

# Smart Bus Management and Tracking System

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**Abstract**— Our nation is on path to become a super power soon, and to be a one finest nation, things need to be in proper order. To initiate this idea we need to begin from the public services, and first comes the public transport services. Since ages public transport isn't performing well. So this system proposes a prototype to develop a real time system which is capable of monitoring the arrival, departure timings and bus data at every bus junctions. This system can be implemented using the RFID along with the GSM Module. RFID will help to fetch data of particular bus and will save it at respective Bus stops. RFID is used, because of its uniqueness and compatibility with most of the trending technologies.

**Keywords**— RFID Tag, RFID Reader, GPS, public Transport.

## I. INTRODUCTION

In the present progressing world, the embedded system plays a major role in the real time system. IOT is the connected system with various smart devices which gives featured experiences to public consumers all over the world by affordable costs. The smart connected IOT solution provides safety, two-way communication between devices. This system establishes a real-time bus terminal automation system with the use of Radio-Frequency Identification (RFID) by deploying suitable hardware at every possible stop between source and destination. The hardware is capable of tracking each registered bus in area crossing at the stops, which contains an RFID tag. Bus information taken care with RFID and current location taken care with GPS. The system of hardware, if installed, they can record real-time arrival and departure time of buses. The system can reduce efforts of conductor who is appointing for that bus. The data is to divide and distribute the various bus stations to alternate paths, for the get good result out of it. This system provides accurate and true entries of buses. With the development of systematic public transport, This prototype allow for a more efficient system that saves time providing a simpler automatic device.

## II. LITERATURE SURVEY

A literature survey was started to understand the need for atomization of bus station. As mention in [1] this paper proposed a flexible system offering a suitable student bus tracking for awareness about the buses and get notification to their parents and respective institute. It provide real time information about various specification of buses like location, route, speed, number of students.

From the proposal of the author [2], the bus transportation and management system with the integrated system contain the cellular network and GPS which is used in public transportation. This system contains various modules. The bus stop module which contains the RFID tag and also bus module contains RFID reader. This modules have GPS and GSM. It is integrated system which contains the elemental network and Global Positioning System. This is used in public transport.

In [5] a system which offers aims to provide real time bus tracking and display of the estimated time of arrival of buses at various stops. Currently, when a person has no way of knowing at what time their expected bus will arrive at their stop. He has to wait till the bus arrives, and if it had just left, has to wait till another one arrives. A solution to this is proposed here, with the help of RFID technology.

### III. METHODOLOGY

#### A. Technology used:

##### 1] RFID technology -

RFID stands for radio frequency identification. RFID tags are small chips that are used in our day to day life for unlocking hotel rooms, entering into cars etc. This tiny chip along with an RFID reader forms the RFID system. An RFID system consists of two parts 1) RFID Reader 2) RFID Tag.

##### 1) RFID reader:

The RFID reader has a radio transmitter and receiver within. The reader transmits radio frequency signals incessantly upon powering. It is also called as an interrogator. When an RFID tag is placed within the range area of a reader, it energizes the tag through electromagnetic induction and collects the data from it. Data is stored in the RFID tag electronically. Tags can store only a few kilo bytes of data. This data is retrieved by the reader using electromagnetic waves.

##### 2) RFID tag:

The image given below is that of an RFID tag (smart card shaped tag). RFID tags are available in different types of shapes and sizes. The Tag contains an IC for storing the information, an antenna for transmitting and receiving, and also a modulator. Tags are small in size and they can hold only few bits of data. The operation of an reader is very much similar to barcode scanning method which uses Universal Product Codes (UPC) codes. In some applications, RFID Tag and Reader has advantages over the barcode system.

Types of RFID Tag:

1. Passive
2. Active

1. Passive:

Passive tags are activated only when it receives a signal from the reader. This signal activates the internal IC of the tag through the antenna. Thus the tag sends required data which is stored in it to the reader. Any external battery are not use by these tags. Using the power they are powered up from RFID reader. The data in these tags is pre written. One cannot change the information in these tags.

