IMAGE PROCESSING BASED SEAT VACANCY MONITORING SYSTEM

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Abstract

Bus travel is gaining importance during the last decade. Due to its rapidness, easiness in booking and sophisticated travel, ticket booking is slowly shifting from manual to cloud based due to increase in technology awareness. In this paper a ticketing system is designed by using image captured which will be used to predict and update available vacancy which can be further used for booking. This is a fully cloud based system linked to QR code-based wallet linked ticket booking mechanism which is connected to a secured payment gateway. Passenger availability inside the bus will be validated by using QR code which should be scanned near entrance; this validates the current availability and updates the system. The whole system is designed in a way such that it is fully automated and seat vacancy updates dynamically. The whole framework including software and tools will operate from cloud-based servers for increased stability and reliability.

Keywords : QR-code, Ticketing system, Cloud-based system, Cloud-based servers

I. Introduction

The Public Transportation system is an affordable and efficient way to travel. Due to the raise in hiring cabs most of the employees and students prefer to travel in local bus. The conductor uses the manual ticketing system to issue the tickets which is time consuming. When the bus is crowded it becomes difficult to collect the fares and track the seat vacancy. In this paper, a system is employed where the framework of technology is used to generate the ticket automatically and also detection technique is used to upgrade the seat vacancy.

The paper includes a new approach which is used to issue the ticket by using Quick Response code generated. Once the ticket is booked by using web-based
platform, the account of the user is linked to cloud and QR-code is generated if the sufficient balance is maintained in the wallet of user. While boarding into the bus the QR code is scanned using one of the USB cameras and the vacancy is monitored by using other which is installed in the bus. The QR-code acts as a ticket to user to travel which consists all the information of the passenger regarding the way he travel and the destination.

In this work Raspberry Pi is a vital initiative in the implementation. The Operating system used here is Raspbian of Linux ARM which runs on python IDE. Different methodology is applied to implement the system. The cameras are affixed to the Raspberry Pi 3b interlinking with cloud. It is a dynamically web-based framework a monitor is placed to track the vacancy and upgrade to passengers.

The Raspberry Pi used in this system has various models such as model A and model B. For the efficient implementation Pi3 of model B is used. It does not have enough on-board memory hard disk. So external memory is required to install the OS into board, SD card (Secure Digital) of 16GB memory is used which is inserted into memory card slot on board.

The software module used here is Open CV (computer vision) which consists of set of python libraries. It is used to detect the images on monitor which is an open source software and a real time computer. By using this system, the manual errors can be reduced and a secured database of passengers can be maintained.

II. Literature Survey

In this section we review some writings which are worked up on this system with various approaches. The income through public transportation is becoming a major source in developing countries like India. The ticketing system is considered to be completely automatized and upgraded along with seat vacancy. The seat vacancy is an essential part in the system to be designed. GPS is more prominently used technology for many applications [I]. The vehicle tracking information can be done through the system developed. The GPS tracking module is used to detect the seat vacancy which probably a systematic approach with domain-based algorithm. To facilitate the insufficiency of associate existing system and for defense of e-tickets in light-weight of RFID innovation. Using this method, the notable crypto logic methods area unit utilized which is able to enfeeble price tag fabrication. E-ticket is mostly accustomed change the conductor to bring down the procedure of check and exchange to method. That permits the somebody to possess a speedy and useful confirmation method than the paper-based or money-based check method [V].

III. Existing System

There are various methods that are proposed with seat vacancy and bus ticketing system. The GPS and GSM system gives the tracking of bus continuously which is a cloud based and android based system. The main disadvantage of this system is it is mainly accessible to PC or laptop. In another paper there is a method called Transit smart card system is although used to collect the fares among the passengers [II]. This is implemented to know the starting point of the traveler and a time-consuming process. The automatic fare collection system also be implemented.
but they may not be reliable in some cases due its different methodology. Later, the RFID technology also played a vital role in public transport system. The papers are proposed using this technology for bus ticketing and monitoring the seat vacancy. Basically, it consists of different parts like RFID Tag, Middleware, and Reader to read the RFID tag which completely depends on the database where the information regarding the passenger is stored. The tag reader here is responsible for communicating with the tag provided to the user [III]. The system is designed for the ticketing system while passenger boarding into the bus but not the seat vacancy. Cashless ticketing system is providing a secure and cash free travel which eradicates the use of coins for change purpose. The RFID is mainly used in this system the tag is provided with a specific code which contains the information regarding the payment details the fare is deducted and the passenger is allowed to board the bus [IV]. They also studied on the security of the individual data. The RFID cards are generally used for public transportation system where the data of the user is shown as if they required or for security purpose [V]. Data manipulation can be encouraged if proper server is not used to read the tag also all common passenger details are very difficult to enter into the database.

