International Journal of Recent Technology and Engineering (IJRTE)
ISSN: 2277-3878 (Online), Volume-9 Issue-2, July 2020

Smart Mobility in Urban Spaces

Anitha. T, Madhu Mitha. R, Priyanka.T, Sanchya.V, Saranya. S

Abstract*: *There is a need to make a smart city nowadays, to increase population in cities. Today public transport is of vitaly importance. Conveyance we plan to wait for a bus to hit our place on a long time. In proposed method, people's waiting time is reduced. The RFID tag reads the person who enters and exits the bus. In the MQTT dash application, the number of persons entering and leaving details is shown. The smartcard's tag debits the number. It is a system that is in real time. Using the LCD display, all bus information such as bus number, routes, stops and timings are shown in bus stops.

Keywords: Public Transport, Bus tracking, GPS, RFID tag, RFID reader.

I. INTRODUCTION

A portion of life has developed in public transport.Most people cover by public transport from their homes to a place of work or school. People could miss the bus due to waiting over. If asomebody in that city is fresh and is not familiar around bus stops then there may be chances of getting to the wrong place. Even though he reaches the exact endpoint person won't get places nearby. The driver needed to collect fare is one more, and passengers may face cash problems. Like these, the present system confronts more problems. In order to overcome this issue, we have built a smart system and an Android application that will provide data about the bus location, timing, bus stop, passenger number. We have installed a GPS-connected Arduino UNO on the bus, and it is also connected to the ESP module. The Arduino UNO is connected by using the MQTT platform to the app that is being developed. This system consists of a RFID smart card which helps the passenger automatically detect the amount. RFID reader, GPS module is placed on the bus and the bus route, timing, and bus stop are another system.The mobile app will include Bus Number, Bus Stop Names will also help to locate the foundation and endpoint, c transportation system that is successful for developing a potential solution or outcome.

II. LITERATURE SURVEY

In Sundernath.H [1], Arduino Mega 2560 microcontroller works as an interface for all other components such as GPS, IR Sensors, WI-FI module, LCD and PB switches. This module updates the bus information to the database from time to time so that the information can be retrieved by the students through the mobile application at the bus stops. By this student can be able to track the respective bus at their corresponding stops and also management is aware of punctuality of handling the buses GPS module placed inside bus module communicates continuously with the satellites for getting coordinates then those coordinates from GPS are sent to the database then Arduino extract the required data from received data by GPS the extracted GPS data in the form of latitude and longitude are nade to be uploaded to the firebase and also display on the LCD The proposed project also detects the number of students entering and leaving the bus which is displayed on the standard LCD(2*16). The push button switches have been employed in this section in order to update the current position at the remote location to firebase and also displayed through LCD. The mobile application used to track the information about the bus from the IN Bus Module through GPS in the form of the latitude and longitude at the student end through their mobile application and analyze the data which depicts the bus information at their respective stops for the desired instant. Bus stop module retrieves the bus information from the database through NodeMCU and displays the current status of the bus like arrival, departure. In Virendra Patil[2], the old-style way of tracking the automobile using GPS. The GPS will give the Bus ' exact location and coordinates. The Arduino Uno sits on a bus. Each pair has four IR sensors fixed at the front and back doors of the bus. The IR sensors will count the number of passengers entering the bus and the number of passengers will also decrease when they leave the bus. All information collected by Arduino Uno will be reorganized on Cloud Server like location, number of passengers. In Paul Hamilton[3], The scheduling and tracking of buses will also rely heavily on the capabilities of ICT To represent the various actual events happening in the field of bus and commuter activity in real-time, and to promote the prevention of common issues arising from both the volatile nature of the factors associated.

Manuscript received on May 25, 2020.
Revised Manuscript received on June 29, 2020.
Manuscript published on July 30, 2020.
***** Correspondence Author
Anitha.T, UG Assistant Professor, Department of Electronics and Instrumentation Engineering, Sri Ramakrishna Engineering College, Coimbatore, India. E-mail: anithacie@srec.ac.in.
Madhu Mitha .R, UG Student, Department of Electronics and Instrumentation Engineering,Sri Ramakrishna Engineering College, Coimbatore, India. E-mail:madhumitha.1606026@srec.ac.in.
Priyanka.T, UG Student, Department of Electronics and Instrumentation Engineering,Sri Ramakrishna Engineering College, Coimbatore, India E-mail:priyanka.1606037@srec.ac.in.
Sanchya.V, UG Student, Department of Electronics and Instrumentation Engineering,Sri Ramakrishna Engineering College, Coimbatore, India. E-mail:sanchya.1606043@srec.ac.in.
Saranya.S, UG Student, Department of Electronics and Instrumentation Engineering, Sri Ramakrishna Engineering College, Coimbatore, India E-mail:saranya.1606045@srec.ac.in.

