A Smart Passenger Counting in Public Transport Using Navigation System with Mobile Devices

Mrs. Rajashree R. Shinde[1], Mr. Devidas S. Thosar[2], Ms. Trupti K. Wable[3]
[1,2,3]Research Scholar ,Dr.A.P.J.Abdul Kalam University,Arendia, Indore (M.P.)
[1]rajashreeshinde177@gmail.com, [2]devidas.thosar@pravara.in, [3]trupti.wabale@pravara.in

Abstract— **Now almost everyone has to access a mobile phones with latest information. However the existing system provides the services with information of city's traffic. The services should be user friendly, more effectivel and dynamic. In this paper, we present a Navigation System wth Mobile Devices for Passanger Counting in Public Transport based on our life. Our system separate three sub-system for implémentation. This system minimise the passagers cost. User can tag or write a note in map creating a own map. Also this system counts the passager in public transport. This task is not same in all countries, this task performed differently in all countries. Also there is no defined standard for public transportation. Population of cities grow faster than public transport system. In this paper passanger counting problem is solved through remote sensing method.**

Keywords: *GPS, Passenger counting, public transport system, travel information system*

I. INTRODUCTION

Nowadays, mobile devices and mobile network have gained global popularity for business, travel and almost daily life uses. According to the international tendency of the world traffic, a public transportation becomes important in the city due to traffic and environment conditions. In addition, ubiquitous, seamless, multi-modal real-time information services are to be delivered on screen and to mobile devices, together with an integrated communication and ticketing system. Moreover, the localized information becomes useful for people, especially in urban area. However, the existing navigation systems providing services and information on the city's traffic are not real-time and complete. Then, the localized information may be not "customized" enough. In addition, the services should be more user friendly, more efficiently and dynamic. Therefore, we propose a Customized Navigation Systems with Mobile Devices of Public Transport based on our life making the existing systems work better. The aims to promote public transport by raising the quality of service offered. This concept can be transferable all over a world, if information is tailored to the local or national context. It provides extra flexibility for the use of traveler and stronger feelings of being in control of the journey. To achieve an objective almost everyone has access to a mobile device, and with latest generation mobile devices the possibilities for offering new information services are endless, such as creating bespoke travel itineraries and user can tag or write note in map creating a own map, location-based services to help those in unfamiliar areas and real-time updates and revised plans when journeys are disrupted or delayed. Most of all, the systems open up new opportunities for delivering quality public transport services, achieve minimize the passengers' costs and improve operational practice; they contribute towards "greener travel choices" by making public transport easier to understand and therefore more convenient. Our systems key conditions for implementation are design an evaluation scheme, treat the transportation route as a network model, understanding of end user needs and requirements, a viable mobile system model, collecting the transportation activities of all users, identification of appropriate technologies and outputs and applying group-intelligence method on evaluation. This method uses three sub-systems organized for mobile devices according to user requirements.

II. RELATED WORK

The related research results focus on technology and applications. Reference by the related research results to build the theoretical basis of this research will also increase the feasibility and integrity of this research. Moreover, research within location-tracking in indoor environments has been conducted for over a decade. Early work such as the Active Location Badge system [11] uses infra-red technology but other sensor technologies have been explored as well [6]. Now, we propose location-based services worked on mobile devices. However, the related work falls in the category of outdoor location-tracking using GPS technologies. This approach generates a difference user needing own of information. Following the results of worldwide related researches are the references of this research [3].

In the personal demand of the smart-travel system, our system selection the internet information through the tourist theme classification. According to the past research the travel classified into nine categories as follows: subtropical, tropical-beach, adventure and sports, vacations and relax, cultural/historical, Group attraction, alone attraction, couple attraction, nature and business and study.

III. HOW TO CALCULATE PASSANGER

The first paragraph under each heading or subheading should be flush left, and subsequent paragraphs should have a five-space indentation. A colon is inserted before an equation is presented, but there is no punctuation following the equation. All equations are numbered and referred to in the text solely by a number enclosed in a round The main question in analyzing flows of passengers is – how to calculate real amount of passengers in vehicle and on the route. There are a lot of researches and techniques about how to perform this task, but still there are not offered really working approaches for making public transport system sustainable. At least in Riga City we still have a big problem with understanding of real amount of passengers travelled using public transport, especially if we talk about on-line monitoring of real amount of passengers. Let's describe the route of the vehicle as a sequence of vehicle stops.

