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EXTENDED KALMAN FILTER BASED NAVIGATION SYSTEM FOR URBAN BUS RIDERS

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ABSTRACT: Effective transportation could be an essential issue to be considered in public daylight transport system. To make a city smart and digitalized this is a little commitment. Smart public transportation system utilizing IOT demonstrates that how IOT can be applied to the public transport system and present the navigational offices for urban transport travelers. Smart public transportation system gives three novel administrations to transport travelers: 1) micro-navigation.2) crowd –aware route recommendation.3) bus arrival time estimation. Micro navigation gives fined-grained information or guidance about passenger's bus journey by recognizing and tracking the bus a person boarded. Crowd aware route collects the crowd degrees of various routes and predicts and indicates the exceptional and less crowed routes to passengers. Bus arrival time gathers transport areas and predicts the assessed entry time to traveler's area with shared route details. In this paper mobile phone GPS to evaluate passenger's position, velocity and attitude.Moblie GPS detect the presence of passenger's on buses and provide continuous Real-time navigation over the complete course of a bus journey. After that evaluation, apply proposed algorithm [Extended Kalman Filter] which is used to detect the current state [Passenger's status] and FIFO algorithm [first in first out scheduling] for bus seat allocation. In the end it will reduced uncertainties and more relaxed travelling with better visibility and accessibility of travel information.

Keywords: Navigation System, Mobile phone- GPS, Internet of Things (IoT), passenger detection, Bus transport.

I. INTRODUCTION

A GPS Navigation system is a GPS receiver and audio/video (AV).The global positioning system (GPS) is a 24 satellite navigation system that uses multiple satellite signals to find a receivers position on earth. Satellite navigation is based on a global network of satellites that transmit radio signals medium earth orbit. The signal from receiver can compute the location of the satellite and to make the some other adjustment while its need to accurate their positioning. In navigation system has one of the sectors in automobile controls or then third party to find out their direction in an automobile. It is commonly use a satellite navigation device for capture the data which is match for position on a road. Routing direction should be calculated. A navigation frame work might be altogether on board a vehicle or vessel on the ship scaffold, or they might be found somewhere else and convey through radio or different signs with vehicle or vessel, or they may utilize a mix of these techniques.

Worldwide positioning frame work is a system of circling satellites that send exact points of interest of their position in space back to earth. The signs are acquired by GPS collectors, for example route gadgets and are utilized to figure the correct position, speed and time at the vehicles area. Now days the cities were growing in size as well as population and facing lot of challenges arise for deign in urban mobility infrastructures. While public bus transport systems have the capacity to absorb large masses of urban travelers, their public image often suffers from a negative perception. First, from a Passenger's point of view, bus networks in dense urban areas are often considered as complex and difficult to navigate. Second, in contrast to private modes of transport, travelling on buses offers only a low level of comfort and convenience. Third, bus journeys lack a sense of personal control and ownership that is valued by car users. To overcome these inherent weaknesses of the physical bus transport system, researchers increasingly turn their attention to digital technologies in order to improve the perceived quality of bus transport. The urban life transportations are familiar. A lot of accident is happen on road frequently. So subsequently, the need of security and observing is produced. To determine such issues a framework is created utilizing GPS and GSM advancements. In this paper was specially designed for Educational Institutions buses. To fill this gap the UBN system based on GPS and GSM technology for real time bus navigation, arrival time prediction and accident detection. Most of the public transportation tools for smart phones are context-aware and it using in current location detection alone with current time determined via (GPS-WI-FI localization) for retrieve information. Thus the time and location are coarse-grained indicators only support macro-navigation decisions. Supporting micro navigation requires a fine grained contextual, semantic understanding of the passenger in transportation. The vast majority of general society transportation instruments for PDAs are setting mindful and it utilizing as a part of current area discovery alone with current time decided by means of (GPS-WI-FI limitation) for recover data. In this manner the time and area are coarse–grained markers just help large scale route choices, supporting smaller scale route requires a fine grained relevant, semantic comprehension of the traveler in transportation. It's used to enabling the passenger is active with the help of smart phone to find nearby urban bus infrastructure. Urban is a novel setting mindful route framework for urban transport travelers with help for full scale and small scale route.

II. PROBLEM DEFINITION

The different issues that we look in everyday life are, standing for transport on the individual transport stops without knowing the entry and takeoff time of the transport, for particular stops precisely and furthermore transports accessible for in that course. In urban transport system, public transformation accessibility is the large effect to hit upon the location and different wider transport facts. Global positioning system just recognizes the traveler's position, speed and attitude. It doesn't catch the more extensive data like group on transport system and set designation on vehicles.

NEED FOR NEW SYSTEM

To overcome this problem, a new system is proposed that allows improves the navigation process in the transport system which provides more relaxed travelling and better visibility and accessibility of travel information.

III. PROPOSED SYSTEM

The main idea is to process mobile GPS detects the presence of passenger and provide continuous navigation throughout the journey. GPS also performed to detect the passenger's position velocity and attitude. After that evaluation, algorithm of extended kalman filter is used to detect the current status of passenger using state estimation vector and Covariance matrix based on time and measurement update process. Bus seat allocation is performed by FIFO scheduling algorithm. This scheduling performed based on the arrival time of the passengers in bus. The proposed method has more visibility and accessibility of transport information and provides more relax journey.

