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RFID Based College Bus Management System

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ABSTRACT: *The objective of this work is to implement an intelligent student bus monitoring system based on current challenges and problems that is determining the person who is getting into the bus, the time of getting into the bus and the place where he is getting into the bus provided for student bus management system. This entire system consists of Radio Frequency Identification (RFID), Global System for Mobile communication (GSM), Global Positioning system (GPS), Liquid Crystal Display (LCD) and the Microcontroller. The system consists of two main modules In-bus module and Base station module. When the person is about to get the bus, he has to swipe the RFID identity card, the RFID tag is read by the RFID reader in the In-bus module and the tag number is then sent to BASE-station via GSM. By using the signals from ATMEGA328 microcontroller, GSM modem is used to send appropriate RFID tag number to the BASE station. The microcontroller at the Base station searches for the received tag number at the Base station and links the related tag number data. An entry corresponding to the bus is created and entered into the new database at BASE station. This module is then stores the data in the XL sheet.*

key wods: ***GSM, RFID, LCD, GPS, BASE station, In-bus module, Microcontroller, Database.***

1. INTRODUCTION

This project consists of microcontroller, input section and output section. The input section consists of RFID reader, GSM, Microcontroller, GPS and LCD display. The output section consists of GSM, Microcontroller and information storage. .

RFID is a Radio frequency Identification technology that has been used in many fields including solid waste management, human, animal, goods and object tracking and the several researches proved that the implementation and monitoring the RFID is very easy and it increases the efficiency of the system at a low cost. An automatic system is a one which doesn't need any external instructions by human beings instead of it acts according to the situation automatically. A Radio Frequency Identification Reader (RFID reader) is a device which is used to collect the information from an RFID tag, by using Radio waves. RFID is a technology similar to barcodes and somewhat extent to it. RFID has more advantages when compared to barcodes. RFID tag identifies the tag within the range of 3 to 300 feet. RFID technology scans the objects very quickly and enables the particular product, even when it is surrounded by several other objects.

GSM uses the variation of Time Division Multiple Access (TDMA) and it is the mostly used of the three digital wireless telephony technologies those are TDMA, GSM and CDMA. GSM digitizes and compresses the data and then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 900MHz or 1800MHz frequency band.

ATMEGA328/P is a low power CMOS 8-bit Microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATMEGA328/p achieves throughputs close to 1MIPS per MHz.

1.1 RELATED WORK

The authors Komal Satish Agarwal et al proposed RFID Based Intelligent Bus Management and Monitoring System. They concluded that by implementing this system various problems like underutilization of bus fleet and long waiting time at the bus stops will be reduced. It can improve the quality of the public transportation service effectively [1].

The authors M.A.HANNAN et al, proposed the Intelligent Bus Monitoring and Management System. The experimental results show that the system is intelligent enough and able to provide important information to the authorities for monitoring and management of the bus system [2].

The authors Anuradha Vishwakarma et al, proposed GPS and RFID Based Intelligent Bus Tracking and Management System. In their proposed model they have developed AISFBRM- the autonomous informative services for bus route map that is flexible, affordable, customizable and accurate [3].

The authors Shital M.Dharrao et al, recommended the Intelligent Bus stand Monitoring and Control Using Combination of GSM,GPS& IR Sensors. The proposed system provides real time information to monitor bus stand activity done by bus stand management as well as prospective passenger. Proposed system is more efficient and cost effective, it is possible to implement commercially [4].

The authors Sunil Praneel et al, proposed Wireless Sensor Enabled Public Transportation System. The research focuses on the actual RFID hardware implementation such as the passive tags and the reader that is used to track the University Bus as it moves from one station to another station [5].

The authors Ben Ammar Hatem et al, suggested the Bus Management System Using RFID In WSN. In their proposed model, they concluded that it is expected that integration of RFID and WSN will provide new opportunities for applications related to the identification of object over a large area. Possible applications are parking solution, agriculture [6].

2. EXISTING SYSTEMS

Traditionally, RFID tags are designed for commercial applications to replace the barcodes for assetcounting and identification. A barcode is a visual representation of data that is scanned and interrupted for information. Radio Frequency Identification technology (RFID), involves a tag affixed to a product which identifies and tracks the product via radio waves.

Disadvantages of Barcodes:

1. Barcode scanner needs a direct line of sight to the barcode to be read.
2. The range of barcode reader is small, nearly 15feet.
3. Barcodes doesn't have read or write capabilities, they only contains the information of product and manufacturer.
4. Barcodes have less security, because they can be more easily reproduced or forged.
5. If the barcode is damaged, it doesn't supports the scanning.

Advantages of RFID:

1. Can read RFID tags from a greater distance than barcodes.
2. RFID tag doesn't need the line of sight with the scanner.
3. The read time of RFID tag can be very small when compared to barcodes. Approximately 40RFID tags can be read at the same time.
4. RFID tags can work within much greater distances information can be read from a tag at up to 300feet.
5. The data can be read or write into the RFID tags as they are read or write devices.