Through ICT enabling connectivity through telephone wires and wireless / mobile signals, the infrastructure of vehicles, pedestrians and points of reference like bus stops and traffic signals will be expanded and universal, as the capacity to operate would carry and be able to manage as much territory as the current telecommunications systems. It encourages a clearer picture of the current world in which monitoring and scheduling can take place. With the increasing use of cellular phones, landlines and even the inclusion of cable television, sending messages within the network will be practically trouble free. Should there be no network for landline or cable television, cell phone towers (base stations) or GPS satellites may take over the role of relaying messages. With a message being sent whenever a bus is registered and a commuter key is entered, an almost immediate notification of that event is sent to the corresponding recipient and depending on the processing status related to the mess is given. Nivita. N[4],This system is based on the ticketing qualifications for bus passengers in public transport. A lot of passengers have more uncertainty about tariffs and that leads to corruption. The system will automatically accept passengers at a rate based on the distance traveled. This system uses RFID and GPS for purchases, which makes it very easy to fly. Shortcomings like system only provide automated ticketing conveniences that don't provide monitoring of the bus. And there's also no institution for calculating crowds (density). This system does not have any kind of user application for passengers to monitor the bus and display the bus schedule[3]. The process and the findings from its submission to Porto bus service information. The records relate to an AFC system combined with an automatic vehicle location system that provides transaction data for each passenger boarding a bus, with track, vehicle and travel card features used, along with the time and location of the journey[4]. Tracking systems are hardly existing on the marketplace, and the presented systems are not suitable, and costly are successful systems. The aforementioned system is much cheaper than further systems already in the shop This suggested system helps to get college bus data and location through mobile or smart phone use. But in this system, we've got various lagging points; there's only tracking facility. Such tracking is based on SMS only. There is no actual time view of bus position and there is no mobile-based application for tracking as well.

III. BASIC BLOCKDIAGRAM OF SYSTEM

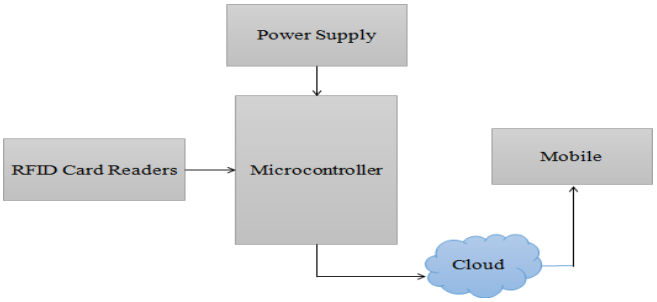

Fig. 1. Block Diagram for Bus

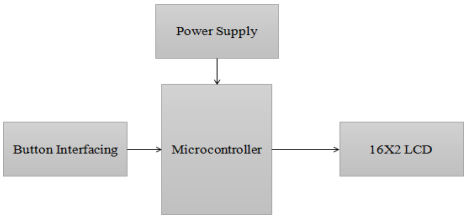

Fig. 2. Block Diagram for Bus Stop Module

The bus timing details, bus route and bus number can be viewed in the LCD display by pressing the button based system available in the bus stop.For counting the passengers in the bus RFID based technology is implemented. Smart card is used for automatic collection of fare established on the distance journeyed by the public or a person.

IV. HARDWARE DESCRIPTION

Gps (Global Positioning System)

The Global Positioning System (GPS) is a satellite navig ation system composed of 24 satellites or more. GPS works 24 houra day in all climate situations, anywhere in the worl d, with no subscription fees or setup costs. The GPS satellites twice daily circle the Earth in a precise orbit. That satellite converts a specific signal and angular parameter which allows decoding and calculating the precise location of the satellite by GPS devices. GPS receivers use this information and trilateralisation to determine a user's approximate location. The GPS receiver essentially calculates the range to each satellite by how long it takes to acquire a transmitted signal. The receiver can determine and reveal the position of a consumer using distance measurements from a few other satellites. A GPS receiver has to be locked on to the signal of at least 3 satellites to calculate your 2-D position (latitude and longitude) and track motion. The receiver can determine your position in 3-D (latitude, longitude and altitude) with 4 or more satellites in view. A GPS receiver can usually monitor 8 or more satellites, but that depends on the time of day and where you are on Earth. When your location has been calculated, the GPS unit will measure other information, such a

1. Rapid
2. Contour
3. Stretch
4. Excursion dist
5. Distance to travel

LCD (Liquid Crystal Display)

Fig.3. Liquid Crystal Display

In most embedded projects, LCD modules are commonly used vey, the reason being their cheap price, availability and programmer friendly. Most people in our day-to-day life would have encountered these displays, either at PCO's or calculators.

