Paperless Ticketing in Public Transport System Using IOT

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Abstract- **The rapid changes in information technology has led to digitalization and e-system. Many business-oriented organizations offer e-ticket instead of paper-based tickets. The proposed system discusses electronic ticketing system i.e., Paperless Ticketing System which is eco-friendly. This system charges fare as per kilometer so cost saving, because fare is calculated according to kilometer. As everything in this society is getting digitalized so the people are aware of this digitalization and using it on daily basis, this paperless ticketing system also will be a step towards digitalization. There will be no chances of frauds happening in the bus. It provides security for the passengers. The passengers will be able to check availability of seats from where ever they are convenient. There is no need for passengers to come to bus stop and wait for long time, instead they can check the availability of the bus and seats so they can reach the bus stop just few minutes prior the bus arrives. The passenger can enter the bus using the smartcard which has customer details and sufficient amount to travel, so there is no need to wait for conductor until he comes to the passenger to provide tickets. There will be no conflict between passenger and conductor for the remaining change as everything will be cashless. The passengers cannot enter the bus before scanning the smartcard, so there is no chance that any passenger can travel without a ticket. In case of emergency alert will be sent to the nearby bus depot. Passengers' location can be detected through GPS.**

INTRODUCTION

We come across theft, terrorist attacks on public transportation systems & fraud by Passengers or conductors by reusing the old tickets. Sometimes there is problem for the passenger if he does not have the exact change to purchase a ticket; this trivial issue sometimes leads to big fights between conductor & passengers. Also we know it becomes difficult for investigating agencies to track the cases in case of accidents or terrorist attacks with the existing system. We are proposing a Centralized bus control system where a passenger needs to fill up the details and purchase a unique ID bus pass card having unique number. Thus the bus centralized control cell has the passenger's details in their database. While collecting details the centralized cell needs to collect the passenger's photo, mobile number, ID proof & address proofs as well. Also this issued card should be valid for only certain time. In our case we are proposing the validity period for 1 year. After Expiry of the card, passenger needs to get the card renewed again in the centralized cell by paying the prescribed fee. While preparing the data of the passenger, we can use Aadhar number (Unique ID issued by Govt of India) so that unique identity of the passenger is maintained & hence monitoring & maintenance becomes more easy. Every time Passenger needs to get that card recharged in the bus stop (Centralized Cell outlets) or in the bus itself by a conductor. With this proposed system existing old system such as the paper ticket can be removed with an e-ticket. Here E-ticket is sent to passenger's mobile number with his journey &amount deduction details in the message. As the E-ticket will have the timestamp & bus number& journey details, it cannot be reused & it will be passenger specific. There is an issue of exact change to be given to the passenger when he buys a ticket. When the conductor/ passenger do not have the exact change, then it will be problem which sometimes results in fight between them. Thus by using proposed system by conductor, a RFID reader automatically reads the unique tag number & Processor processes the transaction & deducts the amount from the passengers tag (card). A SMS message which we call here as E-ticket is triggered to the customer/ Passenger stating that certain amount for his journey has been deducted from his tag no. This SMS again will be used by a passenger as an E-ticket for that journey as the message will have time stamp hence valid for that specific journey only & hence no issue of reuse of it thus preventing the fraud by the passenger. Thus the proposed system will not only help Indian transport systems such as KSRTC BMTC etc. in preventing fraud but also helps in maintaining the database and helps Security agencies. KSRTC or BMTC can encourage the people for using public transportation system by introducing various lucky draw offers by points system for their journey. Passengers can redeem their accumulated points against their card no for attractive offers or prizes. If the passengers are regularly using the public transport system, to encourage them discounts should be offered. Toencourage people occasionally offers need to be given so that they can prefer public transport system over their own vehicles. In the face of the corona virus outbreak, health officials are advising citizens to avoid crowds whenever possible, and people are increasingly worried about being in close contact with strangers. For those whouse public transit, this concern is top of the mind. Health experts know that Covid-19 causes respiratory problems. This virus is similar to the common cold and other respiratory viruses, which usually spread through exposure to tiny droplets from a sick person cough or sneeze. Scientists have been planning for a pandemic for decades and transport hubs are widely regarded as infection hotspots, with virus transmission rates up to six times higher for those using public transport systems. Airplanes, trains and buses (and the stations and airports you must travel through) provide in many respects the perfect environment for droplet-spread diseases such as corona virus (Covid-19)to thrive. Most cities with large transit systems, such as in the US, are doubling down on deep cleaning their subway cars, buses, turnstiles, and handrails. The London Underground, which serves roughly 1.2 billion passengers annually, is a particular hotspot. Many mass transit companies have set up pandemic response teams. If the outbreak getssignificantly worse, it is up to transit and local officials to use their discretion and shutdown the system or reduce

