SMART BUS SYSTEM

Prof. Vasanthamma
Professor, Department of Computer Science and Engineering, Proudhadevaraya Institute of Technology,hospet, Karnataka, India
vasanthamma@pdit.ac.in
Meghana M kulkarni[1], Pavani Y V[2], Ramya E[3], Supriya P[4]
[1,2,3,4]Students, Department of Computer Science and Engineering, Proudhadevaraya Institute of Technology, hospet, Karnataka, India.
[1]meghanakulkarni654@gmail.com, [2]yvpavani2017@gmail.com
[3]ramyaeshwaran5@gmail.com, [4]supriyapattar5@gmail.com

Abstract— The Embedded Technology is now in its top and the wealth of Knowledge to be had is mind-blowing. Embedded generation performs a primary position in integrating the diverse features related to it. This needs to tie up the various sources of the Department in a closed loop system. This idea substantially reduces the manpower, saves time, and operates correctly without human interference. This task places forth step one in reaching the preferred target. With the arrival of technology, the prevailing structures are advanced to have in constructed intelligence.

The crowded Public Transports is Bangalore's lifeline. The city's supply chain of essential commodities and its residents are heavily dependent on this mode of transport. The Buses, used by more than 37 lakh commuters daily, are being sanitized in a bid to control the spread of corona virus. Special efforts are being put in to ensure cleanliness and hygiene in all passenger interface regions and additives in buses, together with door handles, facet handles, snatch handles, seats, windows, etc. That said, travelling in the local buses could be the easiest way to contract the virus. The Bangalore locals, which are known to carry commuters 2.6 times more than its capacity, are famous for people breathing down each other's necks, literally. An infected person travelling on a local bus in Bangalore can potentially infect Lakh s.

Keywords—IOT, RFID, Data Analysis, Bus Tracking, Paperless Ticketing, Monte Carlo Simulation

INTRODUCTION

We stumble upon theft, terrorist assaults on public transportation systems & fraud via way of means of Passengers or conductors via way of means of reusing the antique tickets. Sometimes there may be a hassle for the passenger if he does now no longer have the precise change to buy a ticket; this trivial difficulty every so often ends in large fights among conductor & passengers. Also, we understand it turns into tough for investigating groups to music the instances in case of injuries or terrorist assaults with the present system. Thus, the bus centralized manipulate mobiliary has the passenger's information of 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 needs to be legitimate for best sure time. In our case we are presenting the validity length 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 getting ready the information of the passenger, we will use Aadhar number (Unique ID issued through Govt of India) in order that specific identification of the Passenger is maintained & as a result monitoring & upkeep turns into greater easy. Every time Passenger desires to get that card recharged with inside the bus stop (Centralized Cell outlets) or with inside the bus itself with the aid of using a conductor. With

this proposed gadget present antique gadget consisting of the paper price tag may be eliminated with an e-price price tag. Here E-price price tag is dispatched to passenger's cellular variety together with his journey & quantity deduction information withinside the message. As the E-price price tag could have the timestamp & bus number & adventure details, it cannot be reused & it is going to be passenger specific. There is a problem of genuine alternate to take delivery of to the passenger while he buys a ticket. When the conductor/ passenger does now no longer has the precise change, then it'll be hassle which once in a while outcome in combat among them. Thus, with the aid of using the usage of proposed gadget with the aid of using conductor, a RFID reader routinely reads the precise tag Number & Processor methods the transaction & deducts the quantity from the passenger's tag (card). A SMS message which we name right here as E-price price tag is induced to the customer/ Passenger mentioning that sure quantity for his adventure has been deducted from his tag no. This SMS once more can be utilized by a passenger as an E-price price tag for that adventure because the message could have timestamp hence valid for that specific journey only & hence no issue of reuse of it thus preventing the fraud by the passenger. Thus, the proposed gadget will now no longer handiest assist Indian delivery structures consisting of KSRTC BMTC etc. In stopping fraud however additionally facilitates in preserving the database & facilitates Security agencies. KSRTC or BMTC can inspire the humans for the use of public transportation device through introducing numerous fortunate draws gives through factors device for his or her journey. Passengers can redeem their accrued factors in opposition to their card not for appealing gives or prizes. If the passengers are often using the public shipping system, to inspire them reductions must be offered. To inspire human beings from time to time gives want to receive that will decide on public shipping gadget over their personal vehicles.

