

Introducing a Hi-Tech - Cloud based Public Transport System

Rushabh Patel¹ and Rahul Raghvendra Joshi²

*Under Graduate Scholar, Department of Computer Science,
Symbiosis Institute of Technology, Pune, India,
E-mail: rushabh.patel@sitpune.edu.in.*

*Assistant Professor, Department of Computer Science,
Symbiosis Institute of Technology, Pune, India,
E-mail: rahulj@sitpune.edu.in.*

Abstract

This paper presents advancement in public transport services, like use of Hi-Tech components and software which may lead this transportation system to be more stable and easier to operate. In this paper, we will introduce a framework which will help passengers and other users to track exact location of bus and count number of passengers. Today major problem of public transportation is overloading of buses which leads to accidents and creates life risk to other vehicles. In this paper, we will introduce some devices which can keep count of passengers travelling in buses. We will also introduce cloud computing which in turn will help government as well as user to easily operate and keep track of bus services. So, Let us first see what is cloud? - as we know that cloud computing can be used for deploying groups of remote servers and software's networked that allows centralized data storage and online access to computer services or resources^[10]. And, it is also well known for delivery of services such as shared resources, platforms, software and data, as per the interest of end-users^[10]. They are located in distributed datacenters over a network such as internet. In this paper, we will introduce a new cloud computing model called Hi-tech Cloud computing model for public transportation and it is also proposed to improve transport outcomes like to track the location, count passengers. Therefore, by using this proposed cloud services public transportation system will lead to new peak. The organization of this paper is viz. in section [A] introductory details, in section [B] role of Information Technology in Public Transportation system, in section [C] proposed improvements in it, in section [D] working methodology for proposed advancements in the same is described. The section [E] represents concluding remarks and in section [F] references used in this paper are listed.

Keywords: Cloud, Hi-Tech, Public Transport system, GPS, Passenger Counter, Wi-Fi, etc.

[A] INTRODUCTION

The Public Transportation system is still same as it was a decade ago. Only the thing that is changed is increase in the number of passenger which leads to the improper services catered by transport system. The increase in population increases number of passengers willing to travel per day and now, the situations are getting so worse that people don't even bother about rush in the bus and they travel in the overcrowded buses. Therefore, by using some advanced devices and techniques, we will be able to solve this problem. Now, government has started Wi-Fi services in public transport buses which will helps to track bus location easily. Also, Global Positioning System (GPS) technique is used over Wi-Fi services which in turn help to track accurate information about bus. Buses take up over 90% of public transport in Indian cities^[17], and serve as a cheap and convenient mode of transport for all classes of society. The services are mostly run by state government owned transport corporations. The new initiatives like Bus Rapid Transit (BRT) systems and air conditioned buses have been taken up by various state governments to improve bus public transport systems in cities^[17]. The idea of a BRT in India is based on successful implementation in Curitiba, Brazil and Bangalore were the first to introduce this in year 2000 in the form of a feasibility study carried out by Swedish consultants but was not implemented^[17]. Therefore, this paper has introduced some devices and techniques in order to improve our public transportation system.

[B] Role of Information Technology in Public Transportation

The role of Information Technology (IT) is limited in Public Transportation. Presently, they are loosely coupled with each other. But, some state governments have taken up initiatives to introduce technology equipped buses for e.g. BMTC (Bangalore Metropolitan Transport Corporation), they have introduced Wi-Fi services in their Vayu Vajra buses at free of cost^[3]. Likewise, our government can plan and implement few initiatives to provide comfortable and safe journey to passengers. Therefore, IT can play a major role in future to enlighten public transport service.

