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Paper free Tickets for Public Transport using Android App (Flutter)

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ABSTRACT: If we talk about traveling in public transportation there is a huge problem of ticket generating, ticket collecting, ticket verifying. In this paper, we proposed a Smart bus App with QR (Quick Response) code-based ticket generating using this passenger scan QR code which is pasted inside the bus while entering inside the bus and at the time of exit from the bus a ticket is generated using ticket generating algorithm discussed below. And also, this app has additional functionalities that will help the user a lot. Is the problem of the user that they could not track their bus and Also, they have to pay their amount in cash and it takes time Of the user. Sometimes some users travel on the bus without any Payment. So, in this paper, we present a flutter app that can generate tickets easily through a QR code scan.

KEYWORDS: Tickets; Data entry on Cloud, Bus routes.

I. INTRODUCTION

Public transport plays a vital role in our day-to-day life. In day-to-day life, most of the people use public transport to travel and it's the problem of people to buy tickets and it also matters for nature that a good amount of paper is wasted in the form of tickets and sometimes people travel without any tickets so we have created an android app that manages all problems discussed above and other than it the app also has some more functionality which is useful for the person traveling through the public transport. We are using QR code to generate the secure tickets and the data of the user like traveled distance and balance deducted is securely saved in the cloud database. It is the quietest way to generate the ticket by only scanning a QR code that is placed in the bus and the data of the user can also be used for any improvement in the app. Also, technology is increasing fastly and now it's time for the internet everyone has fast internet in their smartphone and this technology will increase with increment in technology. As we know google is improving its Google map rapidly.

To track real-time public transport is the attraction point of many companies with the improvement in technology and the growing fastest speed of the internet. We have created this app on flutter it is a native platform and Mary depend dependency is used in this app to increase its functionality like connectivity of database system and server we are using firebase database to increase the functionality and it is also secure as it is made by Google the app is easy to use and it needs low hardware requirement Android devices to run so everyone can use this app into their devices

We are using QR codes to generate tickets for the users because it is the fastest way to create tickets and also at the time of the QR code scan, we are storing the user's entry into the firebase cloud which can be used further for app development.

So using these app peoples are will be more aware of the current location of their bus and they can use this App easily and with the help of this app they can generate the ticket in seconds and it is secure also it saves the papers and also does not affect to environment regarding paper wastage and in other ways so so as we all know that Google is improving their technologies
As seen in Fig 1.

Map rapidly so in future we can have some more dependency in a building app which will be more useful and secured for damn we have created some virtual currency in this app which will be detected with the traveling of the user as much as the distance he will cover so that amount will be deducted my according to the distance that the user has covered Google has implemented many API is in their Google Maps like Google SDK for Android Google static API and street view and other if so we have used many of them and implemented this app.[4]

II. COMPONENTS USED

There are two components in this app on which this app depends the first one is the database which is used to store the data of the user and the second one is the functionality of the QR code that we have added in this app which will reward on whenever a user will scan the QR code and the third one is a Google Map as we have implemented to track the current location of the bus using this app as seen in Fig 2.

QR code used in the App

(a) QR code for less Data   (b) QR code for More Data

Fig. 2: QR codes concerning the number of modules in the symbol area

Many different applications are based on QR code so because QR code is the fastest way to connect the user and the functionality easily because if we will at IIFA URL then it will consume a lot of time of the user and also it makes the user frustrated.[5] After all, no one likes to type any link so QR code is the fastest way to use any app which has some navigation property e nowadays QR code is also used for authentication Apps using QR code a user can access a piece of huge information in seconds because it is quick and fast As seen in Fig 3.
A QR code scanner that works on both iOS and Android by natively embedding the platform view within Flutter. The integration with Flutter is seamless, much better than jumping into a native Activity or a View Controller to perform the scan.[1]
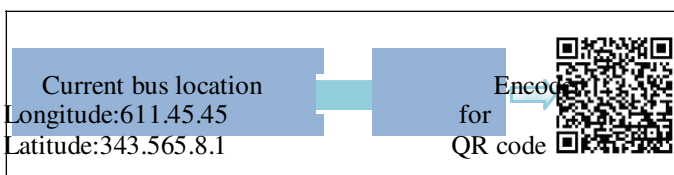

Fig. 3. QR code will be placed inside the bus.