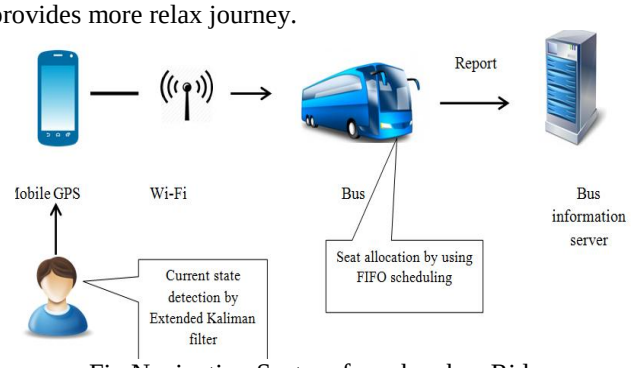


Fig Navigation System for urban bus Rider

IV. IMPLEMENTATION METHODOLOGY

A.GPS Navigation

GPS navigation is used to detect the passenger's position, velocity and attitude in the urban bus rider. It monitors the state of the passenger in overall bus journey. The web service exports the current GPS position of the vehicle with the vehicle id. It also supports to detect the number of passenger in particular route, the web service exports the current route name, id and list of bus stops on the route. It also exports the name of the next bus stop, id along with current route.

B. Current State Estimation

In proposed method current state is estimated with the help of extended kalman filter algorithm. This algorithm is used to compute the state estimation vector and covariance matrix is to construct by using measurement update and time update. Extended Kalman filter out is used to estimate state of dynamic state by a stochastic linear space model. By using the extended kalman filter algorithm out in included navigation gadget, the error charge of declaration measuring is very low. It performs robustly and may efficaciously lessen the measurement price. It is more strong for anti filter divergence without external calibration and achieves higher performance for the surprising perturbation.

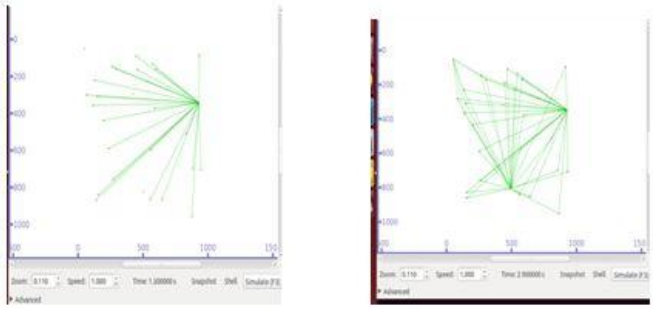


Fig (d) GPS detect the presence of passengers on bus. Estimate the current state and Bus Seat allocation

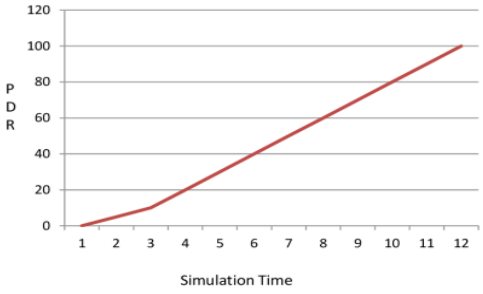
C. Bus Seat Allocation

Bus seat allocation is performed by First in First out scheduling in the urban bus rider. In the scheduling system, the passenger who enters in the bus firstly, get prior for the seat allocation. If a person enters the bus early, the seat allocated to that person based on the arrival time. By using first in first out scheduling method allocate the seat for every passenger by using their arrival time on bus. It reduces the possibility of the crowd density in the urban bus rider and makes the journey smother.

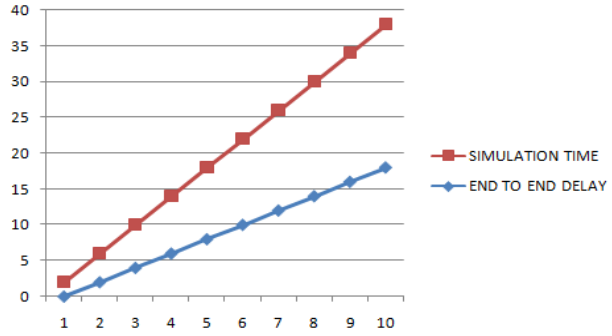
D. Performance Evaluation

The performance of the proposed urban rider system is evaluated with following metrics, which shows that, method have more reliability and accessibility for travel information on journey.

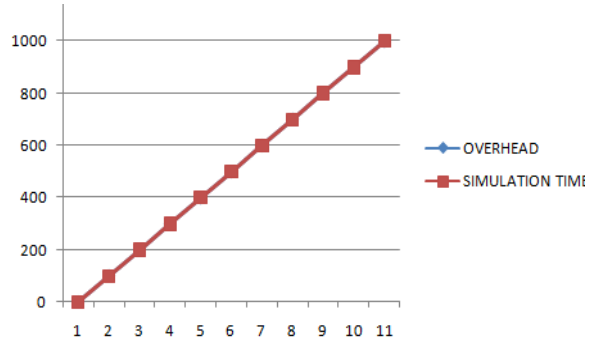
Packet delivery ratio



End to end delay



Overhead



Packet delivery ratio in proposed system improved by using mobile GPS and extended kalman filter for current state determination .thus end to end delay is minimized by reducing the packet overheads during data transmission.

V. CONCLUSION

In this project, the extended kalman filter based navigation system for urban bus rider system for bus passenger that has the ability to connect the passengers with public transport service. Mobile GPS is used to detect the passenger's position velocity and attitude. This algorithm is used to performing the current state detection with measuring time update. Bus seat allocation is performed by first in first out scheduling method. The urban bus rider system provides more relaxed travelling, better visibility and accessibility of travel information.

Future Work

The future work of the project is to plan to focus on area to improving the coverage tracking system with different location. Interconnecting all the objects to the web for easy and quick access by setting up Wi-Fi mesh type (WI-MAX) network to increasing the communication range.

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