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Survey on Ticket Collecting System Using QR Code and Mobile Application

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Abstract

The need for a real-time public transport information system is growing steadily. People want to plan their city commutes and do not like waiting for long hours, or take up a rush bus. The proposed solution in this project computes scanning of the QR code and paying through E-Wallet. This information along with the passenger's id, starting and destination point of the bus, timings will be stored in the database for analysis purposes for releasing buses in certain areas at peak hours. Based on the sensor placed at the steps on the bus, number of passengers entering and exiting can be noted and the total amount for gained can be calculated. The passenger details will be updated every one and then when the conductor side application is switched on. Thus we can improve the usability of the bus and also earn much more profit if technology is adapted with the public transport. This will give a pleasant and comfortable journey to the commuters.

Keywords: *QR code, IR sensor, Global Positioning System (GPS), Hyper Text Transfer Protocol (HTTP), Internet of Things (IoT).*

INTRODUCTION

For ages, public transport has always been a huge success in commuting different cadres of people in and around the city across the globe. Conventional process includes commuting through buses. During primitive era, people used to wait for the bus to arrive and then get on to travel. They neither had access to the information as to when the bus would arrive nor did they have any knowledge for the amount of vacant seats inside the bus. Outstanding advancements in technology have now helped a person to view where his/her bus is located in real time. This helps in knowing the whereabouts of a bus making life easier. But, during emergency scenarios when the commuter has to be seated the necessary information as to how much seating is available is not present. With all these taken into consideration, the proposed system helps to view not only the live location of the bus but also the amount of vacant seats available. This helps the commuter to make decisions as either to wait for the bus or to choose a different means of transport. Furthermore, surveys and analysis are also being compassed to collect the necessary data to view the exact peak hours to improvise the fleet by adding more number of buses.

REVIEW OF LITERATURE

In this study, a review on the behaviour of various types of technologies in tracking a bus and ticket system has been made.

Estimation of Passenger Flow

As mentioned by Jun Zhang[1],it is possible to analyse and predict the passenger flow in real-time . The data input of the system are the GPS trace and smart card payment records. The passenger flow is estimated by deriving the source and destination of the passengers, with the help of two datasets.

Both historical data as well as recent data are used to predict the passenger flow. There two steps in Real-Time prediction model. Comparing with all other prediction model this Real-Time prediction model has given better accuracy in the result at most of the time.

RFID Technology

Dr. Prasun Chowdhury [2] proposed an idea for implementing smart card technology for ticketing the passengers travelling in bus. The smart card is mainly based on latest Radio Frequency Identification (RFID) technology. For this purpose, an interface is built between RFID setup and driver's mobile phone using a specifically developed Android app "SwipeNgo".The passenger ID can be sent from RFID reader to the drivers mobile phone .This can be transferred with the help of bluetooth which acts as an interface. The "SwipeNgo" application is installed in the driver side mobile application, and the information is received in this app whenever passenger steps into the bus. Not only the ID of the passenger is being documented but all the records of the bus stop name and number are also noted using Global positioning system (GPS) coordinates. The exact fare between source and destination is calculated and deducted from the balance when the passenger gets down from the bus. This information regarding balance is also sent to the RFID setup where the fare is displayed. There is a separate announcement system which alerts the passengers prior to the next halt.

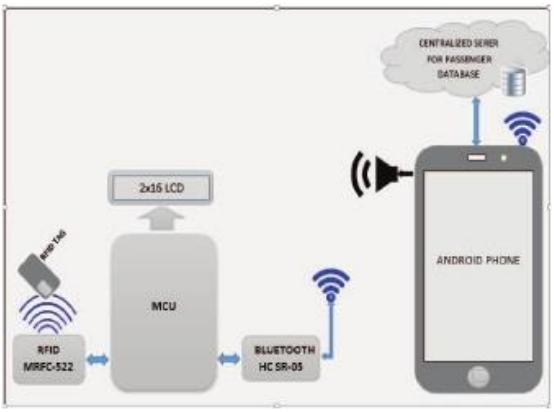

Fig. 1.1 *System architecture of smart ticket system.*

Global Positioning System

Z. Wei[3] proposed an idea in which smartphones have been widely integrated with GPS receiver, which may provide accurate location information of vehicles without cost increase. Traditionally, LBS applications obtain vehicle locations then using the Hypertext Transfer Protocol (HTTP) protocol uploaded to central servers with a fixed frequency. GPS sensing and transmitting is one of the major areas covered in this paper. Real time GPS data can be collected from the vehicles. Android smart phone acts as a GPS sensor in a vehicle. Adaptive time stamps are updated after execution with the help of client side application software that generates the GPS location. In the final comparison, MQTT push technology is introduced into GPS transmission in order to effectively reduce mobile traffic.

Fig. 1.2 *Data monitoring system*

Internet of Things

Y. Chen [4] compared the performance of IoT protocols, namely MQTT (Message

Queuing Telemetry Transport), CoAP (Constrained Application Protocol), DDS (Data Distribution Service) and a custom UDP-based protocol in a medical setting. The performance of the protocols was evaluated using a network emulator, allowing us to emulate a low bandwidth, high system latency, and high packet loss wireless access network. The results of this paper is that even though DDS gives higher bandwidth usage than MQTT, the performance with regard to reliability and latency makes it a choice for medical IoT applications and many more of such applications.

Location of the Bus

As mentioned by K. Tanaka [5] it is possible to design a system, which used to sense the bus location. This system is a new type of application based on participatory sensing systems. Sensing operations can be performed without using users operation. So, this mechanism can be used for practical application such as bus. The sensing systems contains beacon device, cloud service and a smart phone application. The beacon device is installed on a bus to activate the smartphone application. The smartphone application can upload a bus location to the cloud service when the smartphone application detects the beacon device. The bus location is managed by the cloud service and is distributed to the smart phone applications. The prototype for a bus location system is based in this sensing mechanism.

Arrival time of the bus

As mentioned by J. Gong [6], there is an approach to predict the public bus arrival time based on historical and real-time GPS data. After analyzing the components of bus arrival time systematically, the bus arrival time and dwell time at previous stops are chosen as the main input variables of the prediction model. The input variables of the prediction models are the real time GPS data and the algorithm used to get this data is data interpolation and processing. From the analytical data of average moving time of each dwelling time and link of each stop, the statistical model is obtained for every time-of-day and day-of-week. Prediction of the bus arrival time is predicted from the hybrid dynamic prediction model. Finally, Actual GPS data from bus route 244 located in Shenyang, CHINA are used as a test bed. The index of Mean Absolute Percentage Error (MAPE) is used to evaluate the three models. The results show that the improved model outperforms the historical data based model in terms of prediction accuracy.

Tracking of information

L. Singla [7] proposed an idea in which the current position of the bus is acquired by integrating GPS device on the bus and coordinates of the bus are sent by either GPRS service provided by GSM networks or SMS or RFID. GPS device is enabled on the tracking device and this information is sent to centralized control unit or directly at the bus stops using RF receivers. Factors like volume of traffic, crossings in each segment and time of day are used to improve the accuracy. People can track information using LEDs at bus stops, SMS, web application or Android application. GPS coordinates of the bus when sent to the centralized server where various arrival time estimation algorithms are applied using historical speed patterns.

CONCLUSION

From the review of various journals, it is concluded that, the usage of advanced technology improves the usage of public transport. Many new ideas have been proposed to change the entire behaviour of the system with more of technology. Before implementation, analysis and study are one of the major knowledge that has to be performed.

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