

# METRO MASS TRANSIT AUTOMATION (MMTA)

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## Abstract

*Metro Mass Transit Automation has been enhancing the growth of Metro Transportation which deals with a travelling cashless card which has a unique identification serial number used for faring purpose. In this project we will use EM18 RFID integrated in a card and it is called a smart card. The transaction records generated in Android App (Metro AFC) with the help of AT mega 328 can reveal the Origin and Destination of the passenger's individual journey trip, as passengers are required to tap there Cashless card each time they enter the origin and destination station. Additional provision can be involved such as queries, feedback and also the card can be recharged with the help of net banking .IR sensors will count the in out of passengers keeping in mind the easy flow of metro movement. The deduction of money present in the wallet will depend on the opening and closing of the gate which is driven by DC servo motor. The main intention of this paper work is to give a personalized service to passengers for regular usage and also to encourage passengers to use public transport.*

*Keywords—AFC, IR, LCD ,MMTA, , RFID*

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## I. INTRODUCTION

MMTA has been established to estimate metro fare automatically without disturbing passengers during their journey using a simple scheme card integrated with Radio Frequency Identification (RFID) technology. Using EM18 sensor, ESP8266 WIFI module, ATmega 328 we record details regarding the transaction of passengers boarding a train and his/her required destination.

Through Wi-Fi, an RFID reader can transmit radiofrequency waves. Records thus collected through smart card tags will allow identifying the passenger approaching the metro train for boarding, during its trip in the metro train, and when it alights the metro train and moves away. Keeping in mind, the Metro Rail Communication in Pune, the system has been designed.

The liquid crystal display (LCD) 32segments character can display the station name followed by the number of passengers in individual coach with the help of transceiver and receiver ir sensors which in turn helps us to know about the human counts. with the help of Aurdino ide, the coding to display the four station pune, shivaji nagar, khadki, dapodi) in the LCD 7 segments are displayed. the proposed of metro rail in Kolkata witnessed a change from manual to automatic fare collection system This travelling cashless ticketing is already popular in many cities like London, Singapore, Hong Kong.

Apart from the metro transport it is flexible to use in the buses, toll etc, wherein in India the system has not completely came into action. Smart card encoding is the most expensive encoding option, but it offers the most storage and security. Smart card encoding is a feature found in advanced ID card software – if you need to encode these types of cards, look for software upgrade options or professional versions. The Android Studio 3.4.1

designed to develop the Metro AFC App has been integrated in JetBrains. The software is such as the transactions in the wallet is made as soon as the passenger reaches the Origin. The deduction of the money is made when the passengers reaches his/her destination. The app also signifies the remaining amount in your wallet along with your query/feedback given to the user globally. The gate is driven by motor driver (L293D) is based on the tapping of travelling cashless card on passenger's source and destination which drives DC servo motor with the help of motor driver. This system has been basically proposed to design the working of cashless card and passengers can travel to anywhere cashless with no tension of theft and robbery.

Smart-card technology is by no means new it was invented more than 30 years ago and implementations have been made with smart cards for almost two decades. However, in the transport sector many of the early pioneering trials of smart-card ticketing were based upon a technology push. The Public transport in India had been relying for a long period on manual paper based ticketing systems. The introduction of Metro Rail in Kolkata witnessed a change from manual to Automatic Fare Collection system. Unlike the present system of contactless technology it was based on paper based magnetic tickets

## II. EASE OF USE

The MMTA has been designed keeping in mind the comfort and easy access of passengers The hardware components have been selected keeping in mind the flexibility of the hardware along with its cost Specifications.

