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Smart Transport System using RFID

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ABSTRACT

In this paper, we have used WSN for monitoring operations of bus transportation system. We propose use of minimal information viz.record of arrival time of the buses at the bus-stops, for improvement of bus transportation system. Wireless sensor network are distribute in Smart Transportation system Using RFID(STSR) application made up of tiny sensing devices, low power, low cost equipped with processors, memory and limited wireless network communication have transformed outside transportation network through the advanced communication and computing technology into in-vehicle and road side traffic transportation infrastructure. It is designed to track a moving vehicle using RFID technology. The proposed system has hardware and software components. The hardware architecture consists of an RFID tag, RFID tag reader, a wireless network using GSM Module for communication and Data logger for store recorded data. The Data logger is located at the BUS. The tag readers are located at corner of BUS to read Tag that installed on BUS STOP. The software architecture consists of main Admin(the bus Driver) which handles all communication functions when Safety management issue occur at the during transportation warnings message to user and analyses the data, a friendly GUI (Graphical User Interface) and a data logger that saves all readings. The paper attempts to solve the problem of vehicular Delay using RFID and GSM module through sending SMS to user.

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I. INTRODUCTION

Public Transport is one of the important infrastructures of several countries. In developing country like India bus transport consists of around 70% As the city road networks is growing day-by-day, the question of how to obtain information about the roads is becoming more and more challenging. One of the major challenges that vehicle control and traffic management applications are facing is to know the position and speed of the vehicles on the road network in real-time. However, lack of systematic mechanism to monitor and manage the bus-network is leading to lack of predictability of the bus network. It gets complex to classify causes after delays, or predict the arrival times. Bus transport system faces the ever increasing problem of traffic and congestion. Not including a well-deployed monitor classification, it becomes very difficult to plan for optimization and growth. In order to offering Smart Transportation Systems Using RFID (STSR) that give appropriate bus status to user. Traffic jam and high number of accidents from in urban areas become maximal stressful and direct to dramatically result on economy, human physical condition, parking and environment. It gets difficult to identify causes after delays, or expect the arrival times. Motor vehicle transport system faces the still rising problem of traffic and congestion. Not including a well-deployed screen structure, it becomes very complex to arrangement for optimization and development. The operations smart transportation systems using RFID can be considerably improved by monitoring the traffic operations and analyze them to provided that useful information both to the travelers and bus operating authorities.

Sensor based Transport Systems (STS) designed tiny size, wireless network power consuming, low maintenance and very low cost for achieve Bus details(bus arrival time) that can be used for generate automatically sms and send to user. The main motive behind this project is to reduce time is wasted in wait for bus on stop for which we propose a system that governs and controls bus status with directly sending sms to user.

Recently RFID based system are incorporated in many tracking systems. The proposed system eliminates the need for motorists and toll authorities to manually perform tracking bus and send sms of bus status, with RFID information the records can be maintained. The delay bus warnings are carried out by sending warning messages to user to avoid wasting time on stop. The connectivity between the Bus and User are done through sending sms to user using GSM Module.

The main contribution of this paper is in demonstrating the use of wireless sensor networks to monitor bus operations. We argue that the minimal information required to perform above analysis is the record of arrival time of the buses at bus-stops and inform to traveler.

II. PROPOSED SOLUTION

The problem of bus arrival time and status of bus system can be solved by deploying an embedded system consisting of following elements.

A. BUS STOPS

The bus stop should be located from the central town/city which is in the relatively traveler previous stop. At this stop the rfid tag were installed. The tags are programmed using the RFID reader-cum-writer according to the vehicle information. when bus passes through bus stop then sms will be send to the appropriate user. A RFID tag dispenser can be used to make the system automatic. In each bus stop one rfid tag will be installed.

B. Vehicle

The whole system will be installed in bus. The vehicle passing through the bus stops will be given the RFID tag according to each stop. The RFID reader can be installed on the corner or any external part of the vehicle. When Bus passing through bus stops reader detect the tag. The gsm module also installed on bus for sending sms to user. The data logger used for record bus related whole information as per second. For example it record bus speed, bus fuel, time when tag will be recorded in system. All information of data logger is stored in external memory card. In data logger it create excel file and store data in row and column.

1. The RFID tag can be installed on Bus stop.
2. The RFID Reader operated through Atmel microcontroller.
3. The Atmel microcontroller connected to RFID and GSM module.
4. The GSM Module is used for sending SMS to person.
5. When RFID Reader detects bus then Atmel microcontroller send SMS to person through GSM module.
6. The data logger used for record bus related whole information as per second in excel file.

