BUS ATTENDANCE SYSTEM USING NODEMCU, WI – FI

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Abstract

Time and efficiency are a matter of priority of present day. The improper management at bus terminals and at toll gates leads to high level of waiting time, fuel consumption and pollution levels too. In this project we use wireless fidelity technology. The functional part of this project is considered to be of two parts. First part is at bus terminals where the buses information will be read by the WIFI Module placed at entry and exit points of bus station. The read information is send to the control room wirelessly and the same information is available in the cloud for authorized users. This functionality is new and not implemented yet at any bus station. The second part is at tollgate where the buses information will be read by the WIFI Module and segregate into individual depot buses and the same will be sending to corresponding depot manager along with amount payable information. This functionality is a modified version of current existing "WIFI toll gate collection" with the inclusion of IoT. We are planning to place a WIFI Module for every vehicle & each tag is equipped with information like vehicle number, service route number, vehicle belongs to which depot, source and destination points. WIFI Module will be placed at the entry, exit gates of bus terminals and toll plazas. Whenever the vehicle enters or exits the terminals, the module reads the information. The source and destination depots and service number are stored in cloud the same data was provided to the users and depot manager along with date, entering time and exit time of vehicle. Similarly, whenever the vehicle enters into the toll gates WIFI module reads information from the tag. Collected data was available in the cloud for further analysis the same information will be sent to respective depot manager so that they can pay the total amount through online transaction and this information is secured.

Index Terms— *Vehicle logging, Wi – Fi, HTTP Protocol*

I. INTRODUCTION

Time and efficiency are a matter of priority of present day. In India over 90% of the population, the mode of transport rely upon public transportation. Due to this social significance, urban bus transport is often owned and Operated by public agencies, and many Indian states government has their own fleet of buses which are run under their State Road Transport Corporation (RTC). These corporations have proven extremely useful in connecting villages and towns across the country. The improper management at bus terminals and at toll gates leads to high level of waiting time, fuel consumption and pollution levels too. Even today at bus terminals, the vehicle information is logged manually either by the driver or by the conductor. It involves a lot of manual effort, leads to wastage of travel time and gives inconvenience to passengers. Still there are many solutions available for this problem but in very few places the work around solutions are implemented till date.

Advantages of Vehicle Logging

- Automatic entries of vehicle information at bus terminals.
- Reduces the manual effort.
- Real – time vehicle information to

the user.

- Reduces the traffic congestion at rush hours.
- Encourage digital transactions.

Problem Definition

The major problem identified in bus terminals is still the manual entry of the vehicle by the driver. Due to the manual intervention of vehicle data logging, pretty much inconvenience to the passengers and also leads to fewer time delay. And in extension long waiting time for the next stop passengers because they don't know the bus arrivaltimings in accurate. And at the toll gates, payment of toll tax through cash mode. In affect of this, more time is wasted in executing the process, which leads to piling up of vehicles at toll gate.

Proposed System Feature

The above mentioned problems are solved using a common device setup. The components used in this system are:

- Node MCU (ESP8266 – 12E)
- MFRC522 (WIFI)
- Mifare 1Kb Tag (WIFI Tag)
- Arduino Uno R3
- Wiznet W5100 (Ethernet Shield)
- 16 X 2 LCD
- REES52 (I2C interface module)

SYSTEM DESIGN AND IMPLEMENTATION

Existing

There are two systems which exist currently. One is automation of public transportation vehicle using WIFI and ZigBee. Another one is automated toll collection system using RFID. In both the systems, WIFI is used.

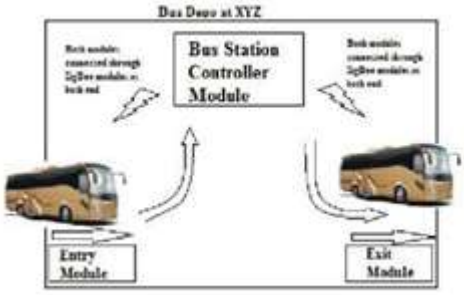

Fig 1: Existing system block diagram

In the former system the information is sent to the controller via ZigBee network. The limitations in both the systems are, these systems are localized systems where the information cannot be sent to internet. This information is stored locally where it can't be accessed by any other person.