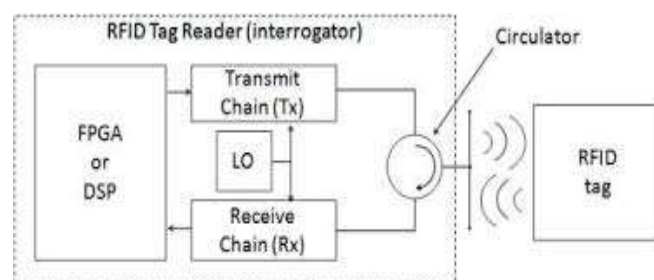


Fig. 1. Working of RFID

These tags are generally used for applications such as race timing, file tracking etc. There are three main frequencies at which RFID tags are can used.

They are:

1. Low frequency (125-134 kHz): At this frequency level, range of the reader up to which it can read from the tag is very at short distance. It is about the 1-10 centimeters.

2. High Frequency (13.56 MHz): The range of RFID at this frequency level is 10 centimeter to 1 meter. This frequency can be used in applications where short range is sufficient such as passport Larger UHF tags can read up to 30+meters. Such UHF tags can be used in applications such as IT assets tracking, file tracking etc.
3. Very high Frequency (865-960MHz): The range of reader at the frequency is about 5 to 6 meters.

### 2] Arduino:

Arduino Uno is a microcontroller board which is an open-source electronics platform mainly based on AVR microcontroller. It allows the designers to control and sense the external electronic devices in the real world It has 14 digital input/output pins, 6 analog inputs, a 16 MHz quartz crystal, a USB connection, an ICSP header and a reset button, a power jack.

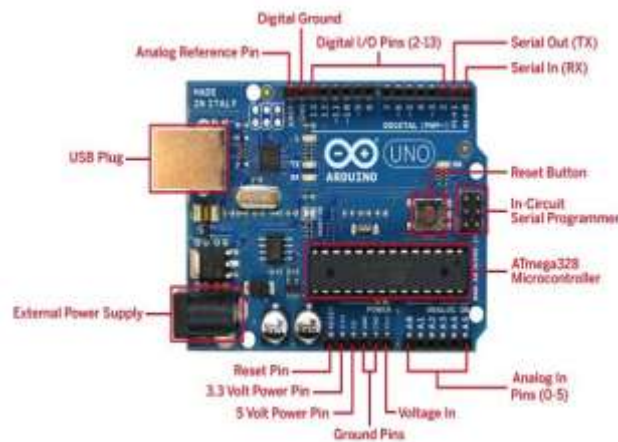


Fig. 2.Arduino

### 3] GPS Module:

GPS is the system for calculating positions from the signal sent by a network of the satellites. Continuously monitoring the bus by reading parameters like the speed, the route and the geographic location in real time which is uploaded to the server by the microcontroller and viewed through a mobile application.



Fig. 3.GPS Module

**B. Software Specification:**

In this prototype, the front end development is done using Java, JSP in eclipse IDE and in eclipse IDE where the web application is built. For Hardware functionality raspberry pi is used. The backend database is develop using MySQL server of XAMP.

**C. Implementation:**

We have two sections: 1.Admin login 2. Stationmaster login. Admin module consist of add bus detail and stationmaster details, view bus details. Stationmaster module consist of view bus at the particular bus stop. The work flow of proposed framework is implemented as follows:

When the application starts, the station master & admin authentication takes place.

Admin module consists of various operations like add bus, add station master & admin can view bus information and view station master details. In station master module they can view bus type, bus number, arrival and departure time current location of bus & stops between source and destination

When bus arrives at bus station, the tag get scanned by RFID reader of respective bus along with that it will also keep tracking bus location using GPS, this data communicate with communication server & update the entries in the database.