## III. SYSTEM DESIGN

### A. Basic architecture

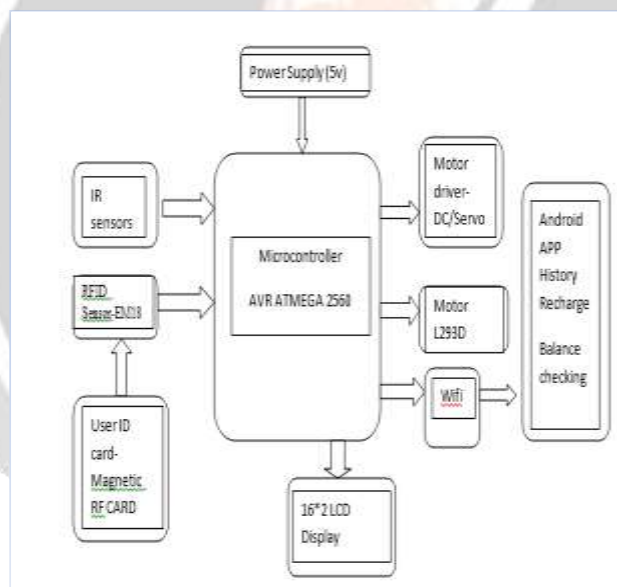


Fig 1:-Block diagram of MMTA



Fig 2:- MMTA Hardware

The hardware of MMTA is described keeping in mind the required specifications, cost effectiveness and as such the components have been selected. The wheels are been taken into action with the help of motor driver and the servo motor equipped inside the wheels.

As soon as the wheels start moving, the LCD displays the required Station name and as such the passenger tapped the travelling card to get the desired source station.

Apart from that, the continues name of the station changes in every 5s and the passengers tapes the travelling card in the required destination station. The deduction of the money is done from the wallet and as such the remaining balance is also been displayed.

Depending on passengers requirement, they can drop and query/feedback in the required app.it also shows the software part which includes the development of the app with the help of android studio 3.4.1.

**B .Design Calculation of Voltage Divider**

The voltage divider rule helps EM8266 Wi-Fi module to connect to the android app as well as RFID sensor by dropping the supply voltage to 2.5v (which is below 3.3v).

$$V_{out} = V_{in} * \frac{R2}{R1 + R2}$$

Where,  $v_{in} = 5v$   
 $R1 = 1K\Omega$   
 $R2 = 1K\Omega$

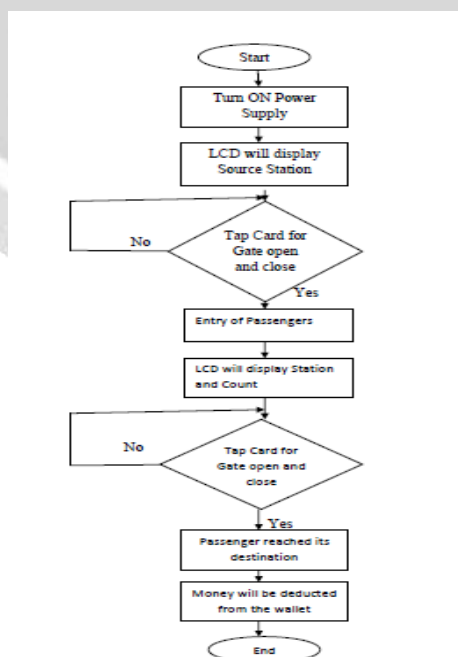
$$V_{out} = 5 * \frac{1}{1 + 1}$$

Where,  $v_{in} = 5v$   
 $R1 = 1K\Omega$   
 $R2 = 1K\Omega$

Output =2.5V

The 5v which is used in the ESP8266 WIFI module has to be lower and should be maximum 3.3v.

**C. Algorithm procedure**



MMTA has been provided with a 5v power supply and as such all the components has been adjusted accordingly.

Initially, the hardware will take few seconds to get ON, once it is ON, the wheels of Metro will start moving and as such the LCD will display the station name( Pune, Shivaji Nagar, Khadki, Dapodi ) respectively. At a later part it will display the the number of passengers in Metro with the help of IR sensor (both transmitter and Receiver).The passenger will tap the card on EM18 RFID Sensor when the respective Source Station name is displayed and as such it will be sensed by ESP8266 Wi-Fi module and signal will be sent to Metro AFC App and at the same time gate will open and close simultaneously for the entry of the passengers.

