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Enhanced & Integrated E-Ticketing - An One Stop Solution

Akshatha R¹

Department of Computer Science and Applications
The Oxford College of Science,
Bangalore -560102, India

Dr. J Meenakumari²

Professor and Head
Department of Computer Science and Applications
The Oxford College of Science
Bangalore -560102, India

Abstract: Communication is a great hazard in Metro cities in the present scenario. During the peak hours the passengers start their travel without concrete decision of their travelling by bus or train. Often they do not carry tender change with them which creates a lot of inconvenience for all. Moreover many passengers travel without much clarity on whether to procure one-way ticket, two-way ticket or monthly ticket. To overcome this kind of ambiguities this paper would help in developing electronic ticket system that will liberate public transport passengers to have a flexible mode of transportation. The key benefit of this paper is that it includes states of the states of the art technology that automatically calculates the correct fare based on the distance. The only thing passengers need is a plastic card integrated with RFID chip that allows it to be identified via radio waves, the card can be used by different transport companies and service providers and for different modes of transport (metro train/bus). This system also helps to maintain database of travellers for futuristic purpose. At the end of the project a march towards available the green revolution could be achieved thereby minimising the paper tickets. The upcoming the feature of RFID card includes the information about passengers. A passenger carrying this card can enter bus or train and swipe on the device. This card will automatically register the information and checks if card is valid or not. This helps in storing data of traveller's and generating of reports as and when required. This system requires Wi-Fi connectivity for better an implementation. This paper mainly comprises of modules such as verification and validation, fare calculation and report generation.

Keywords: E-ticket, RFID, RF tags, RF reader, OCR, EMV, NFC, Smart cards, GPS, Public Transportation System.

I. INTRODUCTION

Enhanced Integrated E-ticketing—An One Stop Solution is a system which helps passenger to travel from source to destination using a RFID smart card. This smart card will have the information about the passenger or user of the card. The information can be off username, user id, RFID number and other information such phone number and mainly the amount or balance which is needed for the travel. When passenger places the smart card on the source reader, card should get detected and user or passenger who is using the card should be a valid card with minimum balance in it. Again when passenger places the smart card on destination reader the travel is stopped or halted in that particular position.

Now, the amount is calculated based on the GPS technology that is with latitude and longitude of source and destination. This system is valid for all transportation system example bus, train, cab etc. Example if passenger gets into a train and swipes the card on reader and travels while getting down again swipes the card which ends the travel. Then passengers gets into the bus and swipes in and swipes out the card which again ends the travel now, that particular amount is deducted from the balance based on the distance travelled, mode of transport used and amount per kilometer based on mode of transport used.

II. BACKGROUND

A brief overview of the literature survey along with our observations is presented below. The system of Enhanced Integrated E-Ticketing has been growing with high changes. Transportation development is the provision and interpretation of information on the unfolding of the transportation systems [1].

Transportation plays a dominant role in our day to day life. The primary Obstacle of using transportation is the uncertainty of waiting at travel stops for longer duration, no availability of tickets due to some bandhs and curfews, due to traffic jam, due to any other factors like poor maintenance of buses, all these directly effects the people [7].

In transportation, smart cards would become the next fare payment media replacing or supplementing cash, tokens and passes. Smart cards or touch and go cards is a chip card that contains an embedded computerized chip which is either a memory or microprocessor that stores and transfer data which improves the convenience and security of any transaction and provides proof storage of user and an account identity.

Once if the passenger insert the smart card to ticket friend machine the RFID reader in smart card contains pay mode terms, which check for the amount in the account. This payment system automatically recharges all pre-issued card with the amount preferred by the authorized person and also when the person used to scan the card. After receiving details from RFID, ZigBee transmits the data of transport facilities through huge display. ZigBee is often used to transmit data over long distance by passing data through intermediate devices which provides a secure network process [8].

Electronic ticketing technologies are classified according to the way they are used for payment. The closer the card is to the payment system, the more reliable the transaction is, but the more constraining it is for the user. Therefore, the long- term objective is for the customer to be able to pay for public transport without having to show or validate any card, relying on fully automatic fare payment systems [2].

Comparison with RFID ticket and paper ticket. In conventional paper based ticketing, each & everyday lots of tickets are being printed and sealed showing that date manually by the person sitting in the travel stoppage counter. After finish travelling, the passengers usually through away the used paper made tickets here & there which ultimately pollutes the environment. Again large number of trees is being destroyed since the current system uses paper based ticketing and the used tickets are just wasted. But in our proposed system the RFID tagged card carried out by the passengers does everything automatically and eventually reduces these mentioned complexities.