2.1 Working Process of the App

1.   Firstly, the user will scan the QR code which is inside the bus when the user will scan the QR code
2.   At that time the functions allocated with the QR code will run.
3.   The QR code is unique for every bus that is linked with a cloud database in the google cloud firebase.
4.   The app will set the current location to a variable in the user's app at the same time user entry will be saved to a firebase cloud real-time database.
5.   And the initial location of the user will be set to the cloud database and some data of the user will also be saved in the database.
6.   Then whenever the user will exit the bus, he/she has to scan the QR code again at that time a ticket will be generated inside the user app and the user's wallet balance will be deducted As seen in Fig 4.
7.   The ticket will be generated according to the ticket generating algorithm. discussed below in section C.

8.   We are using Flutter to create our android app and Google cloud platform for Google map API and firebase database.
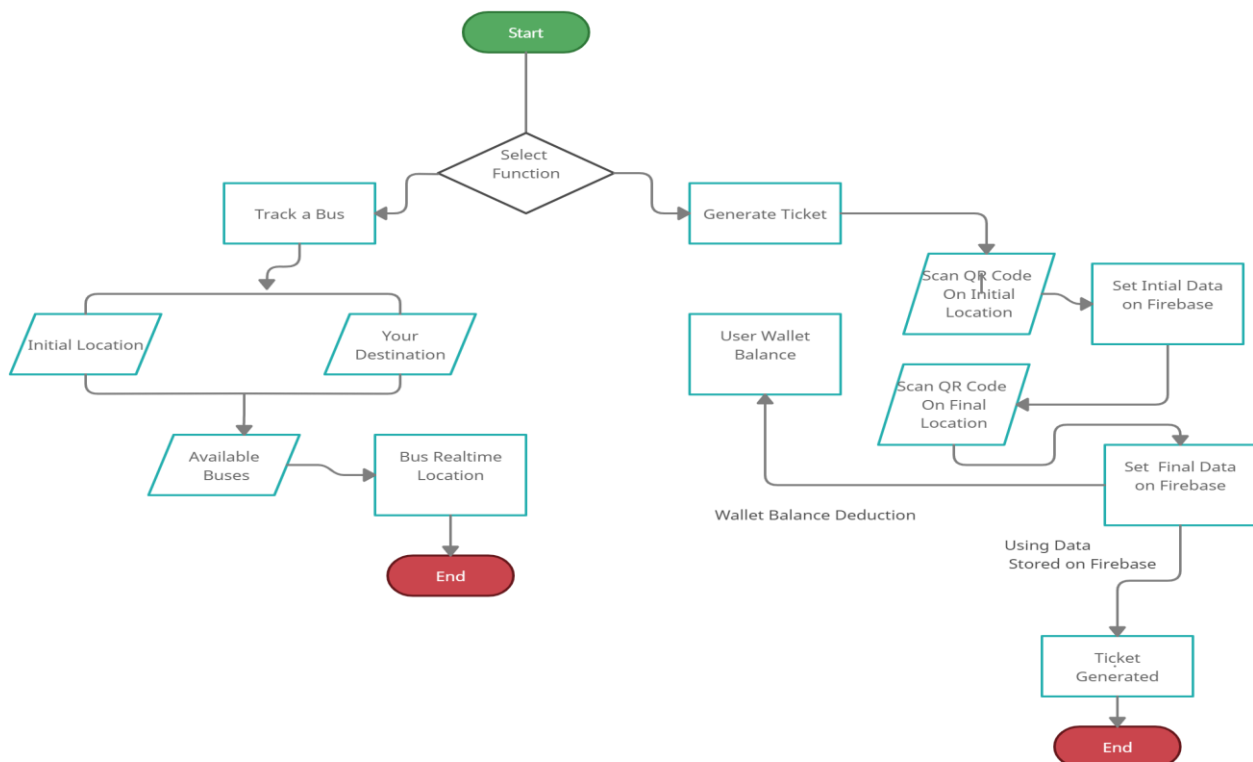9.   User App has all Bus routes Available which can be used by the user. The app is secure with easy to use.

Fig 4: Working Flow Diagram of the User App.

III. GOOGLE MAP API AND GPS

To get the current location of the bus we are using Google Maps and Geolocation API.
Using Google Maps API and Geolocation API we are fetching the current location of the bus and then whenever a user uses
Our App to scans the unique QR code inside the bus the current location is assigned to the user's current location.
Whenever a new user scans a QR code bus's current location is set to the initial location of the user.
We are using geolocation API whose link given below

https://www.googleapis.com/geolocation/v1/geolocate?key=YOUR_API_KEY

In the above Google Maps API link, there is a question mark and after the question mark, we have to use our API key to connect our app to the google cloud platform and the key is unique.[2]

https://www.googleapis.com/geolocation/v1/geolocate?key=YOUR_API_KEY

3.1 Geolocation responses

A successful geolocation request will return a JSON-formatted response defining a location and radius.