service. Authorities in Wuhan, China, the epicenter of the outbreak, closed all transportation hubs in an unprecedented quarantine, stopping all trains, ferries, buses, and planes from leaving the city when the disease started to take hold in late January. This drastic step, in retrospect, appears to have been most effective in slowing the spread of the virus. What measures can individuals and companies take to reduce risk and effectively slow the spread of the virus? Individuals can consider commuting during non-peak hours, using transport other than mass transit systems, or working from home. Many major companies have asked employees to work from home or instituted a staggered work-from-home plan. If you feel sick or belong to the category classified as "at higher risk" of contracting the corona virus (older adults, people with chronic medical conditions, etc), staying at home or self- quarantining is the best thing to do. Generally speaking, close contact with people in crowded spaces (whether that be a subway, airplane, or office) makes a person more susceptible to catching the virus. Previous research has shown that using public transport can increase a person's risk of catching a respiratory infection (the flu or common cold), since "buses and [trains] are crowded with people sitting and standing in close proximity" to one another. Herd immunity (we often say that Indians have great immunity) to other infections may not hold true for the corona virus since it's a new virus strain.

The very need for digitalizing the fares to be error free and easy access to the public transport system, is achieved using RFID for access into the public transport, where the user has to top up the card for using it similar to a SIM and when entering the transport system it would check for the availability of funds in the card, if available it would provide access to the service, if not it would indicate the same through a red LED and if the user has to leave the public transport at desired station, the user has to tap the card at the exit., in this manner it would detect the exact fare for his/her journey. There being a large scope once digitalized one of the other application which could be implemented is, when there are children below the age of 16 who would be using their discount card to travel to and from there school/ college their parents or guardians could subscribe for a service where in which to let them know when and where their children are. In this manner there is an opportunity to expand and develop using this system.

I. LITERATURE REVIEW

In this section, we will survey in brief on the various literatures which are based on the information and communication technology usage in public transport towards tracking of bus. In the research papers, we have observed that GPS technology is been employed for tracking of bus location and scheduling. In the research paper device cyclometer is used to measure the distance travelled, and it is attached to the wheels. Due to regular service of buses the maintenance of device is difficult. In the next research paper the user need to manually enter the location where he wants to go through map or website. The next research paper states that user cannot check the availability of seats. So he may enter the bus which is crowded. It will be difficult for the old age people to travel for along time. In another research paper it states that This system only provides the automated ticketing facilities and not provision for tracking the bus as it lags in some features like its track vehicle only on pc not on mobile as there is no application depending on mobile device to track and get a real time and current view of target or vehicle. In one of the research paper they have used a android application, which acts as a user interface when the passenger boards the bus as per the departure and the destination the fare is calculated. In the next research paper they have used intelligent transportation system and bus rapid transit as they have used a segregated lanes for different bus number but there is no use of networks trace the bus. In next research paper it states without adequate and proper scheduling there were many empty buses commutator's inconvenience commutator's are largely inconvenienced. The next paper states that it is easy to check-in but if the person checks out but has not left the bus he will be fined heavily. In the next research paper it states that Using of raspberry pi, it is expensive. Most of the people they won't travel in the pandemic.