The looks and therefore the pinouts have already been visualized above allow us to get a technical touch.162 LCD is known as this because; it's 16 Columns and a couple of Rows. There are tons of combinations available, such as 8, 8, 82, 102, 161, etc., but the most frequently used is the 162 LCD. So, 0it'll have a total of 32 characters (16idd2=32) and each character will be made from 5pixel dots. one character with all its Pixels is shown within the below picture.

4.4 ARDUINO

Arduino Uno is an open source microcontroller board pro duced by Arduino and based on the ATmega328P Microcon troller. The board is fitted with sets of computerized and basic info / yield (I / O) sticks which could be interfaced with various extension sheets (shields) and other circuits. The board has 14 advanced I / O pins (six fitted for PWM yield), 6 basic I / O sticks, and can be programmed with the Arduino IDE (Integrated Development Environment) using a type B USB cable.[4] It can be powered by a USB connection or by an external9-volt battery, but it recognizes voltages of 7 and 20 volts anywhere. It is like the Arduino Nano and Leonardo, in turn.

The design of the reference equipment is licensed under a Creative Commons Attribution ShareAlike 2.5 license and is available on the Arduino website.The device format and manufacturing documents are equally accessible for certain versions.

4.3 NodeMCU

NodeMCU is a minimally effortless open source IoT level. Initially, it included firmware running on the Espressif Systems ESP8266 Wi-Fi SoC and the ESP-12 module-based equipment.Thereafter support was incorporated for the ESP32 32-piece MCU. As Arduino.cc began to create nascent MCU sheets predicated on non-AVR processors such as the ARM / SAM MCU and used in the Arduino Due, they expected to change the Arduino IDE with the goal that it would be moderately easy to transmute the IDE to reinforce interchange tool chains to allow Arduino C / C++ to accumulate for those nascent processors. They did this with the Board Manager's exordium and with the SAM Core. A “Center" is the programming segment hoard required by the Board Manager and the Arduino IDE to accumulate an Arduino C / C++ source record for the machine language of the objective MCU. NodeMCU provides access to the GPIO (General Purport Input / Output), and a pin mapping table is a documentation segment of the API.

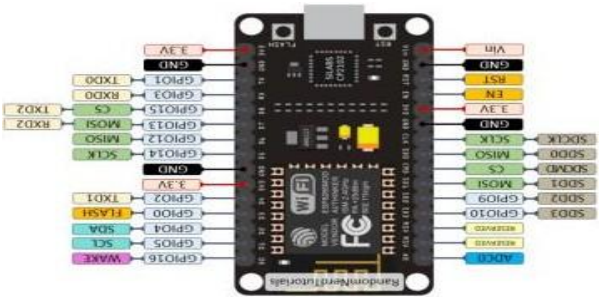

Fig. 4. Node MCU

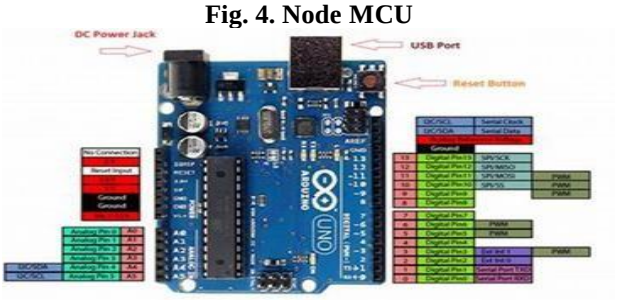

Fig.5. Arduino

RFID

RFID is abbreviation of Radio Frequency Identification. RFID refers to diminutive electronic artifacts consisting of a diminutive chip and antenna. This tiny chip has the competence to accumulate about 2000 bytes of data or information. RFID contrivances is used as a bar code overlay or a magnetic divest described at the back of an ATM card or a credit card, giving each item a unique identification code. And like the magnetic divest or bar code, it is also necessary to scan RFID contrivances to get the details (identification information).