PROBLEM IDENTIFICATION

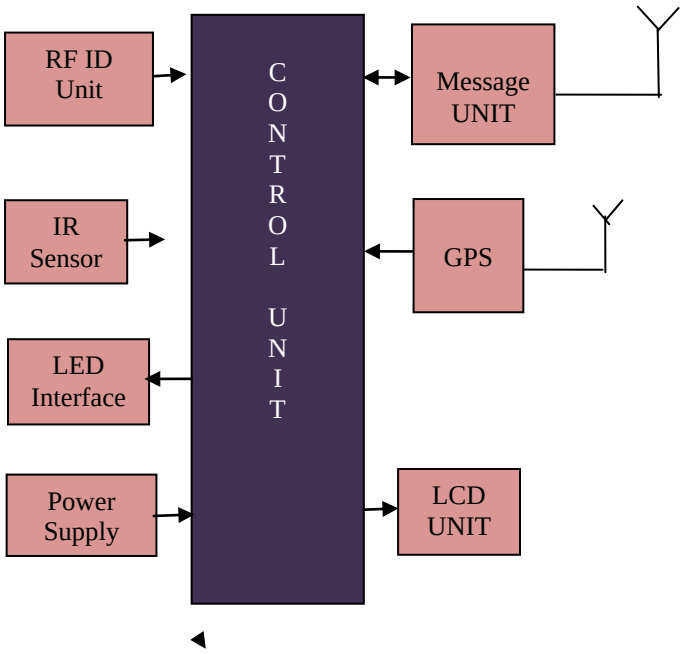
Some of the key problems identified in the current bus system are due to the lack of a proper bus tracking system, passengers must waste their precious time waiting for the bus. The current paper-based ticketing system is inefficient as well as inconvenient for the passengers and leads to a lot of paper wastage each day. There is lack of proper analysis system for bus management,

III. LITERATURE SURVEY

Much research is carried out related to the automated bus ticketing system using RFID. Some tracking systems for public bus transport have also been implemented using these technologies. Vijay Kumar and Dalip [1] have proposed a GPS and GSM based Passenger Tracking System. It tracks the passengers by using ticket numbers and displays location on Google map. As per R. want et al. in their paper [2], Radio frequency identification is wireless communication technology that lets computers read the identity of inexpensive electronic tags from a distance without requiring a battery in the tags. They look forward to transportation as one of the major industries that could benefit from a network of static RFID readers. For example, in ticket booking systems, rental cars with RFID tags fixed to their windshields could store vehicle identification numbers, etc. Lotlikar Trupti et al. in their paper [3], give a clear picture that RFID can deliver more rapid scanning times than barcode QR scanning. They suggest this as one of RFID 's many benefits since tags can be scanned without being in the user 's line of sight as RFID tags automatically catch the radio frequency sent by its reader from a distance and respond back. This makes it immediately preferable over barcode technology as well QR code technology. In paper [4], author Patel, Bhumik et al. have proposed a system in which passengers scan their RFID card in RFID scanner of the system which has a unique id to all travelling passengers. Passengers are validated by the website of the system hosted on server and after validation passengers will select the source and destination of journey and accordingly fare will be deducted from their account. In paper [5], a database is created which stores unique ID of each RFID card which a person holds along with his personal data. Fare calculation is done based on the GPS coordinates of source station and destination station sent to the server which is travelled by the passengers. Fare is automatically deducted from the passenger's account according to distance travelled by the passengers. While the unique ID is stored in the database there is a

need to also protect such essential user data against any type of attack over the application. The author in [6], recommends instead of storing actual password in database, it is hash value to be stored. Although hash value is stored, the application would still be vulnerable to various attacks such as brute force attack, birthday attack and dictionary attack. So, the author improvised his analysis by introducing the use of a salt value. The salt value is the value which is combined with the password and this new value is applied to hash function and the resulting hash value is stored in database. At the same time, it is advantageous to combine the salt value as suffix with the password, as it avoids the possibility of any attack. Boonkrong et al. in the paper [7], describes the method of salting the password and risks associated with them. As per the authors, if the salt for each password is stored in database and position of salt in salted password hash is also known, then rainbow and dictionary attack can still be conducted by the attacker to find the password. The authors believe that the position of salt in the final hash will impact the strength of final password hash. So, they have proposed an algorithm such that it is difficult to crack the stored password in the database. This algorithm avoids storing the salt for each password in the database. It computes a pattern by processing the original password provided by the user, by performing logical operations such XOR over the original password hash. Then, this pattern is used as a salt placement pattern in which the chosen salt bits are placed into the original password using placement rules. The placement rules are certain conditions imposed on the placement pattern as per which each bit of the salt is placed at certain position in the password. So, in this way the bits of the chosen salt and password are mixed. This makes it difficult or nearly impossible for an attacker to conduct any type of attack. As this algorithm is in the application configuration, the process becomes dynamic as different salts are computed for each user without storing them in any database. The authors in [8], explain that each bus will have an RFID card reader attached with a keypad which is connected to the main server for charging ticket fare from the passengers. Each passenger scans their RFID card on the card reader and enters the information of source and destination location through attached keypad and fare will be deducted according to the distance entered by the passengers. The disadvantage of the system is that every passenger must enter their source & destination locations which will result in time delays & chaos.The author in [9], explain that there are two PIC microcontrollers M1 which is interfaced with Zigbee, LCD and control switches which are used for providing route details in case of any route diversion and for opening/closing of the doors and M2 which is interfaced with RFID card reader, GSM, GPS (coordinator system) are used for tracing the bus from the base station. Zigbee and M1 are used to make synchronization with bus stops & display it on LCD. The base station module contains a GSM interfaced with PC together known as coordinator system, used for tracking the bus and showing the route diversion request and emergency situations and used to give the response for route diversions.