II. PROBLEMS IN EXISTING SYSTEM

In traditional paper based ticketing, everyday tickets are being printed and sealed with the date manually by the bus conductor travelling in the bus. After completion of travelling, the passengers usually throw away the paper based tickets which ultimately pollutes the environment. Trees are being chopped off to make papers and the current system is using the paper based ticketing. The conductor then has to enquire each passenger about their destination and develop a ticket manually through a paper roll. The conductor has to issue the ticket to the passenger and collect the bus fare. The Passenger has to carry eact amount for the bus fare or the conductor has to return the exact amount, which often leads to conflict.

If the issued ticket is lost by the passenger, when checked again by the conductor, the passenger has to buy the ticket again paying the full bus fare All these points clearly indicate that the existing method of bus ticket system is not efficient enough in terms of time management, service, security and cost saving.

Also using paper roll for tickets is not eco-friendly nowadays as there is scarcity of trees.

III. PROPOSED SYSTEM

The device is connected with RFID, GPS, switches and display. When the system will start and wait for GPS signal. Once it receives GPS signal, it will wait for the passengers to swipe the smart card. If the card is valid then the journey starts. Simultaneously sensor will monitor if any accident occurs then it will send message to the concerned person to open the door. Once the passenger reach destination, the passenger should tap the smart card, the journey ends. Accordingly distance is calculated based on kilometer. Accordingly the money will be deducted from the card and the message will be sent to the respective passenger. Seat management can be monitored using IR sensors. Based on the sensor we will intimate the seat availability and crowd management. If seats are completely filled with passengers then a message will be sent to the nearest department to request for more buses.
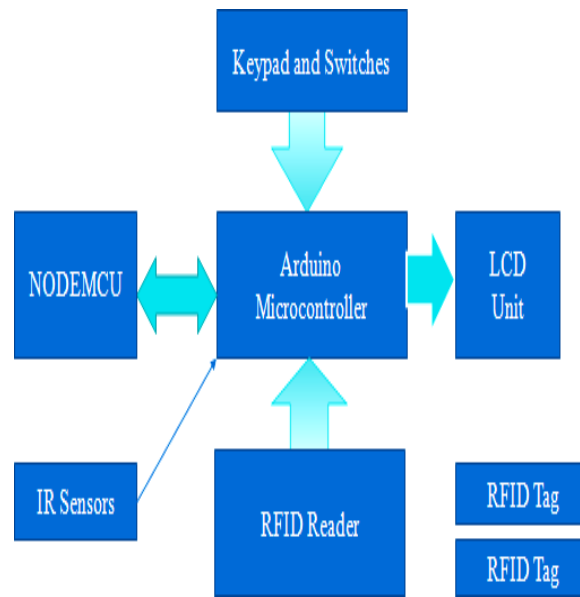
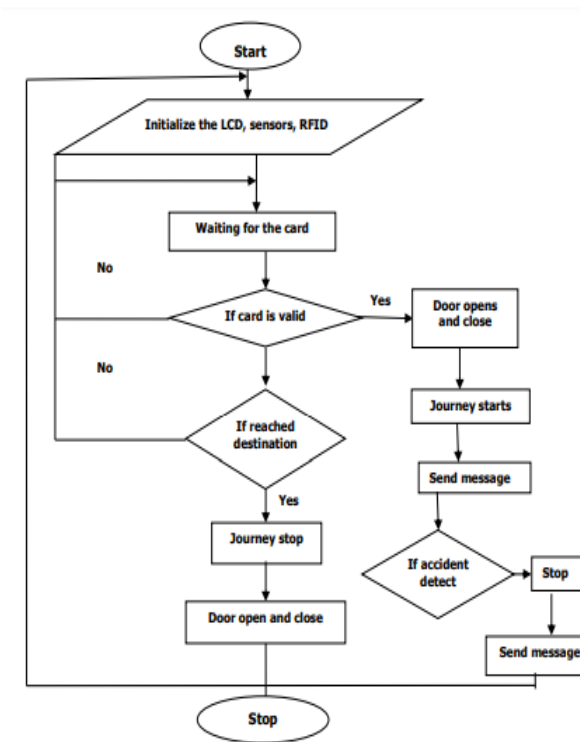**Fig 1 Block Diagram**

