Turkish Journal of Computer and Mathematics Education Vol.13 No.02 (2022), 796-802

ResearchArticle

OA-TAS Online Toll Collection System

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Abstract:OA-TASstands fornothingbutOnlineAutomaticTollassortmentSystemusedtomechanicallycollecttollpayments,during this the identification was created with the assistance of a Radiofrequency. The automotive cars can hold the ID tag. This tag is nothing however a novel ID variety allotted. This can be provided by the governing RTO or control officer. In accordance with this variety we'll surely keep, all basic and advance info and therefore the quantity paid earlier by the TOLL assortment. Reader are deliberately in toll assortment Centre. When the motor car passes by assortment center, quantity of tax is subtracted from his or her paid balance there in card. The new balance is updated. Within this the event that someone has short balance, the user will re-charge the revolving credit exploitation the custom robot App. To address this problem, we made a shockingnoise,whichwarnedmanagementthatthecarwasnotgettingenoughbalanceandthatthecarcouldbeblocked.Since carsdonothavetostandinline,itensurestime-saving,fuelsavingandsavings.IRsensorsaresetbothinandoutforautomatic boom barriers. Automated Toll assortment systems have very helped to alleviate the large congestion caused by massive cities nowadays. it's one in all the best ways accustomed organize massive flow oftraffic.

Keywords: Reader, Toll, assortment, Radio- frequency, tags, sensors

1. Introduction

Aswetendtoallrecognize,transportationinroodsisthatthebackboneofourcountryeconomicaldevelopment throughthetransportationsystemsleadstoafarbetterqualityoflifeduringwhichwetendtoleadfancyandlarger freedomofmovementbycountryrules.whichleadstolargerinterchangefactory-mademerchandisebylocalvendor and services, and better levels of employment and social quality by high endscompany has been closely connected to economical modes of transportation, the rise within the range of vehicles on the road, causes several issues like congestion, level of accidents, pollution and plenty of additional. For this reason, the rise in transportation may be a speedy impact on national and economic productivity. Reducing the value of transporting raw materials to production facilities and transporting finished merchandise to markets is one among the key factors in economic competition. Online Automatic Toll assortment System may be a new technology in the emerging world that uses anautomaticelectronicassortmentoftollprices.Asresearchedbyresearchersandusedonnumerousroads,bridges, associated tunnels need such an Online Automatic method which will be helpful for user. OA-TAS is in a position to see if the vehicle. is registered or not, and apprise the administration, withdrawals, with collaborating accounts. Best use of this OA-TAS is that it's ready to eliminate congestion at the tract, particularly throughout those times of the year once cars seem to be aboveusual.

TheAdvantageofOA-TASprogramis:shortlinesintollplazabyincreasingthetollboothserviceatanycosts quickandeconomicalservice•alternativecommonadvantagesembodyreducingpetrol'sconsumptionandreducing emissions by reducing the speed of acceleration, spending more time for automotive cars in line, and dashing. For Toll assistance, the advantages include: • Reduced the number of toll assortment prices • higher audit management over the central user account. additional capability while not the development of further infrastructure. Therefore, theOA-TASsystemishelpfulforeachmotoristandtolldrivers,thiscanbetheexplanationforthelonguseofthe OA-TAS system worldwide. The main purpose of this proposal is to form associate acceptable revenue assortment system to be used. the proper term here suggests that little changes to this infrastructure with high potency. Automatic toll gates human power is needed for toll operation booths will be greatly reduced and so reduced the quantity spent on them earnings. the fundamental plan of victimization the RFID primarily based Toll System is to mechanicallycontourthetollassortmentmethodandscalebacktheparticularoperationintollplazasandlonglines attollplotsvictimizationRFIDtagsputinonvehiclesitinvolvesgroupingtollpricesvictimizationtheRFIDtagat a similar time it will crisscross if motor car details and may validateinsubsequent period, uncertainty profaned, the person could also get punished the automated toll assortment system that uses RFID in our daily lives avoids fuel loss, saves toll assortment time, avoids cash loss and monitorscongestion.

2. Literature Survey

The Toll assortment system has modified dramatically over the years; from being low transit booth to an outsized collection of infrastructure that plays a vital role in money generation 3 and traffic or town traffic. thoughthegeneralpublicgocomparedtodifferentwaysit'sbecomeanecessityandthesimplestwaytomanage control.