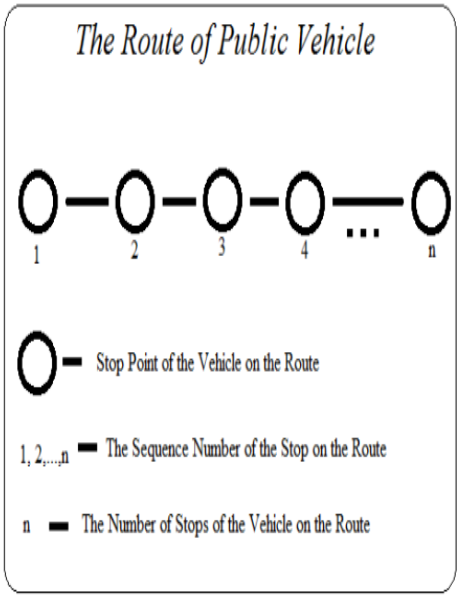

Fig. 1 The route of the Vehicle

So, it will be needed to know at least amount of passengers who have been coming in vehicle on each stop, as well as how many passengers have been leaving the vehicle on each stop.

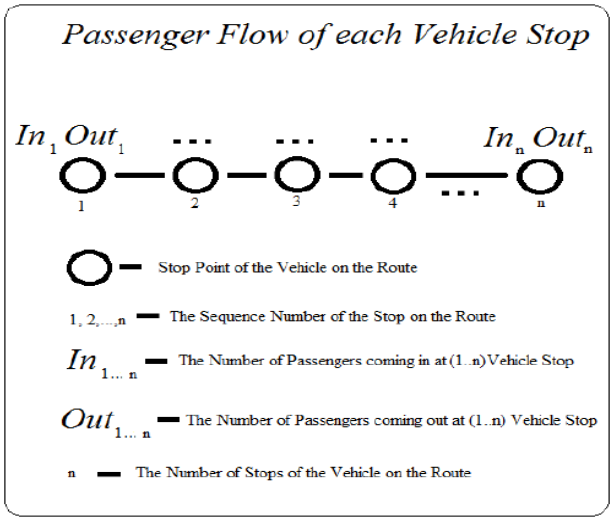

Fig.2 The flow of Passengers on each stop of the Vehicle

And in this case, if will be known all the passengers (amount) who are in vehicle on each stop as well as all the passengers, who have left the vehicle it will be possible to calculate the real number of passengers in each moment between stops on the route. Let's describe also how to calculate real amount of passengers between stops, as well as real amount of passengers of all over the route of the current vehicle. Fig. 3 demonstrates the main idea of this calculation. And equation 1 describes how to calculate real amount of passengers between stops, but equation 2 describes how to calculate real amount of passengers of all over the route of the current vehicle.