[C] Proposed Improvements in Public Transportation System

[C.1] Use of counter to count number of passengers

Today, major problem is to keep the count of passengers travelling in public transport buses which in turn makes these buses overcrowded. This passenger count will help government to keep track of buses which are overcrowded. Therefore, with Hi-tech people counter, we will be able to keep the count of the passengers travelling in bus. There are following different types of counters for passengers as mentioned below:

[C.1.1] Overhead Passenger Counter

Overhead passenger counting sensors are more compact and are mounted above bus door at entrance. It maintains separate counts for passengers in two directions - in and out simultaneously. This counter keeps the track and records passenger count at both entrance and exit. This counter is more accurate than other type of thermal counters^[6] as it determines count by sensing heat. These overhead counters generally use infrared beam to detect object count^[6]. The counter gets increased, when beam is cut by an object. This can be of either wired or wireless type.

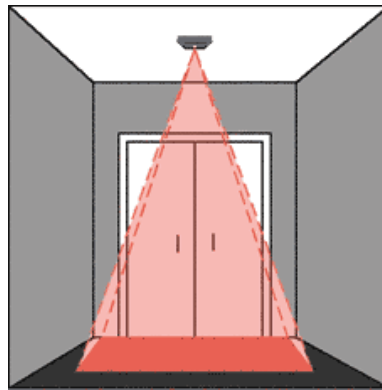


Figure 1: Overhead Passenger Counter^[6]

[C.1.2] Horizontal Passengers Counter

These counters are mounted on the sides of an entry and will maintain a single count for passenger traffic in both the directions i.e. in and out. These sensors are best suited at entrances, where people are not likely to enter and/or exit simultaneously. It makes use of a narrow infrared, single-beam to count and record the traffic, every time the beam is broken. The rest of the devices are horizontal sensors which are unidirectional Counters^[6], they do not distinguish IN count from OUT counts, and here, total passenger count can be divided by hour by these two techniques to determine the number of passengers.

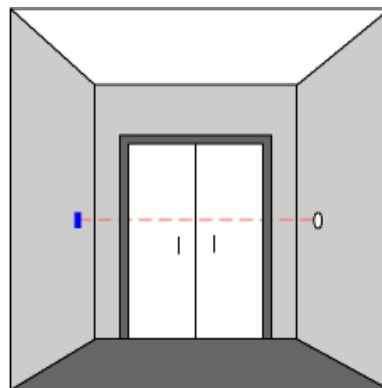


Figure 2: Horizontal Passenger Counter^[6]

[C.2] Use of a GPS Device

A GPS vehicle tracking system is a device that makes use of a global positioning system to determine the precise location of a vehicle, person, or other asset to which it is attached and to record the position of the asset at regular intervals^[13]. The recorded location details can be stored within the tracking unit, or it may be transmitted to a central location data base, or internet-connected computer, using a cellular (General Packet Radio Service or Short Message Service)^[13], radio, or satellite modem embedded in the unit^[13]. This allows the asset's location to be displayed against a map in backdrop either in real time or when analyzing the track later, using GPS tracking software.