Some benefits of RFID based ticketing system over conventional system (both paper based tickets & magnetic tickets) are mentioned as, using automatic ticket systems enables operators such as transportation authorities to save time and personnel costs; fare collection can be organized much more efficiently. These system low maintenance costs and reduced fraud-induced losses represent further advantages. Automation is the key, but it comes alongside crime reduction, reducing excess stocks and work in progress and reducing the time taken from raw materials to finished item on the retailer's shelf ("time to market") and other benefits that directly impact costs [3]. Later many identification technologies came into existence in concern with e-ticket such as:

OCR-Optical Character Recognition (OCR) is the electronic conversion of scanned images, such as 1dimensional barcodes or QR codes (but also scanned documents, PDF files or images) into machine readable characters. Original sources, e.g. receipts, tickets or other forms of printed records can be captured by a digital camera and converted into editable and searchable data (United Nations Economic and Social Commission for Asia and the Pacific, n.d.) [4].

NFC-Near-Field Communication (NFC) is basically an advancement of RFID technology, also enabling short-range communication between electronic devices. By bringing two NFC capable devices together, they automatically start communicating. It is often possible to use existing infrastructure, because NFC is capable to emulate RFID readers and tags [4].

EMV-EMV is the acronym for Euro pay, MasterCard and Visa; those companies initiated the development in 1994. It is a global standard for credit and debit payment cards, including card accepting devices (e.g. ATMs) [4].

III. METHODOLOGY

RFID Technology: Radio Frequency Identification (RFID) is a generic term for technologies that use radio waves to automatically identify and track product, animal, or person by means of using RFID tags that are applied or incorporated on them. An RFID system consists of a tag, basically a microchip with an antenna and an interrogator or reader with an antenna. Most RFID tags contain at least two parts. One is an integrated circuit for storing and processing information, modulating and demodulating a radio-frequency (RF) signal, and other specialized functions. The second is an antenna for receiving and transmitting the signal. The reader sends out electromagnetic waves. The tag antenna is tuned to receive these waves. A passive RFID tag draws power from field created by the reader and uses it to power the microchip's circuits. The chip then modulates the waves that the tag sends back to the reader and the reader converts the new waves into digital data.

GPS Technology: GPS is the latest technology used in varies fields such as navigation, tracking and also in some of surveillance application. Here it is going to use this GPS to calculate the distance travelled by the passenger. GPS module can configured to generate the latitude and longitude of the current position of the bus. The position of the bus can be monitored continuously using this GPS module.

Smart Card Technology: Smart cards can provide identification, authentication, data storage and application processing. These smart cards can be used as passenger identifications. Every passenger carries a smart card. The smart card has the information such as user identification number, RFID number, and available balance. These smart cards should be capable of the recharging, so that the passenger can use it again and again.

Combining all these technology the software is programmed with passenger details and RFID number is integrated in a chip. The RFID reader is developed so that it should identify the card and support any transportation medium. The strict rule is enforced so that if passenger is travelling without a card or exceeding the limits is notified to authorities.

IV. IMPLEMENTATION AND RESULTS

The implementation of the software has effectively helped to overcome various issues of ticketing system. Figures 1 and 2 below shows how a passenger can choose a transport mode and travel using a single RFID card for all transport modes using GPS system. The passenger should select the mode of transport first and then select the route of corresponding transport mode. After selecting both, amount per kilometer is calculated automatically. Fig 1 shows, to select transport mode and route and Fig 2 shows amount per kilometer automatically.



Fig 1



Fig 2

The after doing the above procedure the passenger can start the travel from the current location or by selecting the place which passenger wants to travel which is shown in Fig 3. After selecting the location the current position latitude and longitude values helps to get the start position. Again when passenger swipes out the card the current position latitude and longitude values act as ending position. Later depending on the distance travelled amount is calculated.

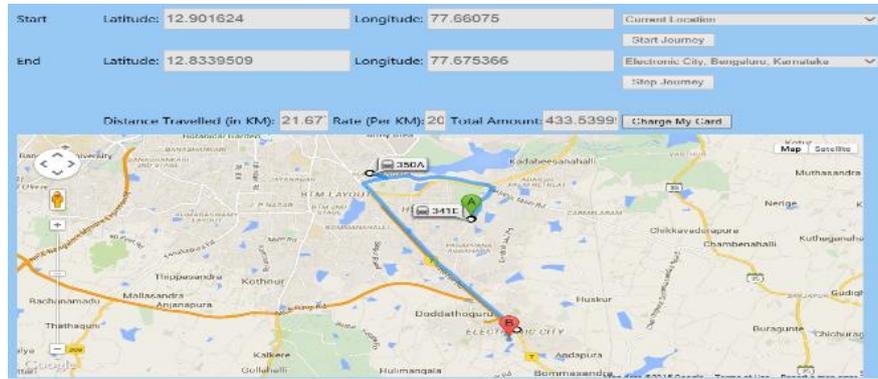


Fig 3

The above image shows the starting and ending location using latitude and longitude positions. After ending the travel or journey amount and distance travelled can be seen and accordingly chargeable amount is deducted from the card.

V. CONCLUSION

Enhanced Integrated E-Ticketing -An One Stop Solution is expected to be fully automated, reliable, transparent and convenient. The whole system can also be used in all transport vehicles with small or no modification. The cards being reusable again and again for recharge as well as for travel, they are much more convenient compared to the paper based ticketing system. RFID card helps to select any route based on passenger convince and availability particular mode of transport depending on minimum balance in the card.

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