Once the source station name is recorded, the passenger will wait for the destination Station to reach and which would be displayed in the LCD screen. Upon reaching the Destination the passengers will tap the card once again, which will be sensed by the Wi-Fi module and the gate will open and close for the exit of passenger.

The Android App will help in the deduction of money from the wallet and also it can be recharged with a imaginary amount of Money. The passengers Query and Feedback can also be taken for suggestion which will be delivered to respective Metro Office holding the details of each User. Finally turn OFF the power supply.

IR (both transmitter and Receiver) sensor will help in the human counts so that no additional passengers will be added to respective couch and will help to maintain the decorum of the Metro rail.

#### D. Implementation

The schematic results has been displayed below which signifies the opening and closing of the gate as well as the deduction of assumed money from the wallet.



Fig 3:- LCD Display

The LCD displays the source station of the passengers travelling journey which also signifies the human count. The preassumed stations are the Stations of Pune city which we have taken into consideration.

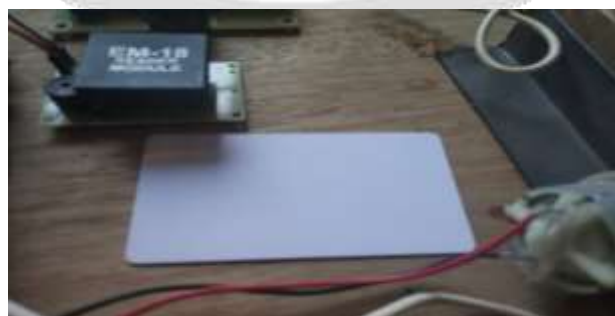


Fig 4:- Travelling Card

The travelling card is a smart less card which is tapped in RFID sensor.



Fig 5:- Open and close of the gate

#### IV.CONCLUSION

It can be used by passengers providing facility to access data about their source and destination journey. Additional passenger's query/feedback can also be involved.



Fig 6:- (a) Shows the transactions of passenger travelling.

- Basically, it is designed with the help of Android Studio .The figure displays the balance deducted from the wallet along with its source and destination time. Assumed balance is also present in the wallet which shows the remaining money in your wallet.
- Feedbacks/Suggestions are always appreciated. Any inconvenience caused to passengers may please be lodge to the Metro AFC App for quick redressed.

The transaction is viewed in the app which shows the amount deducted from the passengers journey.



Fig 6 (b):- Shows the Feedback query of the passenger

The feedback helps to understand the changes which need to be made for the easy travelling of passengers. Feedback will be received in the mail which will help us to understand the needs of the passengers.

Soon it received to the mail; it would be addressed for solution. The solution will depend on the changes that need to be made and as such the passengers comfort will also be valued. The MMTA is introduced keeping in mind the travelling expenses. It can be extended to the hands of passenger by providing facility to access data about their journey and also recharge their card through net banking with debit and credit cards. Additional provision for passenger feedback, queries and help can be involved through web publishing facility.

Time Consumption has been a major factor in this project as passengers should be convenient to travel from source station to Destination station.

The proposed system is designed to eliminate the disadvantages of the existing system. The proposed system "Metro Mass Transit Automation (MMTA)" is mentioned for tracing the problems in the existing system.

- ✓ Increased efficiency and reliability.
- ✓ Easier Access.
- ✓ Easy to use
- ✓ Provide accurate information to the user for taking necessary decisions.

#### IV.FUTURE SCOPE

The future scope of the project is to enable a CCTV camera to identify the entry and exit of the passengers near the gate which will also help the Government to identify miscreants of any crime, burglary and theft. The counting of passengers over video CCTV can be 98% accurate.

With CCTV camera the operator can see the counting of the passengers is done correctly and as such the miscreants caused to the government will be less.

Additionally we can also use advanced version app to get the transaction and the balance can be recharged with net banking/credit/debit card.

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