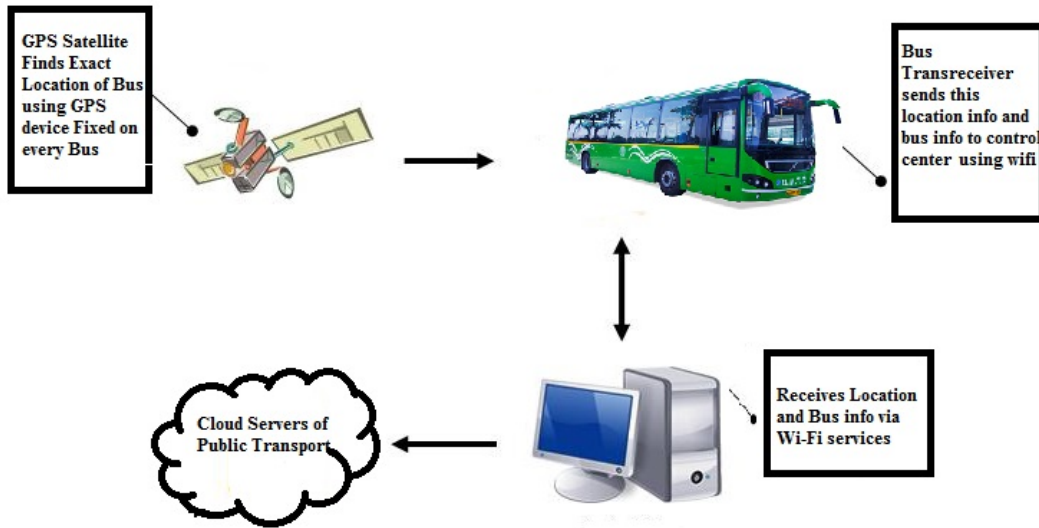


Figure 4: Proposed GPS Working Model for Public Transport

[C.3] Use of a Cloud Computing Service

With use of a cloud computing service, both users (here passengers also) and government will get benefited. Cloud computing means information being accessed is found in the "clouds", and does not require a user to be in a specific place to gain access to it^[16]. Public transport may find cloud computing to reduce cost for information management, since they are not required to own their own servers and can be used in capacity leased from third parties. Also, cloud based structures allow companies to upgrade software's very quickly^[16]. A cloud service can dynamically scale to meet the needs of its users, and because the service provider supplies the hardware and software necessary for the said service and there's no need for a company to provision or deploy its own resources or allocate IT staff to manage the services. The example of a cloud service is online data storage. Using these cloud services, we will directly give access to users (or passengers) to locate buses with ease.

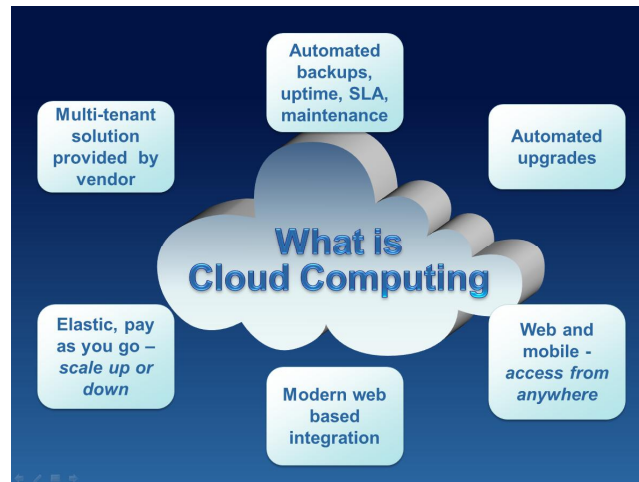


Figure 5: Different attributes of Cloud Computing ^[7]

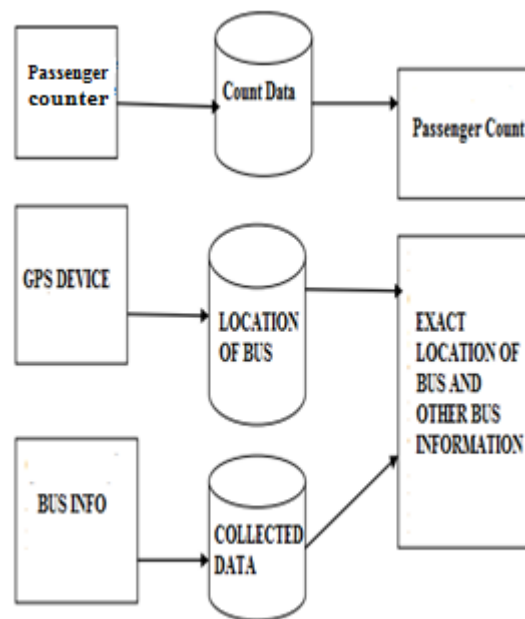


Figure 6: Proposed IT Mechanism for Public Transport

[D] Working Methodology for proposed advancements in Public Transport System

[D.1] For obtaining passenger count

This can be implemented by placing passenger counter at entrance of a public transport bus. As we have seen earlier in this paper, that a passenger counter is a device used to count number and direction of passengers traversing through a certain passage or entrance per unit time. The simplest form of this counter is a single, horizontal infrared

beam across the entrance which is typically linked to a small LCD display unit at the side of the door or can also be linked to a smart device or sends data via wireless links that can be a Wi-Fi service provided by public transport system in each bus. This beam at the entrance gate counts the total no of people entering and leaving the bus. The accuracy here highly depends on the width of the entrance monitored and the volume of passengers traffic. This count of passengers is updated on private server accessible to only Public Transport Control Room (PTCR) using Wi-Fi services. After obtaining exact count of passenger travelling in bus by PTCR, they can employ strict measures against such buses from their next stop.