AnishDhurat,ParagMagal,ManishChhedaandDarshanIngle(2017)realpluswell-organizedinteraction among RFand wirelessmedium formonitoring. The vehiclevalidationand computerizedassortment of automobilesis done on highway. This scheme is proposed on paper and applied automatically torecord automobiles getting in and off by highway reducing the quantityof time in large queues. This paper implements and plan of active tagbased on system meant for automaticrecognizing running automobiles on roads and for collecting their data for future purpose.

Prof. Swapnil Gholap1, Sahil Mondkar2, Swapnil Khaire3, Mayur Mhatre (2020) In this each user is assigned a unique NFC card number for user identification. And each user will have their own unique username in NFC card for verification at NFC reader to identify the individual by NFC card number and username. **AkshayBhavke; SadhanaPai(2019)**Authorization is held with the help of RFID card where user has to use mobile app for verification. When automobile passes through the Toll Unit it is confidential as passenger like normal cars or goods vehicle carrier classified by the Unique Number assigned by authority. Thisvehicle is being weighted by weightier if more weight is being trapped then extra tax is deducted from tax.

RohanPSuresh,ShasnaShajahanKavalakkalandShifanaShereef(2019)reliesonsystemthatusesRFID in a very system that aims to lift tons of good by thissystem.it'sterriblytargetedonimplementingsuchaprograminKerala.Withtherise withintherangeofvehicles,thedemandforhighwayshasadditionallyaugmented.However,theprevailingtoll system in Kerala has several issues, particularly with native conformity. The restricted range of tolls and also theslowassortmentmethodresultsinlongerlinesandimprovedin the makingtimeand ourproject might induce a significant modification within current setupof profit the economy of Kerala.**Prakshaal Jain, Prashant Dhillon, Kaustubh Vats and ShrivishalTripathi(2012)** This effect is for achieving an intelligent fundraising for systems conditions. This purposes paper identifies a solutiontosolveproblemsraisedintheplazacollection,non-financialtransactions,tolloverpaymentcollection, toll plaza corruption, etc. In addition, the proposed system will also enable authorities to resolve car theft cases addedexcellently. Inplanned resolution, the toll are fitted with Recognition anddetector for gathering data regarding vehicles and perform seamless numerical operations supported distinctive identification and crucial partof planned system using a centralized assortment account nationwidesothegovt.isconsciousofthepriceofthetollcenter,andhelpstocutbackexcessivetollassortment prices.

Nicolas Havard, Sean McGrath, Colin Flanagan and Ciaran MacNamee(2018) paper uses Payment methods in India are now widely available. This paper gives a suitable approach that features the collection system that achieve the promises of communicating with a small toll payment system and a state-of-the-art surveillance system that makes this system extremely useful. The help of an intelligent frequency card is used by user handy. A car, motor vehicle , trucks do not have the same weight. The system is also used by a surveillance system which uses an important role to assist the user identification. The program will cause in high-traffic places by leaving many lines and petrol damage to people and minimizing the error. **Sabbir Ahmed,TamkinMahmudTanandNoshinNawal(2018)**paperproposescontinuousdevelopmentandgrowth, duringthispaper,theRFIDbasedmostlymachine-controlledTollassortmentSystemisintroducedasananswer to road issues and transparency within the road assortment system. The projected set up goalsfor making a numerical assortment that may remove delays on roads, bridges and corridors while price it whilenotneedingcarriagestoprevent.Thispaperemphases on associatedegreeelectricassortmentthat practices technology to spot a vehicle that's directly collected.

K.Balamurugan, Dr.R.Mahalakshmi, Dr.S.Elangovan, R. Pavithra(2012)paper uses current situation car testingisamajorproblemforpeopleintermsofvariousissues.Itarisestrafficissuesandeveninsystemtraffic are extended. The computerized collection is mosteffective now and paper is also related by the Automatic system of checking and uses Identification and also Global System for Mobile module like gsm. This was achieved through directing the idle frequency. The motor vehicle details associated withtheprojectsuchasadifferentIDarestoredintaginvolvedtothevehicle.Afteralltheinformation isclearlycomputerized,itcanbestoredinthedatabanktofindtherequiredtimeandexpecteddate. **SathyaM.E., Rishabh Ostwal, Srijan Bhattacharjee, Mohit Karmakar (2019)** The Toll Plazas can cut the total time taken to pay by using this system. As long as the vehicle owner pays the toll tax on the day of departure, he will be able to share time with others on the road. The existing system does not pass a secure database and also the database is accessed exclusively by the toll administrators. The implementation of Blockchain in our proposed system will bring new dimensions to smart city planning. By starting with our proposal, all the goals

of our Minor Project are accomplished.