IMPLEMENTATION

Fig 2 Flow Chart

Crowd management can be done using sensors. Once the bus seats are filled completely automatically door will close and intimation send to the nearest bus depot. Distance (kilometer) based Amount deducted using RFID and GPS location. In this project, each user contains one prepaid smart card which is used for bus tickets and to reserve tickets. We are checking the Passengers count and safety of each person manage the crowd by using IR sensors to avoid the spreading of the corona virus from one person to other persons. Send SMS to the every passenger after his completion of journey.
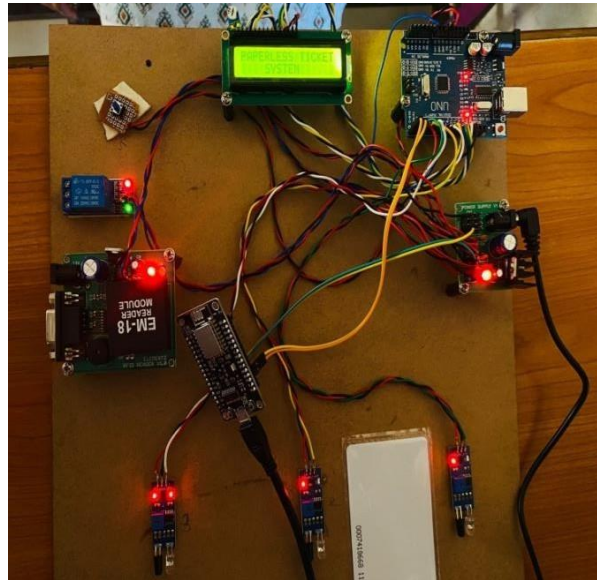
v.   **RESULT**

Fig 3 Experimental Setup Of Paperless Ticketing System
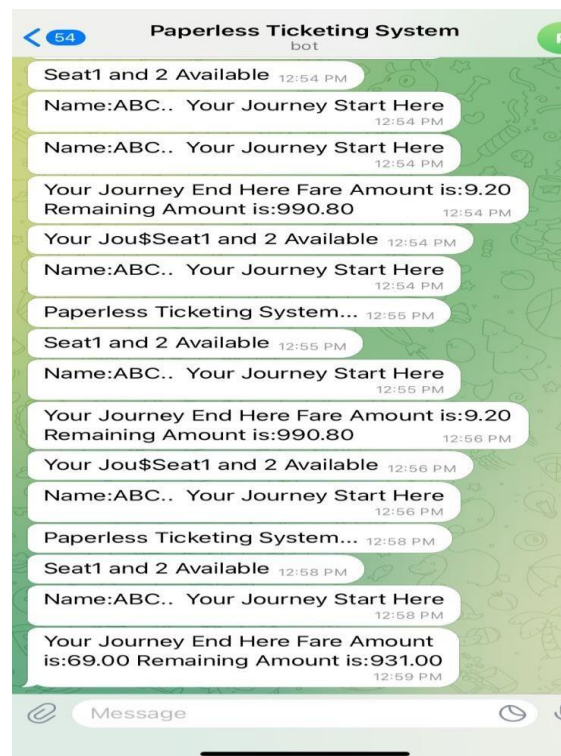

Fig 4 Paperless Ticketing System Message Sent to the passenger

CONCLUSION

The system is expected to be fully automated reliable, transparent, convenient and very effective in transport facilities. It has been implemented in many of the developed countries. Since we are one of the emerging countries, we do can make the transport system in an efficient manner. Using automatic ticket systems enables operators such as transportation authorities to save time and personal costs; farecollection can be organized much more efficiently. These systems are low maintenance costs and reduced fraud- induced losses. The whole system can also be used in railway ticketing system. The card being reusable, they are much more convenient compare to the paper based ticketing.

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