Initially, RFID systems are deployed for VANETs, in which RFID tags are installed in vehicles while RFID readers are deployed on stationary infrastructures. For example, in a typical Electronic Toll Collection (ETC) system, automatic toll RFID readers are installed at the gate. A RFID tag (attached to the E-Zpass on a vehicle) is read by the reader when a vehicle passes by the gateway. The toll system identifies the vehicle through the data obtained from the RFID tag and automatically charges to the vehicle's or driver's account.

The RFID is also used in Bus monitoring system based on GSM communication. The system consists of three modules, Bus module, Superstation module and Bus stop module. The microcontroller based bus module consists of mainly GSM modem and RFID reader on the entry and exit gates. When driver presses the ignition button, Bus module sends the bus number and licence plate number to super station and starts transmitting its location to superstation module about a particular bus location out of Bus stops. This entire system is interfaced to PCs to keep the track record of every bus, processes user request from Android mobile application about a particular bus location out of Bus stops and updates the buses location on the Bus stop's LCD display.

3. PROPOSED SYSTEM

In the proposed work the entire system consists of two modules, they are in-bus module and base station module. The in-bus module is fixed in the bus for which we want to know the place of the person getting into bus, time and name of the person who is getting into bus. Every person who is supposed to belong to that particular bus provide with a identity card which contain the information of that person. When the person is about to get bus, he has to swipe the identity card and has to get into the bus, when the person swipes the identity card, the RFID reader reads the identity card and sends the tag number of that RFID tag to the microcontroller, the microcontroller in the in-bus module checks whether that particular person is belongs to that particular bus or not. If that person belongs to that particular bus, the microcontroller sends the tag number of that identity card to the GSM modem, and the place of the bus is provided by the GPS system.

The total information that is place, time and tag number of the person is transmitted through GSM modem to the Base station module. If the person is not belonged to that bus, the LCD display at the in-bus module displays the error message. Microcontroller is provided with the group of persons who belonged to that bus earlier. The person has to swipe the identity card when he is getting down the bus also. The below figure shows the In-bus module.

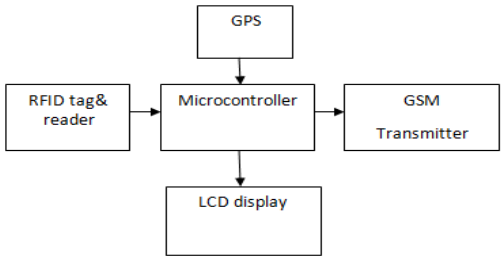

Figure 1: In-bus module

The base station module consists of GSM receiver, microcontroller and computer for information storage. When the GSM transmitter sends the information of that particular identity card the GSM receiver at the base station receives the

information, the microcontroller at the base station searches for the received tag number related data and stores it in the information storage. The below figure shows the Base station module block diagram.

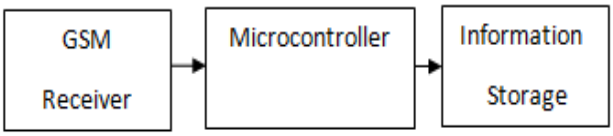

Figure 2: Base station module

The below figure shows the flow chart of the proposed work. The system updates for each clock cycle.

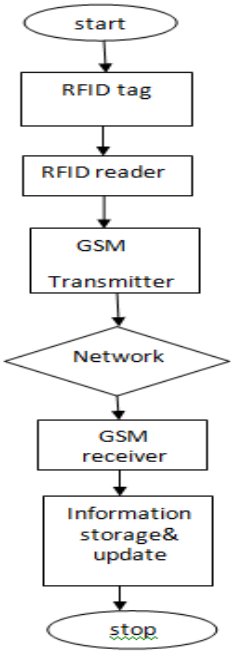

Figure 3: Flow chart of proposed work

Advantages of proposed work:

1. this system is very easy to implement.
2. the same system can be used for many applications with minute changes.
3. very easy to maintain.
4. we can provide security to the bus system.

Applications of proposed work:

1. used in bus monitoring and controlling systems
2. used as library login system.
3. used as student attendance monitoring system.
4. used in Electronic transportation system.

4. CONCLUSION & FUTUTE WORK

The proposed system is implemented practically in the bus and the working is monitored and observed that it has maximum functional capability. The system gives the information of the person who is getting into bus, place and time. It also gives the person who is getting down the bus, time and where he is getting down. So that we can know the number of persons remaining in the bus at particular instant of time and can also know that who is getting into bus. So that by using this system we can provide the security to the bus system. This system only gives the latitude and longitude of the place, in future we are trying to implement the system which gives the name of the place.

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