K. Gowrisubadra ,Jeevitha.S,Selvarasi.N (2017) The collection of Tolls requires a lot of actions like blocking, reduction, precise cash management before travelers can continue their journey.RFIDtechnologyusesvehicle-focusedtags,wheretag-baseddataisstudiedwithreaders.Themainaim istoexaminethemanymechanismsthatexistwhenitcomestobanningmotoristsandpaidofficialsfrompaying for tickets and checking to drive without the proper document, overcrowded vehicle, respectively.

Tanim Ahmed1, Md. Mahedi Hassan, Rabeka Sultana, Abu Numan Afif, Md. Saniat Rahman Zishan(2020) paper uses an RFID for toll collection system on image processing was to see the tolls. A two-waytollsystemverifiedvehicleanddeductedanamountofmoneyfromcardwithoutinformingorstoppingthe registeredvehicle.Thismotorvehiclearerequiredtopassbyenteringanumericalvarietyplatterandthus the plate collected data isfixed in the tags. **Nazmul Hossain, Mahumad Khan, Abdus (2017)** planned digital toll management system is accustomed collect initial payments and therefore the system can offer a console constructionaimed at the system. The result of this application on the Bridge can facilitate the govt. to gather toll fees properly for all drivers or transport house owners. The Digital toll management system is used on a commercial to ascertain sensible human technology across the country.

Rafi Hossain, Moonmoon Ahmed, Md.MozaddedAlfasani, Hasan U. Zaman (2017) current RFID asking system the scholar solely receives Associate in Nursing RFID card to deduct the quantity charged in keeping with the categories of vehicles. The cohesive systema politician desires, selected sort of automobile. With this, a straightforward code is sent to organization mistreatmentthemodule, alsoautomobileis of no use. Theevenoncedeductingthetax quantity from the account of the automobile owner. additionally, this would being done to block trafficwithintheboothspaceofconnectionswithintheeventofAssociateinNursingemergency.

Syafei, Listyono,Darjat(2018)theplannedsystemusesacommunicationtechnologyunremarkablycitedasoftenest Identification. The automobile is visible through the systems because it permitsby the gate. Thus its route removes roadspresent in toll as expensecreated a rapid.[14].**ElhassaniaRouan,AhmedBoumezzough**(2019) a wise car parking zone may be originated to reduce parkingissues.VehiclescannotreachtheautomobileparkingspacewhilenottheRFIDtagasidentificationand entry/exitmaybedoneterriblyquickly.Userswon'tanticipatetheidentificationoftheirvehiclesaswhichwill be done mechanically with tags connected to them. this may additionally guarantee safety as solely registered vehicles allowed to enter the automobile parkingspace.

3. Diagrams

ThesystemusesESP32asamicrocontroller.Ithasbuilt-inWi-Fiwhichmakesitidealforourapp.TheRC522 RFIDReaderisconnectedtoreadtheuser'sRFIDtag.Usermustenterasecretkey/PINtoverifythetollplaza provided by toll managers during registration but can be changed later. Servo-enabled baropens or remains

closed as a user verification exit. If the secret key matches the card key, then only the servo bar will open the gateifanydiscrepanciesoccurtheservo willnotwork.TheIRsensortrackstheuser'smovementand whenthe usercrossesthebartheservo-enabledbarclosesgivingasoftsignaltothenextcarapproachingthescannerthat the scanner is now ready to read thecard.

