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An Effective Approach to Combine GPS, GSM and RFID for Door Opening and Tracking of Public Transport Vehicles

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ABSTRACT*:* Many intelligent traffic control systems have been implemented before. But still public transport vehicles e.g. buses do stop at the positions they shouldn't, which creates traffic stagnancy. In this paper, we propose to use UHF RFID along with GPS and GSM module to make the door opening mechanism automated, so that the bus door doesn't open unless the bus is stopping at the proper place and also it's route and speed can be monitored.

KEYWORDS: Automated door, UHF RFID, GPS and GSM, route and speed monitoring.

I.INTRODUCTION

The current scenario in traffic is that people tend to stand along the road before the stoppage to board the buses soon, so the buses stop even before they reach the stoppage to get those passengers. This blocks the entire path specially near circles. So the plan was not to allow the buses to open the doors until they reach the exact point. So we propose to use RFID. One of the major purposes of using RFID is because of its ease of use. The RFID tags are easily sensed when it comes near to the antenna.

II.RFID

Radio-Frequency IDentification (RFID) uses electromagnetic fields to automatically identify and track tags attached to objects. The tags contain electronically stored information. RFID is one method for Automatic Identification and DataCapture (AIDC). RFID tags are used in many industries, for example, an RFID tag attached to an automobile during production can be used to track its progress through the assembly line; RFID-tagged pharmaceuticals can be tracked through warehouses; and implanting RFID microchips in livestock and pets allows positive identification of animals.RFID systems can be broken down by the frequency band within which they operate: low frequency, high frequency, and ultra-high frequency. There are also two broad categories of RFID systems- passive and active. Passive tags collect energy from a nearby RFID reader's interrogating radio waves. Active tags have a local power source such as a battery and may operate at hundreds of meters from the RFID reader.In Fig.1, we show a basic RFID device.

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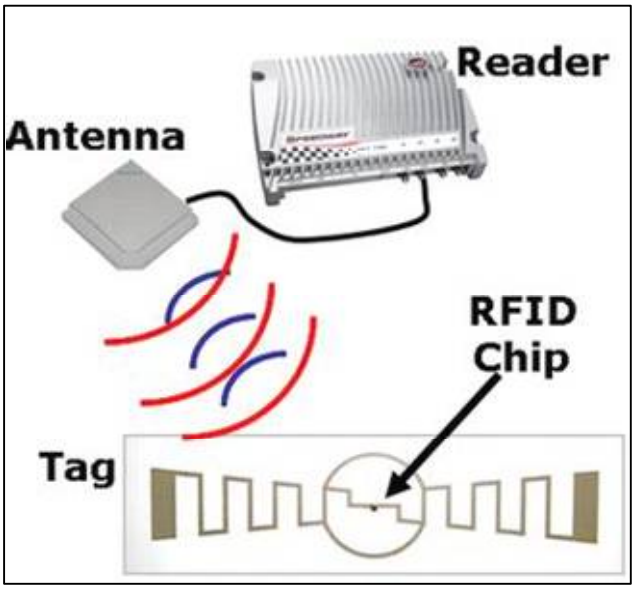

Fig.1: Basic RFID

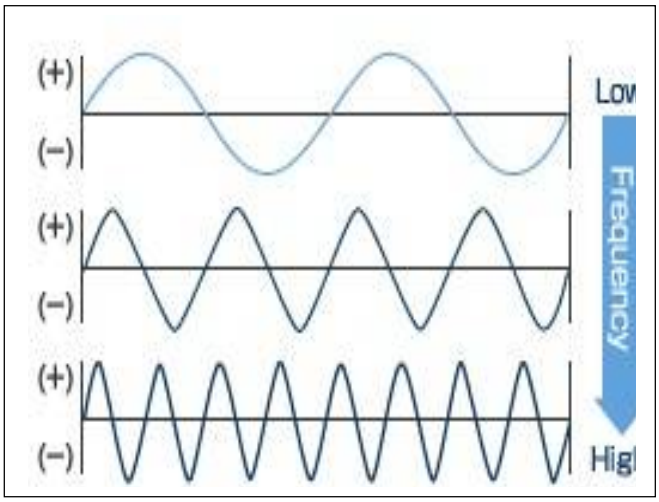

Fig. 2: Time domain representation of different frequency levels

In Fig. 2, we show how the graph looks like for Low Frequency, High Frequency and Ultra High Frequency respectively in time domain.

III.HOW RFID WORKS

A Radio-Frequency IDentification system has three parts:

- A scanning antenna
- A transceiver with a decoder to interpret the data
- A transponder - the RFID tag - that has been programmed with information.

The scanning antenna puts out radio-frequency signals in a relatively short range. The RF radiation does two things:

- It provides a means of communicating with the transponder (the RFID tag) AND
- It provides the RFID tag with the energy to communicate (in the case of passive RFID tags).