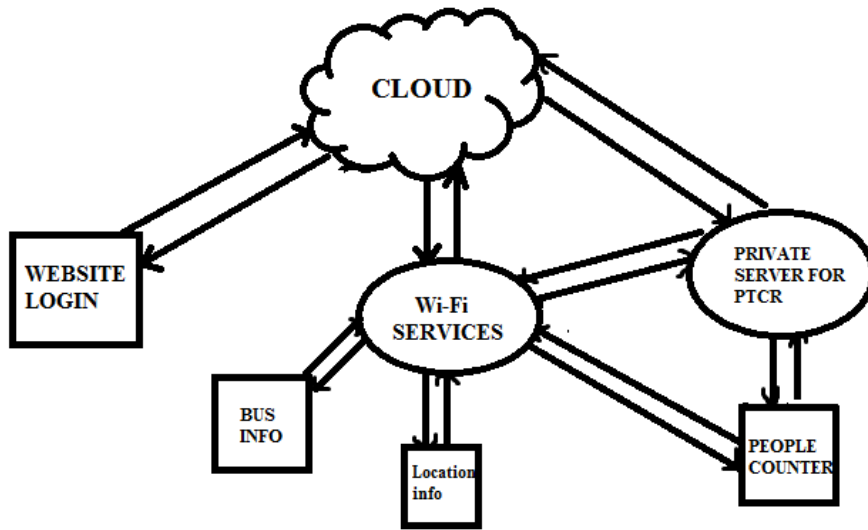


Figure 7: Proposed Working Model for obtaining Passenger Count

[D.2] For tracking location details

The location of a bus can be tracked using GPS technique. This technique can be introduced so that the exact position of a bus, speed of bus (using sensors), duration of time left for arrival on next stop, and duration of time needed to reach at the next stop can be calculated. If during the journey failure of a bus engine occurs then location of a bus can be traced by PTCR easily. After obtaining this location and other bus related information by GPS device from GPS satellite, this information is sent over the internet by Wi-Fi enabled services provided by Public Transport system to the cloud. Simultaneously, this information can be shared to PTCR via the same Wi-Fi services. This location and other information can be made accessible to users or passengers using their credentials on Public Transport website via their smart phones or other smart gadgets. Thus, GPS technique can be implemented easily, if government provide Wi-Fi services and GPS devices on each and every bus. This advancement can be possible in near future.