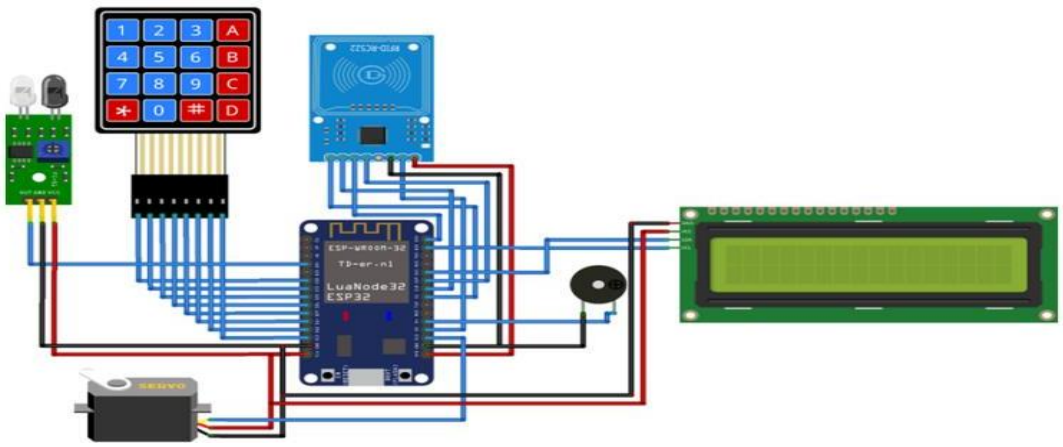


Figure.1. *Proposed Methodology*

The data is stored in ThingSpeak Cloud Storage which will help administrators see a record of every user and seeabargraphthathelpsanalyzethedailyormonthlyactivityofusers.TheAndroidappiscustomized forthis application using MIT App Inventor 2. The app can be used to recharge and check the balance of RFID tags speciallydesignedforuserswhocanloginwithacardassociatednameandtheuniquerfidcardnumberprovided

duringregistration.

4. SOFTWAREUSED

ArduinoisIDEinwhichcodeiswritteninonlyjavalanguage.Mainlyusedforwritinganduploadingprograms in board. It supports C and C++ by using special rules.it provides software lib from wiring projects, which has common I/Oprocesses.