Limitations:

- Using ZigBee network which may be interfered with high frequency radiation leads to data loss.
- Using of GSM network which is unreliable based on network availability.
- WIFI tag used need acceptance from RTO and other government authorities.
- Security issues related to payment and data available for authorized users

Proposed

Here in this system, the above mentioned systems are combined and made as a single system. Both the functionalities are achieved using same system setup. In this project we used IoT and WIFI technology. The functional part of this project is considered to be of two parts. First part is at bus

terminals where the buses information will be read by the WIFI modules placed at entry and exit points of bus station. The read information is send to the control room wirelessly and the same information is available in the cloud for authorized users. This functionality is new and not implemented yet at any bus station. The second part is at tollgate where the buses information will be read by the WIFI and segregate into individual depot buses and the same will be sending to corresponding depot manager along with amount payable information. This functionality is a modified version of current existing "WIFI toll gate collection" with the inclusion of IoT.

We are planning to place a WIFI tag for every vehicle & each tag is equipped with information like vehicle number, service route number, vehicle belongs to which depot, source and destination points. WIFI modules will be placed at the entry, exit gates of bus terminals and toll plazas. Whenever the SRTC vehicle enters or exits the terminals, the module reads the information. The source and destination depots and service number are stored in cloud the same data was provided to the users and depot manager along with date, is read by WIFI module and sends the information with date and time to the control room again acts as a client.

Similarly, whenever the vehicle enters into the toll gates WIFI module reads information from the tag. Collected data was available in the cloud for further analysis the same information will be sent to respective depot manager so that they can pay the total amount through online transaction and this information is secured.

entering time and exiting vehicle time.

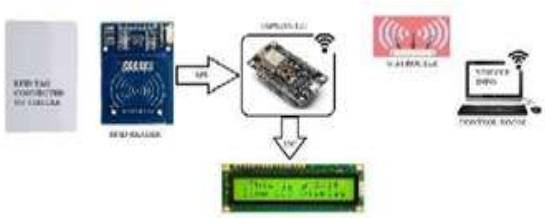

Fig 2: System architecture at bus terminal

At bus terminals:

Mifare 1Kb tags written with predefined vehicle information like Service No., Source and Destination points, Vehicle No. and Depot Name are attached to the buses. Whenever these buses are entering into the bus terminals, WIFI module which is placed at entry gate will read the bus information which is stored in tags and sends this information to the control room using Wi-Fi. The WIFI module is interfaced to Node MCU (ESP8266 – 112E) having an inbuilt Wi-Fi module acts as server. The bus information which is read from the tags along with date and time will be sending to control room which acts as client. By using the same hardware setup at exit gate when the bus leaves the bus terminal, the bus information

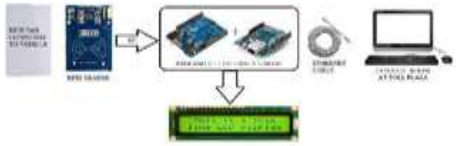

Fig 3: System architecture at toll gate

At Toll gates:

Whenever any bus come closer to the toll plaza, WIFI module is placed on the roof of the plaza where it reads the WIFI tag. Then this information is stored in the local database or on the SD card. This

information is sent via Ethernet cable to the local system which acts as client. Thereafter it will be segregated in terms of depot names and sent across internet to the concerned depot managers. This information is secured in internet. Along with this the information is displayed on LCD.

The bus information which is read from the tags along with date and time will be sending to control room which acts as client. By using the same hardware setup at exit gate when the bus leaves the bus terminal, the bus information is read by WIFI module and sends the information with date and time to the control room again acts as a client.

SOFTWARE DESIGN

Arduino IDE corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor.

The Arduino Integrated Development Environment - or Arduino Software (IDE). It contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. For communicating and for uploading the programs IDE is connected through an USB cable to the Arduino and Genuino hardware. The code or program written for Arduino IDE is called **SKETCH**. These sketches are written in the text editor and are saved with the file extension (.ino). We can even do the modification of the sketch by cutting/pasting and for searching/replacing text in the editor window. In the message area, it provides feedback while saving and exporting and also displays errors and warnings. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom right hand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor.