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This is an absolutely key part of the technology; RFID tags do not need to contain batteries, and can therefore remain usable for very long periods of time (maybe decades).
When an RFID tag passes through the field of the scanning antenna, it detects the activation signal from the antenna. That "wakes up" the RFID chip, and it transmits the information on its microchip to be picked up by the scanning antenna. In Fig. 3, how a basic RFID works is shown.

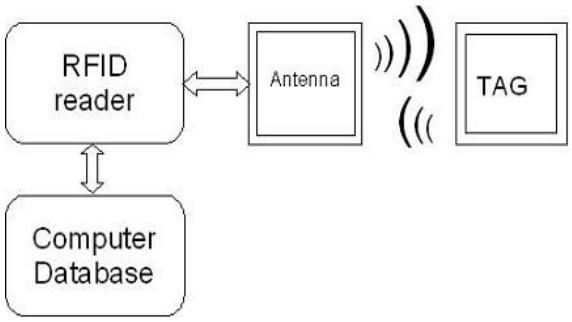
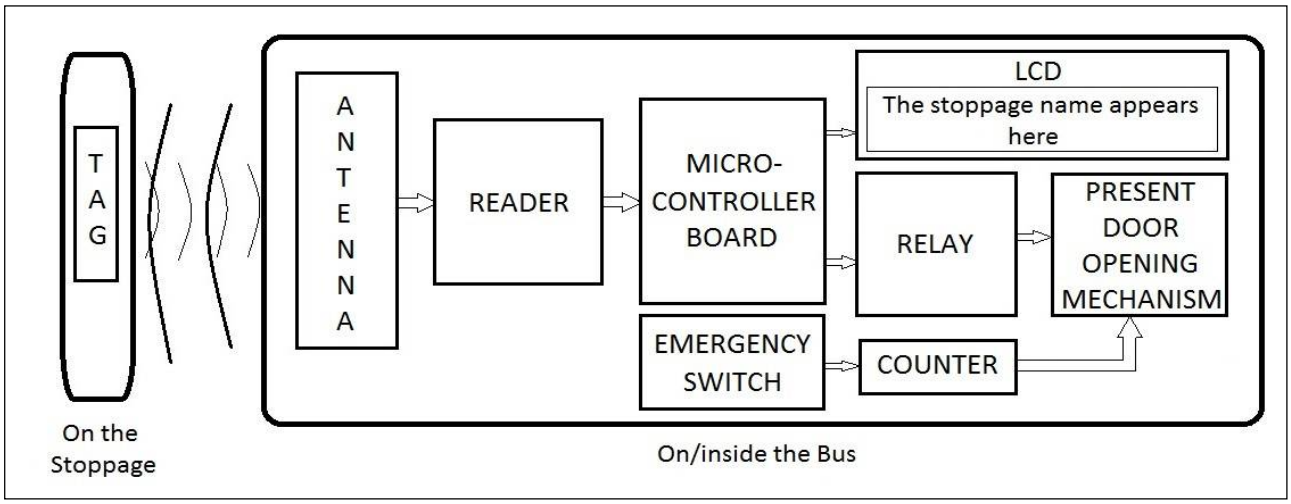


Fig. 3: Block diagram of working of RFID

IV.SYSTEM MODEL

According to our proposal, the passive UHF RFID tag, i.e. the passive RFID tag operated in Ultra High Frequency, is placed on the bus stoppage and the ID of the tag is mapped to the name of the stoppage. The antenna is placed on the bus at the side where the gate is, facing the stoppage. The receiver of the antenna is connected to a micro-controller board. The board may be an Arduino board or a Raspberry pi board or a customized board made from Zero PCB. An LCD is attached to the board as well. The output of the board goes to a relay by which opening of the door can be controlled. Only when the bus stops near the stoppage, the tag is sensed, the name of the stoppage appears on the LCD and the relay is triggered to open the door. Anyhow, there will be an emergency switch to open the door in any case of emergency. There will also be a counter attached to the emergency switch to monitor any misuse of the switch. According to this paper, a GPS and a GSM module is interfaced in the micro-controller board to monitor the position and speed of the bus. We propose to use UHF for an effective distance between the stoppage and the bus.
Fig. 4 shows the block diagram of our proposed model.



place and not anywhere according to their will which is assumed to prevent the unnecessary man-made traffic stagnancy.

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VI.CORRECT STOPPAGE

As the IDs of the stoppages are mapped to the names of the stoppages, those appear on the LCD screen whenever the bus reaches the stoppages respectively. So it reduces the chance of people alighting the bus at any wrong stoppage.

VII.CONTINUOUS MONITORING

Using the GPS module, the exact position and the speed of the bus is found out and the GSM module helps the information to be sent to the control room or the station. So the bus can be monitored continuously. It reduces the chance of over speeding of the vehicle as well as going astray.

VIII.RESULT AND CONCLUSION

Thus it allows intelligent door controlling mechanism which is assumed to help the traffic control system. Moreover with the GPS and GSM module, the bus can be monitored continuously. Again the project can be modified to use real time synchronization of the GPS to get the traffic status of the area.

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