sensor detects the content of alcohol nearest to the driver seat in order to avoid accidents. If so then it stops the vehicle immediately and the intimation is sent to the predefined number. The owner can only restart the vehicle by sending control action over internet.

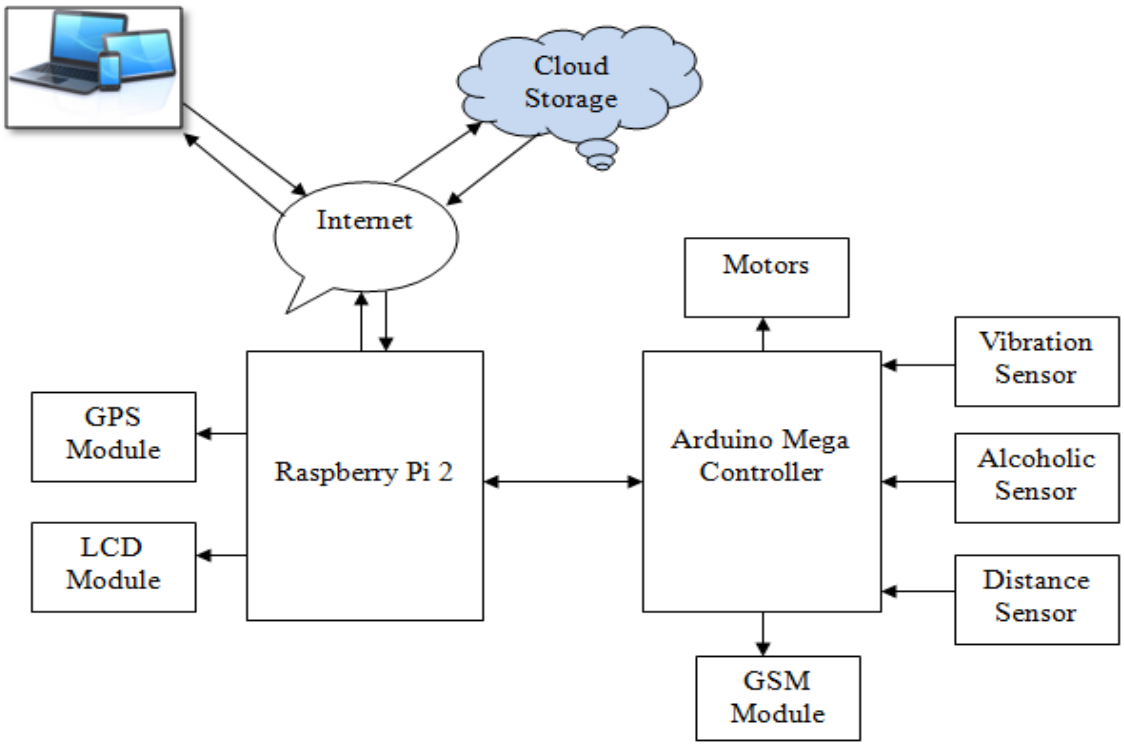

Fig 1: Block Diagram of Automation of Automobile using IoT

Here Raspberry Pi 2 controller acts as a Master controller and Arduino acts as a slave controller. As this is an ongoing work partial output is obtained.

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