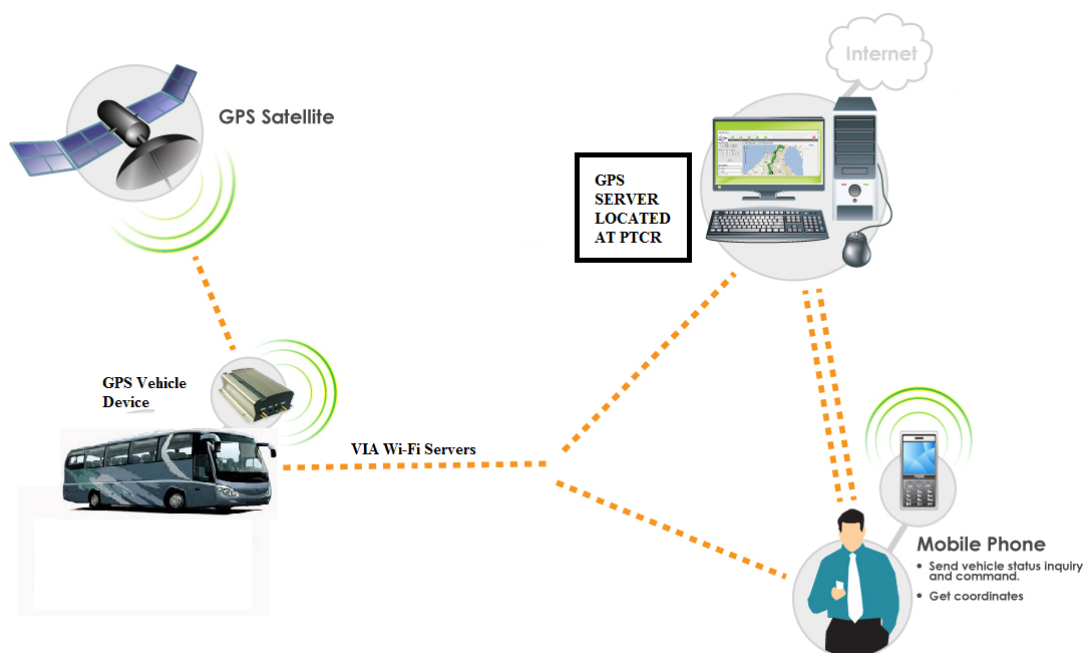


Figure 8: Proposed Working Model for implementation of a GPS in Public Transport

[E] CONCLUDING REMARKS

As we know that Public Transport is the heart of a city - on which every person is dependent to travel to and from. The major issue while using public transport service is overloading of buses which in turn makes it a risky mode of transportation. So, with implementation of the techniques proposed in this paper, overhead count of passengers in buses can get reduced and this will in turn give relief to government as well as passengers in terms of management and safety. Another issue is to track exact location of bus, it can be achieved by using Hi-Tech equipments. But, with the change in time the Public Transport needs to reform and facilities are required to be upgraded and cloud computing is the best solution for the same. Hence, it seems to be a lengthier way, when IT will simply be able to drive and maintain the whole Public Transport on its own. But, still we have attempted to present this paper in order to contribute towards the development of Indian Public Transport system but can also be considered for advancements in Public Transports of other countries too.

[F] REFERENCES

- [1] <http://ijcttjournal.org/Volume3/issue-1/IJCTT-V3I1P124.pdf>
- [2] <http://www.mdpi.com/1424-8220/12/5/5290>
- [3] http://en.wikipedia.org/wiki/Bangalore_Metropolitan_Transport_Corporation
- [4] <http://en.wikipedia.org/wiki/BMTC>
- [5] http://en.wikipedia.org/wiki/Cloud_computing

- [6] <http://www.sensourceinc.com/technology.htm>
- [7] <http://osarena.net/faqs/toses-cloud-ipiresies-pos-na-tis-organoso.html>
- [8] <http://www.ijcit.com/archives/volume2/issue6/Paper020621.pdf>
- [9] <http://www.ipcsit.com/vol6/40-E099.pdf>
- [10] Cloud Computing – Issues Research and Implementations, Malden A. Vouk.
- [11] Zhang. Z and Zhang. X, “Realization of Open Cloud Computing Federation Based on Mobile Agent“, IEEE, 2009.
- [12] B. Rochwerger, D. Breitgand, E. Levy, A. Galis, K. Nagin, I. Llorente ,et al. “The Reservoir model and architecture for open federated cloud computing,” IBM Journal of Research and Development, Volume 53, April 2009.
- [13] http://en.wikipedia.org/wiki/Global_Positioning_System
- [14] <http://etherealmind.com/blessay-cloud-computing-like-public-transport/>
- [15] <http://www.accenture.com/us-en/Pages/insight-infrastructure-transportation-cloud-computing-summary.aspx>
- [16] http://www.webopedia.com/TERM/C/cloud_services.html
- [17] http://en.wikipedia.org/wiki/Transport_in_India#Public_road_transport