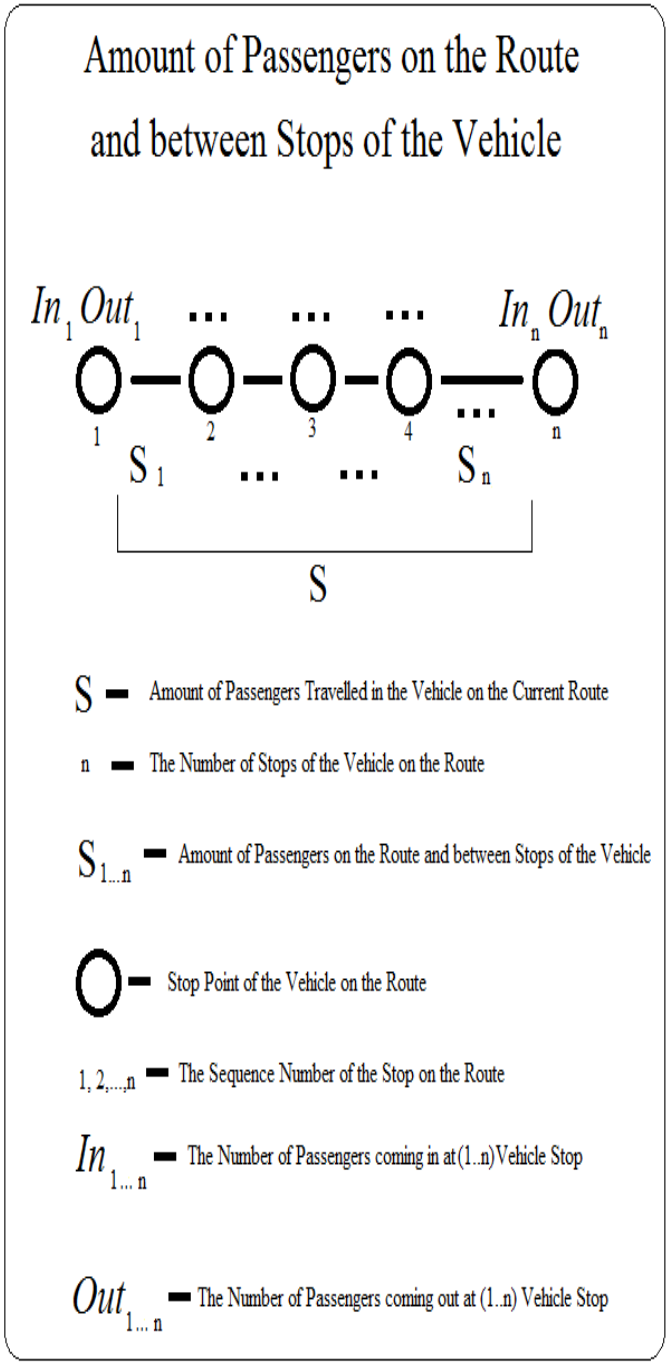

Fig.3 Amount of passengers on the route and between stops of the vehicle.

And here it will be used a new approach offered by author – the use of photogrammetry for solving the task of collecting the quantitative information about passengers. As it is mentioned in [2], there is no universally accepted definition

of photogrammetry. The definition given below captures the most important notion of photogrammetry. Photogrammetry is the science of obtaining reliable information about the properties of surfaces and objects without physical contact with the objects, and of measuring and interpreting this information.

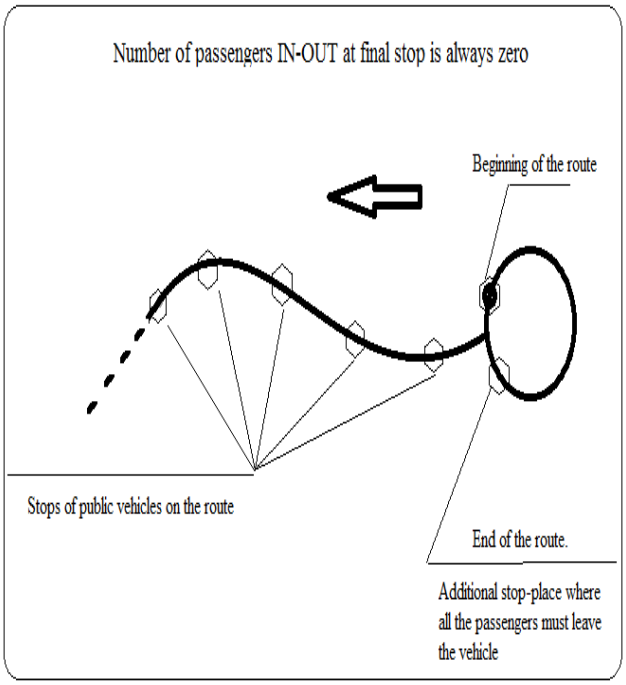

Fig. 4 Number of passengers IN-OUT at final stop would be always zero.

The name “photogrammetry" is derived from the three Greek words "phos" or "phot" which means light, "gramma" which means letter or something drawn, and "metrein", the noun of measure[7]. Let’s say, that the photogrammetry is the remote sensing technology – the science which help to make measurements from photography. The best and most understandable way to answer the question – how to collect the real data about “in” and “out” passengers at each stop of the vehicle during the route using a new approach offered by author – the use of photogrammetry for solving the task of collecting the quantitative information about passengers, is to describe a practical example – case study for Riga City.

IV. RECOMMENDATION ALGORITHM

The recommendation algorithm is popular research of the recommendation system in internet application. Another there has association rule-based, content-based, collaborative filtering and hybrid approach. That is what we call personalized recommendation system. Look by the shopping website, main recommend products to customers and selection of products in accordance with the personalized features and complete solutions based on customer needs [10].

