© 2017 IJSRST | Volume 3 | Issue 8 | Print ISSN: 2395-6011 | Online ISSN: 2395-602X
Themed Section: Science and Technology

SMART local bus transport Management System using IoT

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ABSTRACT

The local Public transport Management in India is very poor in some state and there is a need to build SMART local Bus Transport Management System. Current management system for local Public transport has no way to track vehicle in real time. Even Passengers do not have adequate information on the Vehicle and route. This creates mess when buses come at Bus Stops. Local Public transport Managers also have very little idea of vehicles running on routes in real time. The current management system is manual. The status data is compiled at the end of day and complete picture comes on monthly or weekly bases. The analyses of frequency routes, Footfall of Passengers on routes, fuel consumptions, Fuels use in KMPL (Kilometer per Liters), and Mechanical status of vehicles are not available in real time. These parameters determine the profitability of Public transport organization. Here, we propose Internet of thing (IoT) based model to solve this problem. We have implemented IOT techniques for effective management of local bus transports. The system will consist of one gadget placed in the system, cloud server, Application software for depot and Android Application for commuters travelling in buses. We will measure Engine Temperature, Fuel Level, Vehicle Speed, and Passenger Count. The number of passengers travelling in the bus is counted for real time and data is sent to server through cloud. The software at depot shows the position of all the buses on Google maps along with all the parameter details. Passengers can check the status of bus on android app by entering bus number.

Keywords: Vehicle-to-Cloud (V2C), Vehicle-to-Everything (V2X), Precision senor, IoT, local Public transport management system, Automotive IoT, Internet of Things, SMART Vehicle.

I. INTRODUCTION

In India, there is a need for proper bus transport system. With increase in the population, it has led to uncertain crowding at public bus stops. People wait for long hours and suddenly gather near stops whenever they see any bus coming by, even though it is not their destinations bus. This leads to unnecessary crowding which be solved by the use of this smart design of IOT based bus transport system.

Here in our project, we aim to reduce the crowd at public places and where in people will come to know about the upcoming buses which have left the previous stop and are heading to the next stop soon. Therefore, by applying this approach a person need not to gather to see which bus is coming their way. He may sit and relax until his bus arrives from the previous stop. By using this designed system, we can come to know about all the buses that are heading towards the bus stop, their destination and the time they will require to reach the stop. By using IOT a person at remote place i.e. away from stop or anywhere at home or workplace can know the information about the bus, from which stop, at what time, within how much time the bus will reach destination and much more information about it through the internet. The user will need to just open his web browser, enter the static IP address. And then the whole information related to the bus can be accessed by him.

In India, until now we do not have such a smart city bus transport system where in the real time of the bus reaching the destination is known. Further implementations can be made in this project like we can also display the no. of vacant seats in the bus, so if there is a limited seated bus, people in the queue will get the place and the remaining will have to wait for the next bus to come. This will lead to a safe and comfortable journey indeed reduce the crowding.

The organization of this document is as follows. In Section II literature survey is explained. Section III

presents proposed methodology with detailed description of different hardware and software used in system. Section IV i.e Conclusion is the last part of paper and it concludes the whole research work. Section V includes references.

II. LITERATURE SURVEY

In the two decades since OnStar was formed as a collaboration between General Motors (GM),Hughes Electronics, and EDS (acquired by HPE in 2008), connectivity-based automotive technology has become increasingly ubiquitous. Beyond the basic concept of a connected vehicle equipped with Internet access, new markets have emerged, such as Vehicle-to-Infrastructure (V2I), Vehicle-to-Vehicle (V2V), Vehicle-to-Cloud (V2C), Vehicle-to-Pedestrian (V2P), and Vehicle-to-Everything (V2X) [2,5,6 and 7]. A recent study by the Centre for Automotive Research highlighted that "the average Vehicle now contains 60 microprocessors, and more than 10 million lines of software code—more than half the lines of code found in a Boeing Dreamliner airplane." Vehicles are becoming increasingly intelligent, and by 2018, one in five Vehicles on the road will be self-aware and able to discern and share information on their mechanical health, global position, and status of their surroundings. This self-awareness, together with the need to be constantly on, requires reliable connectivity and Internet of Things (IoT) solutions.

The rollout of 4G LTE, and subsequently 5G networks, will further increase the capabilities of the connected vehicle, and facilitate faster transmission rates and higher volumes of data. Tier-1 Communication Service Providers (CSPs) and Telcos are ideally suited to provide such Connectivity while needing an IoT solutions partner to address the automotive needs [4 and 8].