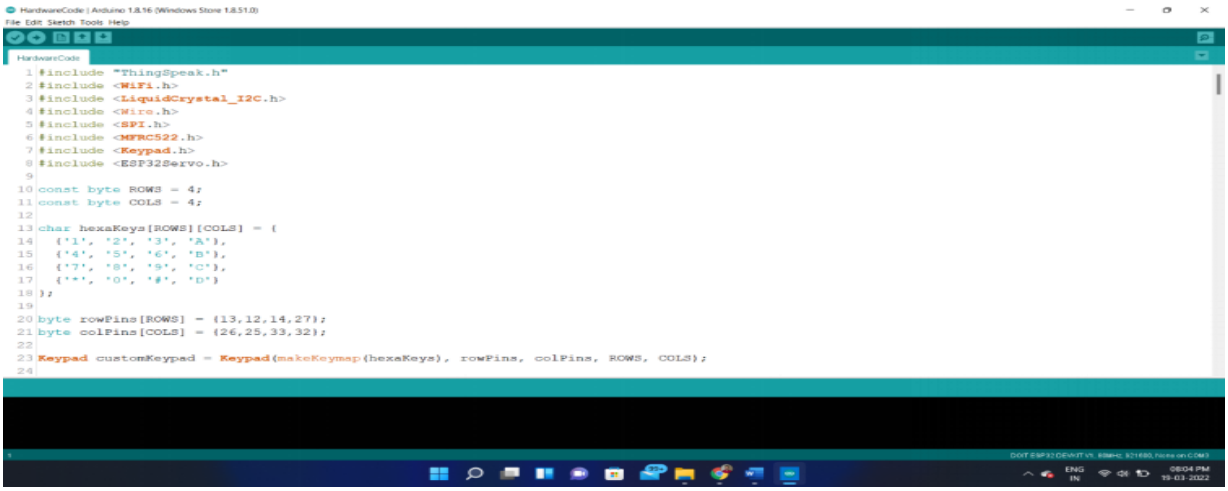


Figure.2. Arduino IDE

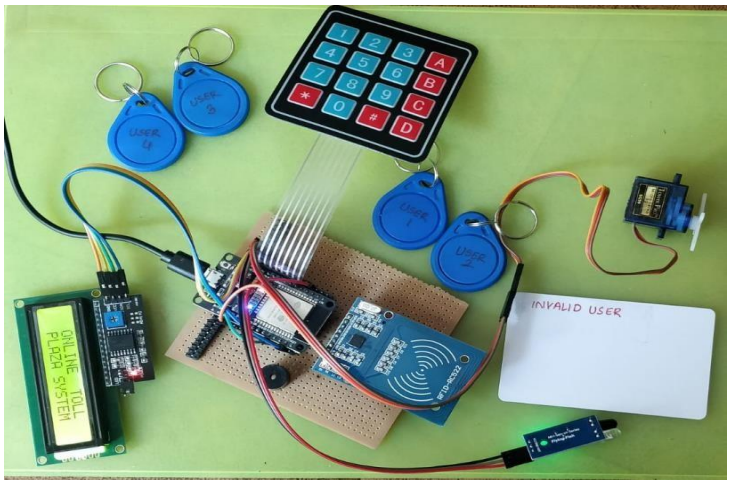
It requires two basic function only which is drawing and the main loop which is integrated to main program.

ThingSpeakisAssociateinNursingASCIItextfilesoftwaresystemwritteninRubythatpermitsuserstospeak withwebenableddevices.Itfacilitatesinformationaccess,retrievalAssociateinNursingdworkofinformation by providing an API to each the devices and social networkwebsites.

Figure 3. Thing Speak

5. RESULTS

In this section developed software using I5 Dual core,10th generation, RAM 8GB. We had interfaced hardware



with our laptop. After setting up the system achieved following results.

Figure 4. ProposedSystem

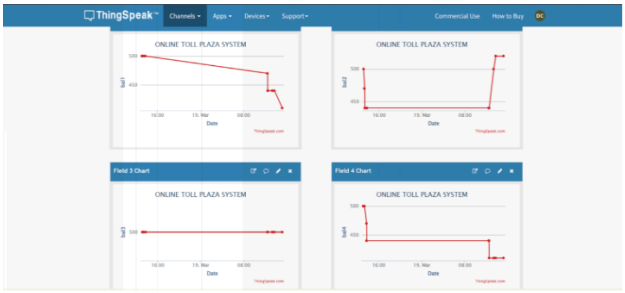


Figure.5. Datacollection

An effective model of Road Collection System. There are four valid users which are user1, user2, user3 and user4,oneuserisnotallowedthesystemwillnotworkduetohim.ThesystemhasanLCDscreentoshowthe livestatusofthesystem.IfthecarpassestheIRsensor,itwillbedetectedandthegatewillautomaticallyclose.

Our project reads and records data on thingspeak that helps track the remaining amount on each card. ThingSpeakCloudStoragethatwillhelpadministratorsseearecordofeveryuserandseeabargraphthathelps analyse the daily or monthly activity ofusers