- location: The user's estimated latitude and longitude, in degrees. Contains one lat and one Lng subfield.
- accuracy: The accuracy of the estimated location, in meters. This represents the radius of a circle around the given location.[3]

IV. TICKET GENERATING ALGORITHM

Variables

initial_loc: current location of the user.
final_loc: location where the user wants to reach;
wallet_balance: current wallet balance of the user;
initial_time: Time at entry.
Final_time: Time at the exit.
total_dist: distance covered in the bus by the user.
Avg_time: Average time is taken by bus to travel a distance.
total_charge: Change user has to pay.

Inputs

C_km: Amount charged per km.
Penalty: Penalty amount with the distance covered.

Assumption

1. There are no traffic jams.
2. Bus speed is almost constant.
3. Bus did not stop more than a min in a bus stand;

4.1. Algo Description

1.Firstly, we will fetch the current location of the user when he scans the QR code First.
2. And we also set the Current time of the user at entry time.

if curr_loc is null:

   set initial_loc = current location of the bus.
   set initial time = Current time.

3. At the time of exit from the bus user will again scan the QR code.

   if Current_loc is not equals to null:
  set final_loc = current location of the bus;
    set final_time = Current time;
    total_dis=final_loc-initial_loc;
    total_time= final_time - initial_time;
    Avg_time = 2*total_dis;

4.Now amount will be charged according to this algorithm.

   if total_time is greater than Avg_time:
    total_charge = C_km*total_dis+
             Panelty*(total_time-Avg_time);
    wallet_balance = wallet_balance - total_charge;

   else if total_time is smaller or equals to Avg_time:

    total_charge=C_km*total_dis;
    wallet_balance=wallet_balance-total_charge;

V. USER SERVICES AND INTERFACE

User Experience of the application is as follows:

- Users with their smart mobile devices with User apps installed in their phones to use these services.
- Routes of buses are listed within the Passengers choose one of them to track the bus route.
- Users can track buses within App.
- Only the registered user can track the bus and take the benefits of the other functionality of the

VI. RESULTS

The presented approach for this App is to generate tickets only in few steps as we know that QR code is secure and fast enough to hide private data and users can access the data linked to QR code easily which gives a good outcome in our project because our app needs a basic requirement Android device which has at least 2GB RAM and around 100Mb of free space to install our App this app works on low internet speed also and we have used location in our app which does not consume the battery of the user so the optimization of the battery is good in case of other apps available in the market.
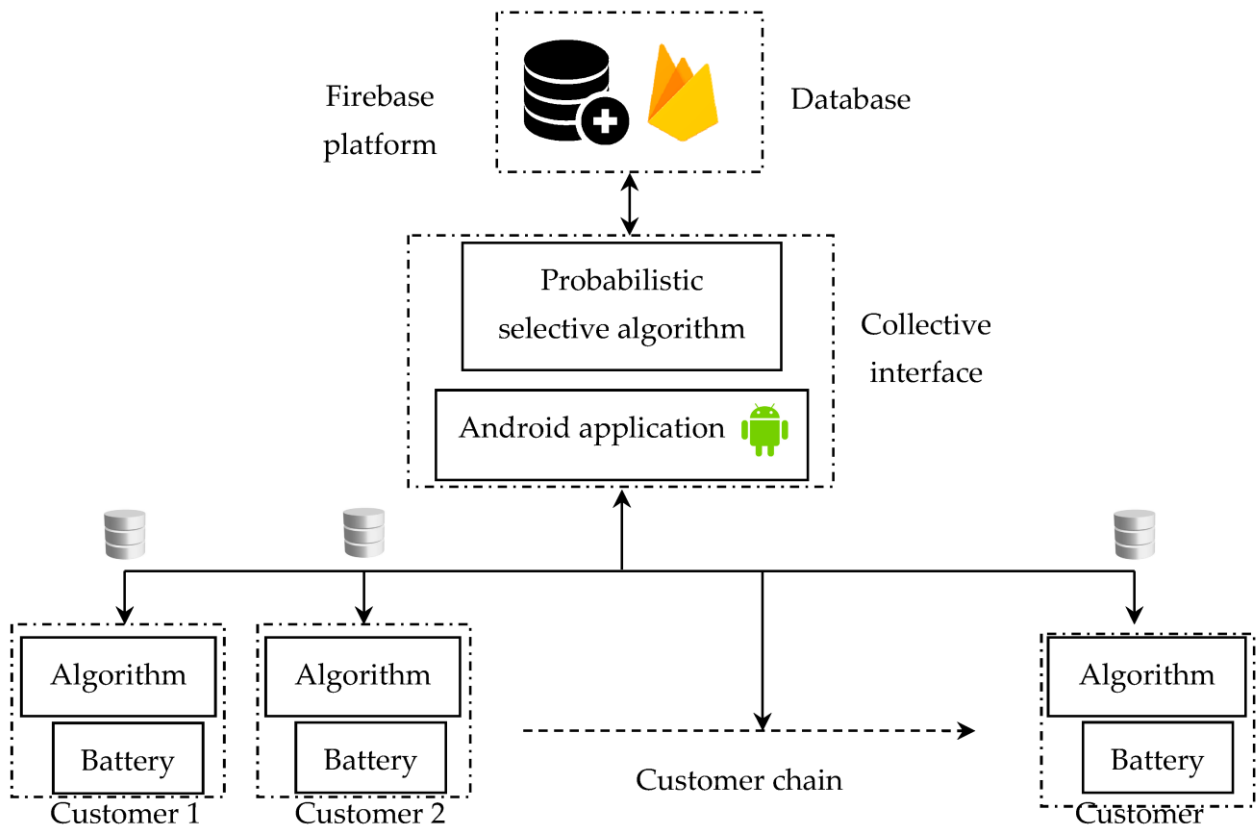
Fig 5 : How Firebase Working with our App

