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Tracking And Scheduling of State Transport Bus using RFID

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Abstract *: This paper deals with the implementation of a system which is capable of tracking and scheduling of State Transport Bus.For this implementation we are using Radio Frequency Identification(RFID).Proposed system can save the efforts of depot staff to maintain the schedules also it can save paper ,in other words it is eco-friendly .The proposed system can inform depot managers and other staff members whether the bus is arriving on time ,early or late .Passengers can also checkout last bus depot visited by the respective bus.*

Keywords :RFID.

1. Introduction :

In Maharashtra for travelling across different cities people prefer State Transport Buses. This way of transportation is also very useful for people living in villages. But there are many issues related with State Transport buses like late arrival, poor maintenance of time table and many more. Every time conductor has to individually report to the respective bus depot this can consume passengers' precious time .At present every work should be done manually and because of this performance is degraded. This problem can be solved by using latest technologies like Radio Frequency Identification (RFID. Proposed system can resolve many issues like late arrival of buses can be solved by automatically maintaining time table also passengers can see the last bus depot visited by the respective bus.

2. RFID Technology:

Describes any system of identification wherein an electronic device that uses radio frequency or magnetic field variations to communicate with tagged items.

Figure 1: Basic Working of RFID

There are three basic components of RFID namely:

1. RFID Reader: sends an electromagnetic wave which carries a signal to identify objects. Then, the reader receives the information returned back by these objects.

2. RFID Tag: attached to these objects, reacts to receiving the signal sent by the reader in order to forwarding to it the requested information.

3. A Computer/Database: stores and processes information collected by the reader.

3. System Architecture:

Figure 2: System Architecture

Each bus is equipped with RFID tags. For entry and exit gates of bus depot there is separate RFID Reader which will read respective RFID tag and will provide details of tag to

the depots Admin office. Admin office will provide the entry and exit timings to the enquiry office present in depot premises and enquiry office will display schedule of each and every bus. Benefits of this system are less paper work because the schedule is automatically maintained and because of this bus conductor or driver doesn't need to go individually in the depot and tell the entry timing. Also this will save time of passengers which are waiting for bus

4. Modules Used:

In proposed system, there are two modules used namely:

1. Desktop Module: This module is used by Admin Office and Enquiry Office.

Admin Office: Admin Office can perform following functions:

1. Login
2. Add and Update Bus Details
3. Add and Update Staff Details
4. Assigning RFID Tag ID to buses

Enquiry Office: Enquiry staff can do following tasks:

1. Login
2. Giving bus details to passengers
3. Giving bus timing to passengers

2. Web Module: This module is helpful to the passengers in various ways. It gives buses details using:

1. Timings of Buses
2. Source and Destination
3. Bus Number

It gives depot wise time table and also the current bus location.

5. Therotical Framework:

The power level received by the tag determines the read/write range and identification range between the reader and tag as follows:

$$R \leq \frac{\lambda}{4\pi}\sqrt{\frac{EIRP_{reader}\ G_{tag}}{P_{tag}}}$$

Where, EIRP is the effective isotropic radiated power; Ptag is the power required at the tag antenna output, Gtag is the tag antenna gain, and λ is the free-space wavelength of the RF carrier.

the distance between the reader and the tag can be estimated as follows:

$$d_{x,0} = \frac{(f_x \times v_x \times p_x)}{(2 \times c_x)}$$

Where, dx,0 is the distance between the tag and reader x, fx is the frequency provided by reader x, vx is the wavelength of frequency provided by reader x, px is the period of time for tag detection and cx is the number of tag detections within a period of time.

6. Results:

As mentioned earlier , when buses enters or leaves the depot the reader will read the tag attached to the bus and further information will be provided to the depot . Following figure shows how the information is collected.

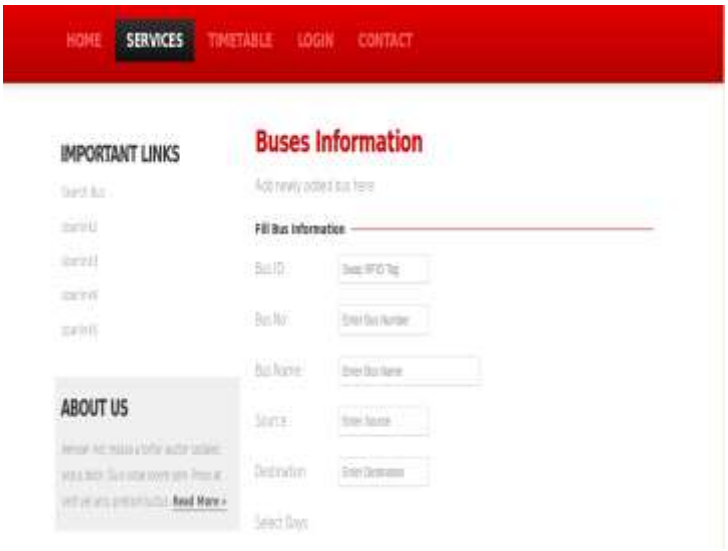

Figure 3: Buses Information collected by reader.

Another benefit of the system is that passengers can see the time table of the required bus using either bus number or source and destination. Following figure shows such aspect.

Figure 4: Bus Schedule Information

7. Benefits of the System:

1. Dynamically manages the time table.
2. Generate auto statistic report.
3. Automatically alert in case of any bus's late arrival

4. Waiting time at the bus depot will be reduced.
5. Enquiry officer as well as passengers can see exact position of a specific bus.

Conclusion: It is believed that by the implementation of this system, problems such as underutilization of buses fleet and long waiting time at the bus station will be reduced. So, both passenger and bus station administrators will benefit from the system as real time information are provided. The ability of the system to act on its own can reduce the manpower required at the monitoring center. Bus drivers will also be more punctual to the bus schedules that have been established, resulting in a more efficient bus circulation system.

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