METHODOLOGY



BLOCK DIAGRAM DESCRIPTION

MICRO CONTROLLER

The LPC2141/42/44/46/48 microcontrollers are based mostly on a 16-bit/32-bit ARM7TDMI-S CPU with real-time emulation and embedded hint support, that combine microcontroller with embedded high speed flash memory ranging from 32 kB to 512 kB. A 128-bit huge reminiscence interface and a completely unique accelerator structure allow 32-bit code execution at the most clock rate. For important code length applications, the opportunity 16-bit Thumb mode reduces code through greater than

30 % with minimum overall performance penalty.

GLOBAL POSITIONING SYSTEM

GPS satellites circle Earth two times an afternoon and ship radio alerts with such data as their places and time. A GPS receiver, including a GPS unit or a GPS app on a cellular device, selections up offer dependable place and time statistics in all climates and at All instances and everywhere on or close to the Earth while and in which there is an unobstructed line of sight to 4 or extra GPS satellites. Our new GPS kit is patch antenna-based GPS with RS232 extension for up to 5mts cable. Due to damage to the external antenna (SMA connector) we are now switching to patch antenna.

Wi-Fi

Then we observe this voltage to the energy delivery circuit. Note that we do this test without a microcontroller because if there is any excessive voltage, this may lead to damaging the controller. We check for the input to the voltage regulator i.e., are we getting an input of 12v and an output of 5v. This 5v output is given to the microcontrollers' 40^{th} pin. Hence, we test for the voltage stage at fortieth pin. Similarly, we check for the other terminals for the required voltage. In this way we can ensure that the voltage at all the terminals is as per the requirement.

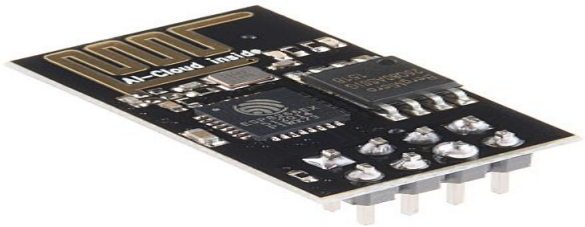


Fig: ESP 8266 Wi-Fi Communicator

`ESP8266 gives an entire and self-contained Wi-Fi networking solution, permitting it to both host the software or to dump all Wi-Fi networking capabilities from every other software processor. When ESP8266 hosts the utility, and while it is far the best utility processor withinside the device, it may boot up immediately from an outside flash. It has included cache to enhance the overall performance of the device in such applications, and to decrease the reminiscence requirements. Alternately, serving as a Wi-Fi adapter, wi-fi net get entry to may be delivered to any Microcontroller-primarily totally based layout with easy connectivity via UART interface or the CPU AHB bridge interface. ESP8266 on-board processing and garage skills permit it to be included with the sensors and other utility unique gadgets via its GPIOs with minimum improvement up-the front and minimum loading throughout runtime. With its excessive diploma of on-chip integration, which incorporates the antenna transfer balun, strength control converters, it calls for minimum outside circuitry, and the complete solution, which include front-cease module, is designed to occupy minimum PCB area.