Installing the ESP8266 Board

To install the ESP8266 board in your Arduino IDE, follow these next instructions:

1) Open the preferences window from the Arduino IDE. Go to File > Preferences
2) Enter http://arduino.esp8266.com/stable/package_esp8266com_i ndex.json into Additional Board Manager URLs field and CLICK the OK button
3) Open boards manager. Go to Tools > Board > Boards Manager…
4) Scroll down, select the ESP8266 board menu and install "esp8266 platform"
5) Choose your ESP8266 board from Tools > Board > Generic ESP8266 Module
6) finally, re-open your Arduino IDE

Implementation Setup

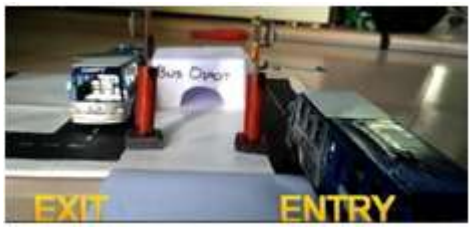

Fig 4: Vehicles at entry and exit gates of bus terminal

Figure 4 explains the bus entry and exit at the bus terminal. The process flow of the system is explained in the flow chart. Initially bus enters or exits the terminal WIFI module reads the information from WIFI tag which is attached to the bus. The read information is sent to the control room using Wi – Fi. Then the filtered information is sent to the next bus terminal as well as to the authorised user.

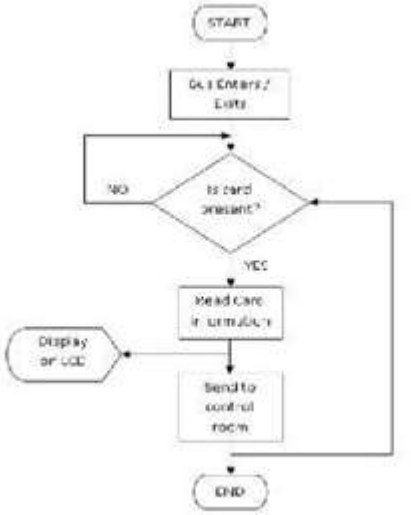

Fig 5: Functional flow chart at bus terminal

At the toll gate, the WIFI module reads the information from tag which is attached to bus. The read information is stored in the local database connected to a system using Ethernet cable. Then the information is sent to bus depot along with the billing details. This improves the transparency in governance and encourages digital transactions.

Fig 6: Vehicle at Toll gate

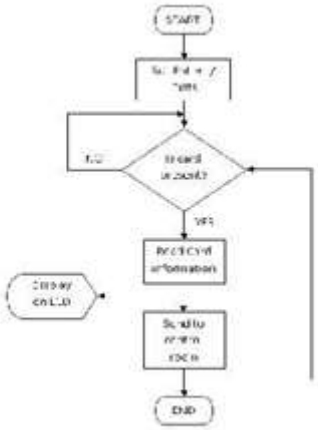

Fig 7: Functional flow chart at bus terminal

RESULTS

In the figure above shows the complete project setup, where you can observe the WIFI modules are installed at entry and exit gates of the bus terminal and at the toll gate.

Fig 8: **Full hardware setup of the project**

The read information is displayed on the serial terminal for internal debugging

purpose and also displayed on the LCD for better user experience.

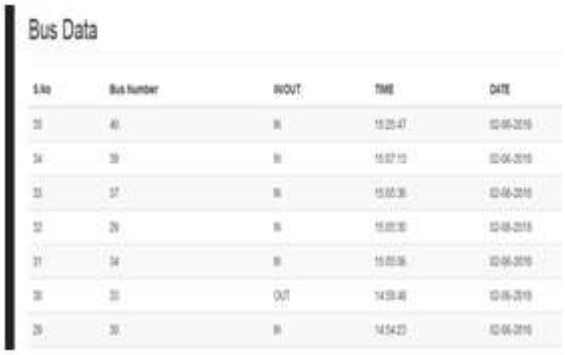

Fig 9: **Bus Data display on LCD screen**

Conclusion

In conclusion, we hope that this project can successful be acceptable and complete soon as possible and follow the schedule. By the research that has been done it is good enough for improvement all part this project. Real – time vehicle logging is used to avoid the human intervention in recording the vehicle information.

Future work

At present we are sending the information to the local database, whereas you can extend this by sending it to cloud and store as much data as you can. And in future perspective the data can be used for analytics.

ACKNOWLEDGMENT

We acknowledge the efforts and hard work by the experts who have contributed towards development of the different solutions for vehicle logging and for toll gate collection systems. We also acknowledge the timely advice of our beloved professors for their constant support, suggestions and modifications to improve the quality of the paper and to help in preparing the camera ready copy of my paper.

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