The further researches are done which are based on seat vacancy monitoring. An automated passenger counting system is involved in the implementation of vacancy of seat vacancy and also incorporate the corruption [VI]. The Nifty system is further implemented to check the availability of seats and track the bus it uses GSM and GPS technology and automatic ticket vending machine to issue the ticket. An android application is developed to access the booking of seat which is a separate cloud-based algorithm is used [VII]. Image processing technology is further implemented to detect the images. There is also a system proposed which is used to detect the seat vacancy using image processing technique. Morphological technique is used to change the shape or geometry of the image which enables to capture the image properly [VIII]. The algorithm proposed in this system is used to detect the seat vacancy information for the passengers but not the ticketing system. So, there should be dynamically proposed a system which includes both seat vacancy and bus ticketing system.

**IV. Proposed System**

In the proposed system Raspberry Pi is used to implement the system, along with Quick response code (QR-code). The QR-code is a machine-readable barcode which contains the information of a product or data regarding a person stored in a database. The algorithm used here is different which includes the both uses of system. The Raspberry Pi is a small computer which holds the working of CPU. The open CV is used for image processing technique to track the seat vacancy.
Fig. 1: Block Diagram

**Hardware Required:**
1. Raspberry pi 3b
2. Adapter
3. SD card 16GB Class 10
4. HDMI to VGA cable
5. 2 USB Cameras
6. USB Mouse

**Software Required:**
1. Raspbian Operating system
2. Python IDE
3. Open CV

**Raspberry Pi**

Raspberry Pi 3 (model B) is a tiny credit - card sized computer that was designed in the UK by Raspberry Pi foundation. The Raspberry pi is the first to be open source and includes ARM1176JZF-S 700MHz processor. There are 2 types of Raspberry Pi model A and Model B differentiated according to their number of USB ports. Other than PC, it also has 40 pins which are controlled by code and it also contains Ethernet port. The system here uses Raspberry pi of model 3 B which plays a major role in the implementation of the system.
Adapter

An adapter is a device which converts an attribute of one system to other. It may modify power or signal attributes while others also adapt the connector from one another. This is used to provide Power supply externally. The system needs 5v (volts) / 2A (amp) micro USB adapter to give the power supply to the Raspberry pi model 3B. We can also use mobile charger cable to power the Raspberry Pi.

SD Card

Secure Digital card (SD card) is used since the Raspberry Pi does not have any on-board memory. It consists memory of only 1GB which may not be sufficient to run the operating system. The SD card used in this system of 16GB memory of Class 10 (Class 10 refers to the reading and writing speed of the card). The OS is stored in the SD card and inserted into slot of SD card on Raspberry pi board.

HDMI to VGA Cable

The VC810 is an HDMI (High Definition Multimedia Interface) to VGA (Video Graphics Array) converter which is used to connect a HDMI source such as laptop directly to VGA display such as, Projector, LCD monitor.

USB Cameras

The system uses two USB (Universal Serial Bus) Cameras. These Cameras are used to capture images and to transfer image data. The first USB camera is used for Scanning the QR -code and the other is used for continuously tracking the seat vacancy.

Raspbian Operating System

Raspbian is the operating system for Raspberry pi which runs on Python. There are various versions available the system here uses Raspbian OS (version 4) which is of 64-bit.

Python IDE

Python IDE (Integrated development environment) is mainly designed for python. It includes the default implementation of the language. It is an optional part of python and consists of various Linux distributions. As Raspberry Pi runs on python it is used in the system.

Open CV

Open CV refers to the Open Computer Vision. It consists of various protocols mainly used for vision. Open CV mainly focuses on operations related to images. This system uses open CV for continuous monitoring and tracking.