A fundamental advantage of RFID contracts above other verbally expressed contracts is that RFID contracting is a fundamental advantage of RFID contracts above other verbally expressed contracts is that RFID contracting is not necessary. The scanner or RFID code reader should be placed exactly nearby. As we are all well aware of the arduousness that billers face when checking bar codes, it is important to swip credit cards and ATM cards. RFID contrivance can work from scanner machine a few feet away (approx. 20 feet for high frequency contrivances).

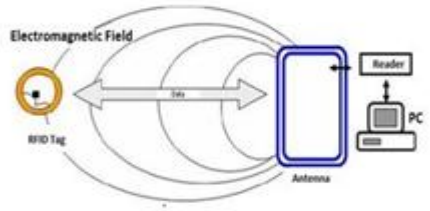

Fig.6. RFID

RFID reader

This unit is used as system authenticator. The reader input is an RFID card. The reader decodes the serial number of the card, and if the no matches the code, it gives us the authentication to run the system until the system does not start. A LED is mounted to glow, to make the authentication visible.

Fig. 7. RFID reader EM-18

V. SOFTWARE DESCRIPTION

5.1 MQTT DASH

Cloud MQTT are overseen Mosquitto servers inside the cloud. Mosquito actualizes the MQ Telemetry Convey convention, MQTT, which gives lightweight strategies for culminating informing utilizing a distribute/buy in message queuing mode. It is an app that can be downloaded then first we give the name it is an smart bus .Then there is an plus symbol on right side by clicking that there is an various function that can be displayed like person status, latitude, longitude and person count. The RFID reader reads after the app will display an person count ,latitude ,longitude and person
count.

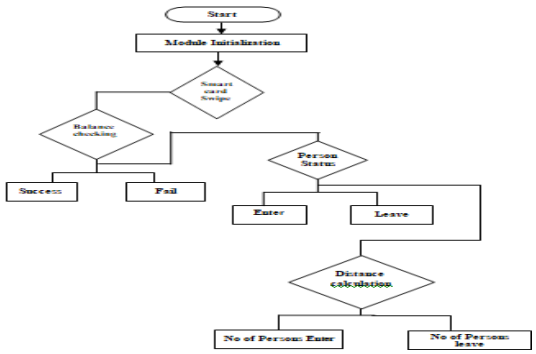

Fig.8. Flow Diagram of Mobile Application

VI. CONCLUSION

This paper is based on the RFID technology and a mobile application. From this technology , the passenger can travel in smart way. The application made easy to calculate the number of persons in the bus and also collects the bus fare Without the help of manpower.

ACKNOWLEDGMENT

This project was supported and carried out at Department of Electronics and Instrumentation Engineering, Sri Ramakrishna Engineering College, Coimbatore. We would like to thank our Management, Principal, faculty members and students for supporting us with the infrastructure to carry out the project work.

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AUTHORS PROFILE

Anitha T has completed her B.E in Electronics and Instrumentation Engineering from M.Kumarasamy College of Engineering in the year 2010 and her Post Graduate degree in Control and Instrumentation Engineering from Anna University, Regional centre Coimbatore in the year 2012. She started her carreer as an Assistant Professor in Karpagam College of Engineering from June 2012 and joined at Sri Ramakrisha Engineering College in 2013 as Assistant Professor. Presently she has three years of working experience.She has published papers in many National conferences and International Journals. She is a life member of Instrumentation Society of India (ISOI). She has attended workshops and faculty development programmes related to her field. She has actively played a role as coordinator for conducting workshop and seminars in the Department. Her areas of interest are Industrial instrumentation and process control.

Madhumitha R Currently pursing UG degree in Sri Ramakrishna Engineering college in department of Electronics and Instrumentation engineering and active member of ISOI, EDC, AIENSTEINS, ISTE.

Priyanka T Currently pursing UG degree in Sri Ramakrishna Engineering college in department of Electronics and Instrumentation engineering and active member of ISOI, EDC, AIENSTEINS, ISTE..

Sanchya V Currently pursing UG degree in Sri Ramakrishna Engineering college in department of Electronics and Instrumentation engineering and active member of ISOI, EDC, AIENSTEINS, ISTE.

Saranya S Currently pursing UG degree in Sri Ramakrishna Engineering college in department of Electronics and Instrumentation engineering and active member of ISOI, EDC, AIENSTEINS, ISTE