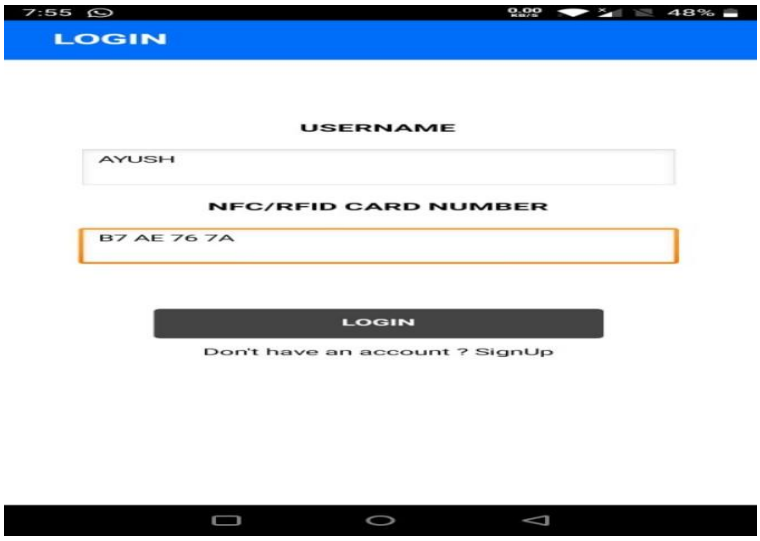


Figure.6. *ONLINE TOLL PLAZA SYSTEM(OTPS) Application*

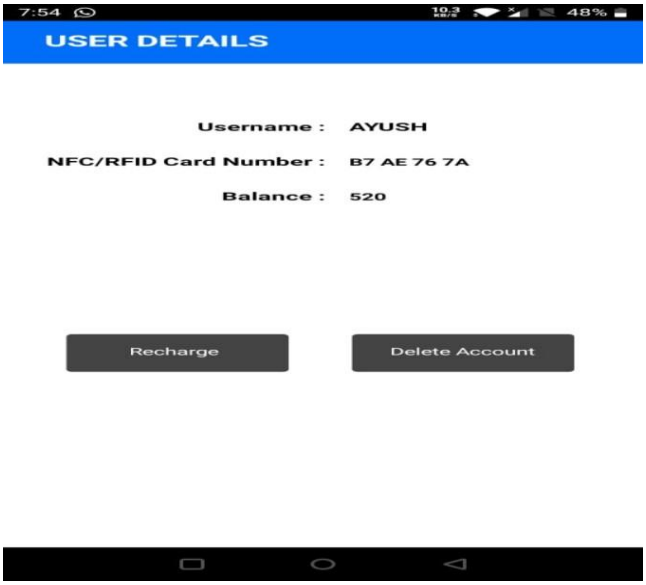


Figure 7.User detail page

Android app login page to verify user using RFID authorized number. Here each user is assigned a unique RFID number for user identification. And each user will have their own unique username to identify the individual. If the person does not have an account can register using the Subscribe the options.

After successful login. The user can only charge the card and can view the amount available on the card. The minimumreloadrateis10rsausercandoandaddvaluetoacloud-connectedwallet.Dataisupdatedonacloud server.

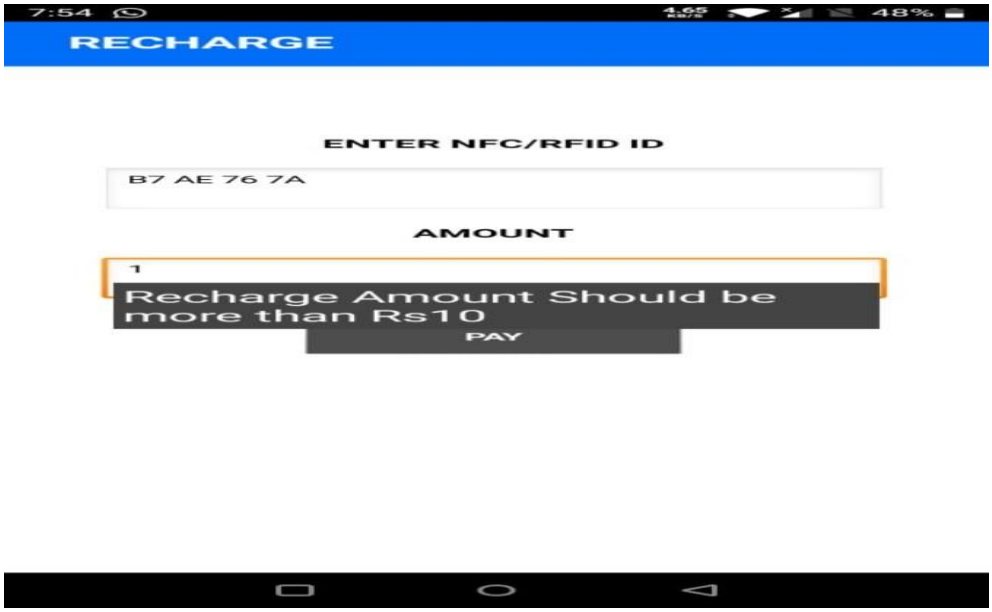


Figure.8. *Recharge page*

The minimum recharge amount is more than Rs 10. Thus, the user cannot be recharged at a lower cost. Here theuserneedstoentertheRFIDIDwhichtheyneedtorecharge.Thereisacheckboxthatwilldisplayanalert, If the value is less than 10rs.