V. Methodology

The system is implemented as follows; the Raspberry Pi plays a key role as it is heart of the whole system. The Raspberry pi is installed with Raspbian Operating system which runs on python IDE. We are using Raspberry Pi since python can reduce the effort of lengthy code writing and also easily accessible to the user. Two
web cameras are connected to the Raspberry Pi where, one camera is used to scan the QR-code and other camera is installed in the bus which continuously tracks the seat vacancy and provides the information of the seat vacancy. Then the traveler can book the ticket. The QR-code is generated once the ticket is booked and scanned at the entrance while boarding into the bus. Open CV (computer vision) is used to track the image for seat vacancy monitoring. The algorithm is going as follows, first the user has to book the ticket using a cloud-based methodology and the QR-code is generated at the server side and scanned at the entrance to check the validation of ticket. Here the most important point is that the ticket is generated only when the sufficient amount is there in the user wallet linked to the server, and seat vacancy is shown on the monitor. This paper summarizes the present problems in bus ticketing system. to beat from this, we have a tendency to operating towards robot platform. We’ve known the present gaps and open analysis areas. Our analysis can specialize in these open issues and propose effective solutions for a similar.

**Fig. 2:** Flow chart

This paper introduces on a way to secure traveler data. to beat the drawbacks of manual ticketing system we have a tendency to victimization QR-Code for security purpose of passenger's data within the propose system.
Fig. 3: Registration page

Fig. 4: Login Page

Fig. 5: Seat monitoring using webcam placed in bus
**Fig. 6:** Booking ticket after seat upgrading

**Fig. 7:** Payment
The System projected the look of a plan for managing time in busy mode whereas wanting forward to public vehicle. This could be Associate in serving application for the all the those that ought to get to move public vehicle daily or rarely. The benefit of this is providing fundamental quantity information on advance booking and seat vacancy, in addition gives the precise position of machine. The system improves quality of images by victimization distinction restricted accommodative bar chart deed and morphological methodology.

VI. Conclusions

The Seat Vacancy Monitoring system is designed using Raspberry Pi, which continuously monitors the seat vacancy and issue the QR-code based ticket. The system is installed in bus when departures from station the webcam sequentially captures the images and upgrades the whereabouts of seat vacancy, using this the passenger can book the ticket using a cloud-based application and the QR-code is generated at the server side. The face detection accuracy is more because we use an application of image processing along with Raspberry pi, the histogram manipulations can be prominently increased to improve the quality of Images of passengers boarding into the bus. So that using this system the vacancy can be upgraded, accordingly ticket can be booked.
References

I. Asha P, Albert Mayan J, Canessane A, "Efficient Mining of Positive and Negative Item sets Using K-Means Clustering to Access the Risk of Cancer Patients", Communications in Computer and Information Science, ICSCS 2018, Kollam, 2018, pp.373-382

II. C. Upendra Reddy , D.L.S. Vara Prasad Reddy “Bus Ticket System For Public Transport Using Qr Code”, Department Of Cse, Sathyabama Institute of Science and Technology, Chennai, India

III. Jafrul Islam Sojol, Nayma Ferdous Piya, Shalim Sadman, “Tamanna Motahar An Automated Passenger Counting System”. Department of Electrical and Computer Engineering, North South University Dhaka, Bangladesh.

IV. Janewit “Vehicle Seat Vacancy Identification using Image Processing Technique” Wittayaprapakorn School of Information Technology Mae Fah Luang University Chiangrai, Thailand

V. M.K. Dharani M. Priadarsini K. Tamilselvi “Nifty system for tracking bus and seat availability” Department of CSE Kongu Engineering College,Erode-638 0522 dharani.cse@kongu.edu priadarsini.cse@kongu.edu tamilselvik.cse@kongu.edu

VI. Mohini, Pooja M. Chinchole, Vaishnavi R. Mahajan, S. Shirsath, Varsha G. Moga “A Review on Smart Bus Ticketing System using QR-Code”. Department of Information Technology Engineering Matoshri College of Engineering and Research Centre

VII. Prof. Balram Timande, “Public Transport System Ticketing system using RFID and ARM processor Perspective Mumbai bus facility”, VLSI & Embedded System design Electronics and Telecommunication Engineering, DIMAT, Associate Professor Department of Electronics and Telecommunication Engineering

VIII. Xiao-Lei, M et al “Transit Smart Card Data Mining for Passenger Origin Information Extraction”, Journal of Zhenjiang University Science (2012),Vol. 13(10), pp.750-760