We are storing the data of the user in firebase in encrypted form so the data is secured. Also we have designed easy to use UI(User Interface) as you can see in Fig6, Fig7, Fig8 below.
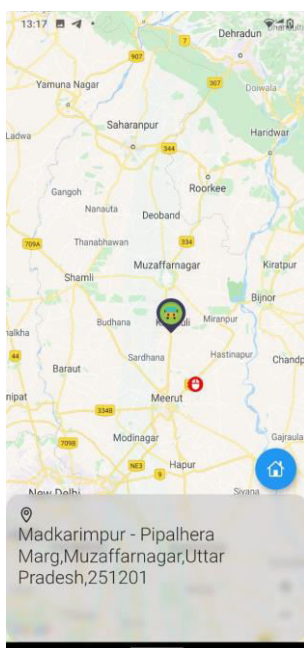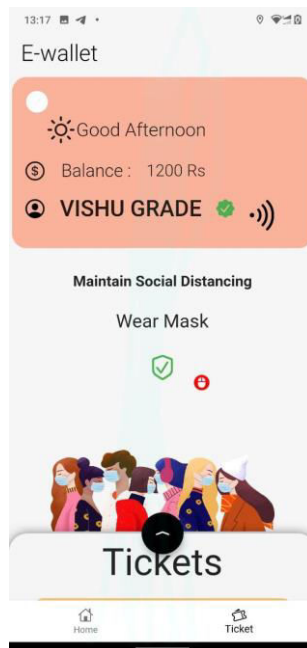

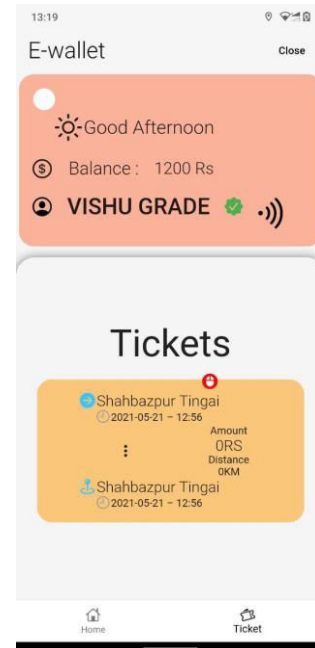Fig 6: Track Live location   Fig 7: Ticket Homepage   Fig 8: Ticket Generated

VII. CONCLUSION

In the future, most people are completely dependent upon technology and the internet is playing a vital role to bring technology into everyone's life. So, our app is based on the Google Cloud Platform and Firebase Flutter, and Google's map technologies. The described system tracks the current location of the bus. And stores the user travel details into the cloud firebase database. The app is easy to use people can use this app easily.

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