Recommended algorithm is the most important functions, the computational steps follow [7]:

Variables
n: the number of scenic spots
V_i: some scenic spot in this system
U_T: the travel topic of user’s choice
U_E: the emotional motivation of user’s choice
θ : the candidate parameter which is between 0 and 1.
N_i: the total number of tags in V_i
t_i: similars to U_T. it’s the total number of tag in V_i
e_i: similars to U_E. it’s the total number of tag in V_i
w_i: V_i’s weight
P_T: U_T’s proportion of V_i
P_E: U_E’s proportion of V_i
T : the set of travel topics
E : the set of emotion
W: the set of weights

V. COSTOMIZED NAVIGATION SYSTEM

This architecture will be separated into three primary components, all of which together, provide the customized navigation and location-based services. For the purposes of this paper, "Core" refers to the basic services and components which provide the base operating capabilities of the system. This includes services such as user classification, system management, application flow management, ect. "Systems" constructs of three subsystems are Navigation, Service Quality, and Intelligent Approach; they are all provided voice interactive technology. While the systems itself provides everything required functionally, an application middleware interface (AMI) is useful to allow systems to interact with the core as a whole.

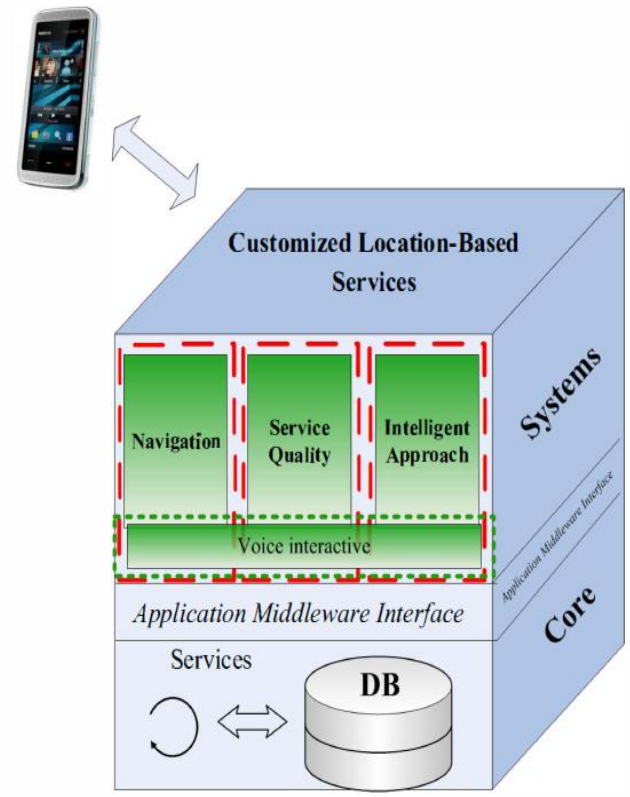

Fig. 5 Customized Navigation System Architecture

To accomplish these goals, we will use the Java Enterprise Edition application environment. An inferred requirement of the objectives requires an application environment that can provide a phased and modular environment, while allowing dynamic changes to the run-time environment of the services provided. It is

technically feasible to apply voice-enabling technology to web-based interaction tools, and can be seamlessly integrated with existing software applications on enterprise platforms with minimal modifications. The following methods:

- Customized way points and descriptions, even voice service.
- Suitable for children, elderly people, disabled people.
- Customized Way Point
- Mobile devices can get the position information, and labeled a customized name.
- Merge the points.
- Calculated the distance from a particular point to saved points.
- Customized Navigation Combine the customized way points with map API (ex. Google Maps)
- Determine relationships between the points returned by the map and the saved way points.

VI. CONCLUSION

In this research we propose a Customized Navigation Systems with Mobile Devices of Public Transport based on our life. It is an innovative way to let users find and share their tour experience. Most of all, it make public transport easier to understand and therefore more convenient. And the system open up new opportunities for delivering quality public transport services, achieve minimize the passengers' cost, and user can tag or write note in map creating own map, providing location-based services for users to help those in unfamiliar areas and real-time updates and improve operational practice; they contribute towards "greener travel choices".

In the future, this research will keep going to expand more location-based and human-based functions of system. The system framework will try to apply Android 4.0 technology to show media on the map, not only the pictures. In addition, it can reach the needs of users to make a perfect tourism plan based on Android 4.0 technologies in future system design. Moreover, this research will keep going link navigation of real-time location-based services subject tour and make user more choices to plan the tour in their way.

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