There have been a large number of related works using GPS receiver equipped vehicles as traffic probes, fleet management, etc. In Anchorage Alaska, the transportation sector used 80 probe vehicles equipped receiver as a terminal for sending and reporting speed, location, direction and fuel consumption to the database server. These data were then processed to estimate the time traveled on the road by drivers. The manager could be observed vehicles' operations based on the map in real time [11].

In past works given in SeokJuLee [8], they have actualized transport vehicle tracking for UCSI University, kuala Lumpur, Malaysia. It is developed for settled course, giving the candidates with status of bus after determined time utilizing LED panel smart phone application. In a paper by Tareq Binjammaz, Ali Al-Bayatti, Ashwaq Al-Hargan [1], GPS receivers are used to provide vehicle position and velocity data. However, GPS cannot provide the high quality positioning information required by applications due to atmospheric effects, receiver measurement errors, and multipath errors.

InMashoodMukhtar[10], The vehicle tracking system exhibited in this paper can be utilized for situating and exploring the vehicle with a precision of 10 m. The situating is done as latitude and longitude alongside the correct area of the place, by making utilization of Google maps. The system tracks the area of a specific vehicle on the client's demand and reacts to the client by means of SMS.

In Maman Abdurohman [9], versatile tracking framework is utilized to monitor vehicles position and in uncommon cases there are much helpful data can be studied, for example, speed, cabin temperature and no. of passenger. This monitoring procedure is done utilizing GPS module, and sending the information to a server through GSM modem. It is proposed machine-to-machine (M2M) communication from which Open Machine Type Communication (Open MTC) as correspondence platform for collecting and preparing area information. The area is shown on Google outline.

III. PROPOSED METHOD

We are implementing IOT techniques for effective management of local bus transports. The system will consist of one gadget placed in the system, cloud server, Application software for depot and Android Application for commuters travelling in buses. The detailed process can be understood by following figure1.

Figure 1. System Architecture

Bus Unit :

The heart of the bus unit is micro Controller. We have used Micro Controller. The data from different sensors is collected by Micro Controller and displayed on LCD. Also all these readings are sent to cloud server.

The software at depot shows the position of all the buses on Google maps along with all the parameter details. Passengers can check the status of bus on android app by entering bus no.

Different sensors are connected to measure the different parameters such as engine temperature, fuel level, and speed. Also alcohol sensor is used to check whether driver has consumed alcohol. The number of passengers travelling in the bus is counted and data is sent to server through cloud. The process is depicted in figure 2.

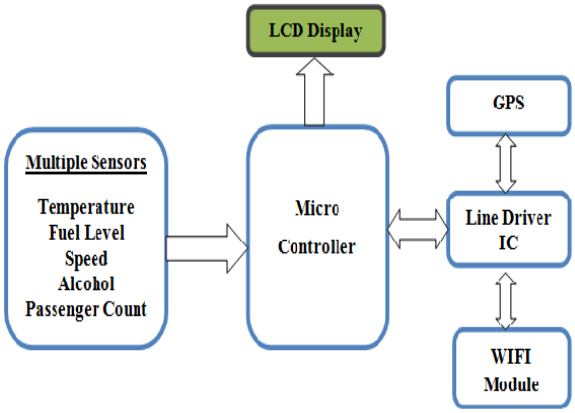

Figure 2. Bus Unit

A. Hardware Components used

1) Micro Controller
2) LCD
3) WIFI Module
4) Line Driver IC
5) GPS Receiver
6) Temperature sensor
7) Alcohol sensor
8) IR sensor to count passengers
9) Level Sensor

In the system, we have GPS and WiFi Module which works on Rs232 standards. The engine temperature is important for measure for public temperature and it decides the efficiency of vehicle.

Alcohol sensor detect, weather driver is drunk and driving or not. The status report is give to depot manager. The manager can make arrangement for stopping bus at next junction. It could avoid accidents and save lives. Here, IR senor is used to emulate the passenger count. We are using pot to emulate the level senor. The level senor detects level of fuel in vehicle. It will help in calculating fuel combustion of vehicle. If vehicle is using more fuel, It shows that the bus due for maintenance. These data is available with manager on daily basis.

B. Software Used

1) Proteous for Circuit design, PCB layout design, Simulation
2) Keil Compiler for Micro Controller programming

IV.CONCLUSION

This paper, Study of IoT based Smart Local Transport Tracking System, gives the outline of Transport tracking system in city, where modes of transportation are different. The proposed system tries to give exact location of local transport vehicles on display screens and on android App using Google map. This helps commuters to reach their destination as early as possible by avoiding the wait time at bus stop or at stations.

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