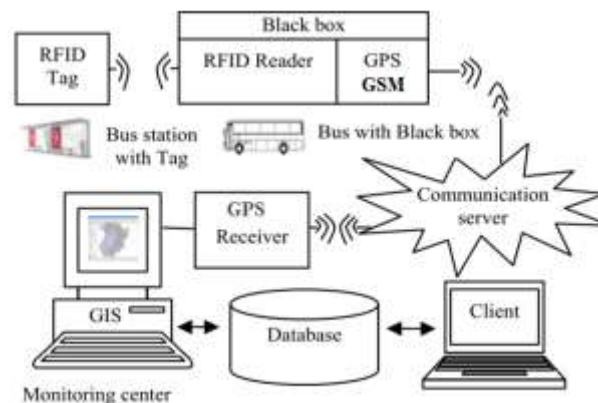
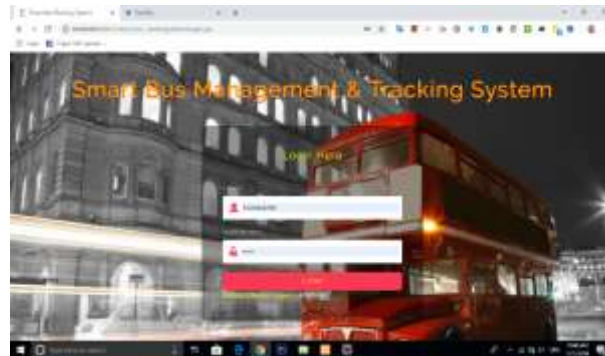


Fig. 4.Flow of Proposed System

RFID works as a combination of reader, which can read unique id, and other information from tag readers can be passive RFID systems where the reader and the reader antenna send a radio signal to the tag, and tag then uses the transmitted signal to power on, and reflects energy back to the reader.

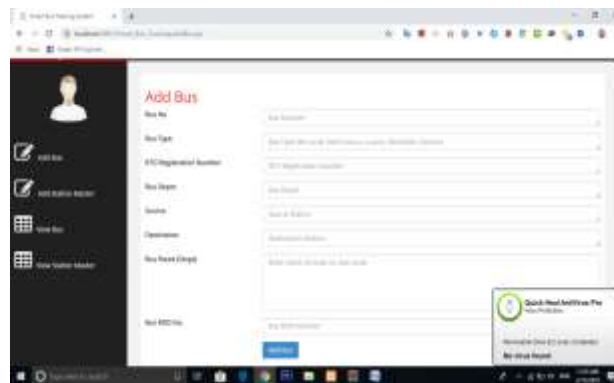
**D. Implementation details:****1) Login Module :**

The first web interface allow user to login as Admin while the second one allows to login as station master.



2) **Admin Module:**

Admin can manage add bus, add station master operation also can view bus information and view station master details.



3) **Station Master Login:**

In Station Master login module, station master can view Bus type, Bus number, conductor id number Source and Destination of bus, stops between the source and destination, Arrival and Departure time, current location of bus.



**IV. ADVANTAGES**

1. **Real Time Information:** This helps to know where the particular bus is and monitor timings.
2. **Communication:** Two way communication is a part of the software , and allows the admin to get in touch with bus driver or bus conductor in case of any anomalies.
3. **Improved Accuracy:** The real time information provided by GPS system is saved. This information can be used to improve your map data, your routes and planning in future.

4. RFID Tags can be integrated with sensors and GPS technology to provide asset condition data, in addition to location information.
5. Enhanced productivity because assets can be located almost instantaneously and most assets management task can be made efficient using RFID.

## V. EXPECTED RESULT

The System gives output in the form of bus details which includes information about bus routes, bus arrival and departure timings, locations. Moreover, in cases like if bus fail to complete its journey due to certain circumstances like failure in the mechanism, the bus depot will be notified automatically.

## VI. CONCLUSION

This paper gives brief idea of interfacing RFID Tags and Readers with Arduino. The proposed system will help MSRTC to create a transparent system. This System replaces the traditional system of maintaining bus data at Bus Station. This system is cost effective and works as real time application. The main objective is to contribute in public transportation.

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