6. Conclusion:

In the new years, the making of digital world is growing tremendously. Though the classificationprocesshang on extreme high programming, Thus we canspread our organization by own attention this needs in organization as this is extreme time redeemable,etc.TheuserhastotapNFC/RFIDCardandenterPIN.Thepaymentiseasily doneusingNFC/RFIDCardandrechargeandbalancecheckcanbedonethroughandroidappspeciallydesigned for the system. In future,the capacity of the machine can be increased by scaling the device.Touch Screenpanel can be

used for increasing ease of access and making it more user-friendly.4x4 Matrix Keypad can be replaced by Touch Screen panel HMIKeypad.

References

Anish Dhurat, Parag Magal, Manish Chheda and Darshan Ingle (2017) Gateless Electronic Toll Collection using RFID. The Institute of Electrical and Electronics Engineers.

Prof. Swapnil Gholap1, Sahil Mondkar2, Swapnil Khaire3, Mayur Mhatre (2020) Automated Toll Collection System Using NFC. The Institute of Electrical and Electronics Engineers.

Akshay Bhavke; Sadhana Pai (2019) .Advance automatic toll collection & vehicle detection during collision using RFID. The Institute of Electrical and Electronics Engineers.

Rohan P Suresh, Shasna Shajahan Kavalakkal, Shifana Shereef, Sreeragh A S, Jerrin Sebastian (2019). IoT Based Toll Gate System Using RFID. The Institute of Electrical and Electronics Engineers.

Prakshaal Jain, Prashant Dhillon, Anand Vardhan Singh, Kaustubh Vats, Shrivishal Tripathi (2018) A Unique Identity based Automated Toll Collection System using RFID and Image Processing. The Institute ofElectrical and ElectronicsEngineers.

Nicolas Havard, Sean McGrath, Colin Flanagan, Ciaran MacNamee (2017) Design and Implementation of Low Cost Electronic Toll Collection System in India. The Institute of Electrical and Electronics Engineers.

Sabbir Ahmed, Tamkin Mahmud Tan, Anna Mary Mondol, Zawad Alam, Noshin Nawal, Jia Uddin (2019) Automated Toll Collection System Based on RFID. The Institute of Electrical and Electronics Engineers.

K.Balamurugan, Dr.R.Mahalakshmi, Dr.S.Elangovan, R. Pavithra (2017) Automatic Check-Post and Fast Track Toll System Using RFID and GSM Module with Security System. The Institute of Electrical and Electronics Engineers.

V. Sathya M.E. , Rishabh Ostwal, Srijan Bhattacharjee, Mohit Karmakar Automated (2019) Toll Collection using ApplicationsofImageProcessingandBlockchainInternationalJournalofEngineeringScienceandComputing.

K. GowrisubadraJeevitha.S,Selvarasi.N (2017) A survey on rfid based automatic Toll gate management. The Institute of Electrical and Electronics Engineers.

TanimAhmed1,Md.MahediHassan,RabekaSultana,AbuNumanAfif,Md.SaniatRahmanZishan(2021)Design and Development of Lane Management and Automatic Toll Collection System. The Institute of Electrical and ElectronicsEngineers.

Md.NazmulHossainMir;N.M.ImrulKayesh;TanzilaMahmudKhan;AbdusSattar(2021)IoTBasedDigitalToll Collection System. The Institute of Electrical and ElectronicsEngineers.

Rafiya Hossain; Moonmoon Ahmed; Md. MozaddedAlfasani; Hasan U. Zaman (2017) An advanced security system integrated with RFID based automated toll collection system. The Institute of Electrical and Electronics Engineers.

W.A.Syafei;A.F.Listyono;Darjat(2017)Hardwaredesignofqueuingfreeenvironmentalfriendlyautomatictoll gate using RFID. The Institute of Electrical and ElectronicsEngineers

El hassaniaRouan Ahmed Boumezzough (2021) RFID Based Security and Automatic Parking Access Control System. The Institute of Electrical and Electronics Engineers.

A. Chaudhari, B. Rodrigues and S. More, "Automated IOT based system for home automation and prediction of electricity usage and comparative analysis of various electricity providers: SmartPlug," *2016 2nd International Conference on Contemporary Computing and Informatics (IC3I)*, 2016, pp. 390-392

A. Chaudhari, B. Rodrigues, P. Sakhare and C. Fernandes, "Prototype for intelligent ticketing system using NFC,"*2015InternationalConferenceonGreenComputingandInternetofThings(ICGCIoT)*,2015,pp.877-880