RADIO FREQUENCY IDENTIFICATION

Radio-frequency identification (RFID) is a technology that uses communication via radio waves to exchange data between a Reader and a digital tag connected to an object, for the reason of identity and tracking. Some tags may be examined from numerous meters away and past the road of sight of the reader. The application of bulk reading enables an almost parallel reading of tags Radio-frequency identity includes interrogators (additionally referred to as readers), and tags (additionally referred to as labels). Most RFID tags comprise as a minimum part. One is an integrated circuit for storing and processing information, modulating, and demodulating a radiofrequency (RF) signal, and other specialized function. The other is an antenna for receiving and transmitting the signal.

RFID READER:

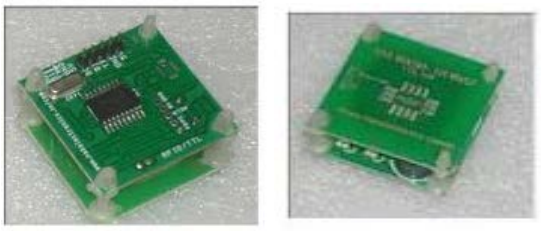


Figure RFID Module

RFID READER DISCRIPTION

RFID Reader Module also are referred to as interrogators. They convert radio waves returned from the RFID tag into a form that can be passed on to Controllers, which can make use of it. RFID tags and readers ought to be tuned to the identical frequency so that it will

communicate. RFID systems use many different frequencies, but the most common and widely used and supported by our reader is 125 kHz. RFID readers or receivers are composed of a radio frequency module, a manipulate unit and an antenna to interrogate digital tags thru radio frequency (RF) communication.

DISPLAY

An LED lamp is a solid-country lamp that makes use of light-emitting diodes (LEDs) because of the supply of light. The term LED light bulb is also colloquially used. Here in the system the LED is controlled by the microcontroller to indicate whether the passenger has got access to board the travel or not. These are got to know by the system by accessing the RFID. If the red LED glows, it indicates access denied or not.

IR SENSOR

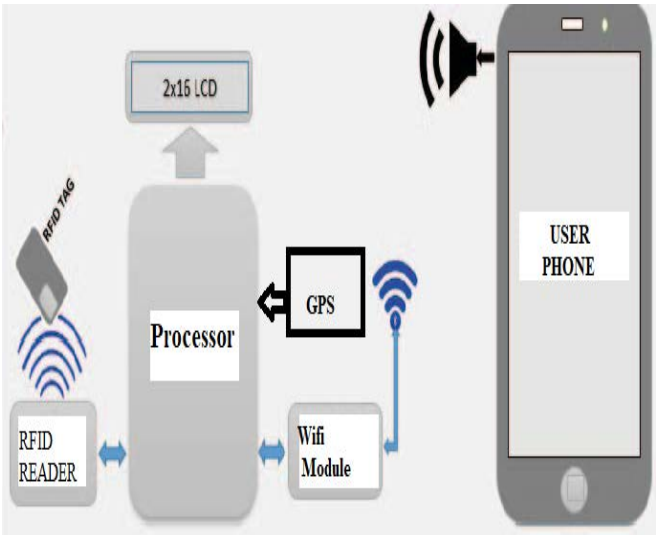
The reason for the transmitter is to convert the records we need to ship right into a sign that may be propagated through the channel. In the case of our stressed-out copper channel, this indicates we need the facts to be converted right into a modulated voltage level, something just like the pulse train. For a wi-fi channel, however, the transmitter wishes to encode the data onto an EM wave that may be without problems propagated.

SYSTEM DESIGN

System layout is the technique of defining the architecture, components, modules, interfaces, and facts for a gadget to meet exact requirements. Systems layout will be visible because of the utility of structures concept to product development. Object- orientated evaluation and strategies are getting the maximum broadly used strategies for pc structures design. Systems layout is consequently the system of defining and growing structures to fulfill detailed necessities of the user. The UML has become the standard language in object-oriented analysis and design.

ARCHITECTURAL DESIGN

System structure is a conceptual version that defines the shape and conduct of the system. It incorporates the machine additives and the connection describing how they paintings collectively to enforce the general machine.



OBJECTIVES

- To design a system using RFID GPS GSM to travel in BMTC BUS.
- Deduct the amount from their smart card according to the How much KM they Travel.
- SMS sending to the after completion of the journey.
- Seat availability facility.
- Crowd Management in Buses.

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; fare collection can be organized much more efficiently. These systems low maintenance costs and reduced fraud-induced losses.

FUTURE SCOPE

A machine learning model which will analyze the past data and predict the required frequency of bus and bus schedule can be created. This model will help the bus management to efficiently plan the bus system to fulfill passenger's demand. Also, all the transaction details can be stored in blockchain network to make them tamper proof and immutable.

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