III.TECHNOLOGY USED

A. Radio Frequency Identity - RFID

A complete RFID system consists of a transponder (tag), reader/writer, antenna, and a computer host. The transponder, better known as the tag, is a microchip combined with an antenna system in a compact package. The microchip contains memory and logic circuits to receive and send data back to the reader. These tags are classified as either active or passive tags. Active tags have internal batteries that allow a longer reading range, while passive tags are powered by the signal from its reader and thus have shorter reading range. Tags could also be classified based on the content and format of information. The classifications range from Class 0 to Class 5. These classes have been determined by the Electronic Product Code (EPC) Global Standard. In the table below, classes refer to the tag's basic function; it either has a memory or an on-board power, while generation refers to the tag specification's major release or version number. The class structure for the tags is shown in the table below. [4]

TABLE I
CLASS STRUCTURE FOR TAGS

Frequency Range	Description	Typical Applications
<135 KHz	Low Frequency, Inductive Coupling	Access Control & OEM applications
13.56 MHz	High Frequency, Inductive Coupling	Access control, Library books
868 – 870 MHz 902 – 928 MHz	Ultra High Frequencies(UHF), Backscatter Coupling	Supply chain tracking
2.40 – 2.483 MHz	(SHF), Backscatter Coupling	Asset Tracking, Highway toll tags, Vehicle tracking

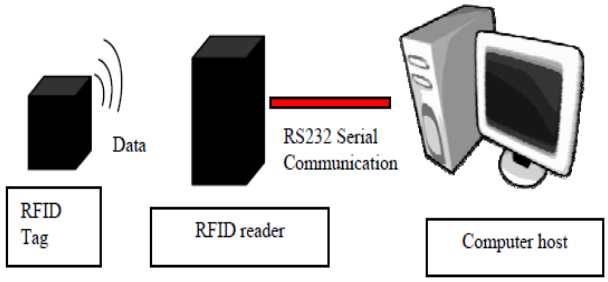

Fig. 1 Working of RFID system

A reader contains an antenna to transmit and receive data from the tag. The reader also contains a decoder and in RF module. It could be mounted or built as a portable handheld device. The computer host acts as an interface to an IT platform for exchanging information between the RFID system and the end-user. This host system then converts the information obtained from the RFID system into useful information for the end-user.

B. *ATMEL Microcontroller*

Atmel AVR® 8- and 32-bit MCUs deliver a unique combination of performance, power efficiency, and design flexibility. Optimized to speed time to market—and easily adapt to new ones - they are based on the industry's most code-efficient architecture for C and assembly programming. The extensive AVR portfolio, combined with the seamlessly-integrated Atmel Studio development platform, makes it easy to reuse knowledge when improving your products and expanding to new markets. The AVR core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in one single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers.

C. *GSM Module*

In this system GSM Module is used to send sms to user. A GSM/GPRS module assembles a GSM/GPRS modem with standard communication interfaces like RS-232 (Serial Port), USB etc., so that it can be easily interfaced with a computer or a microprocessor / microcontroller based system. The power supply circuit is also built in the module that can be activated by using a suitable adaptor. GSM/GPRS module is used to establish communication between a computer and a GSM-GPRS system. Global System for Mobile communication (GSM) is an architecture used for mobile communication in most of the countries. Global Packet Radio Service (GPRS) is an extension of GSM that enables higher data transmission rate. GSM/GPRS module consists of a GSM/GPRS modem assembled together with power supply circuit and communication interfaces (like RS-232, USB, etc) for computer. The MODEM is the soul of such modules.

D. *Data Logger*

The data logger used for record bus related whole information in per second. For example it record bus speed, bus fuel, time when tag will be recorded in system. All information of data logger is stored in external memory card. In data logger it create excel file and store data in row and column. All user registration also does in Data Logger using GUI. Data logger also record the tag of user in excel file.

IV. WORKING

The overall working of the proposed system is as follows:

1) The RFID will be installed on the each bus Stop where we have passenger.
2) When bus is passing from bus stop RFID tag will be detected.
3) The RFID reader will be installed on bus that will read the identification no. of the vehicle and the time at which it passes the bus stop is detect the tag to track the vehicle.
4) In that one rfid tag is used for one station it contain all travellers from that station.

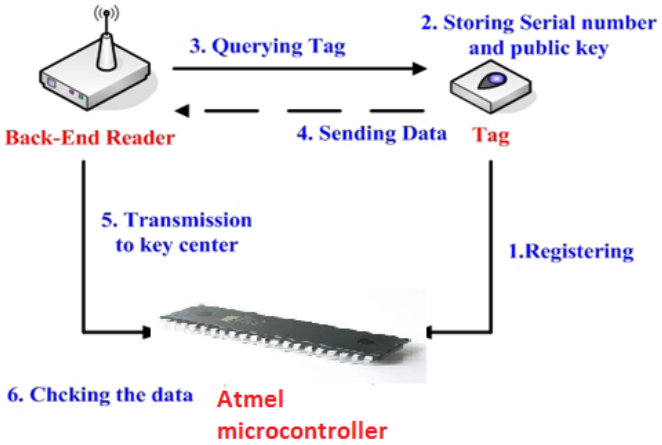

Fig. 4 Working of the tracking system

1) When RFID Reader detect tag it automatically send sms to user is “bus is arrived at previous station”. For sending sms to user we used gsm module.

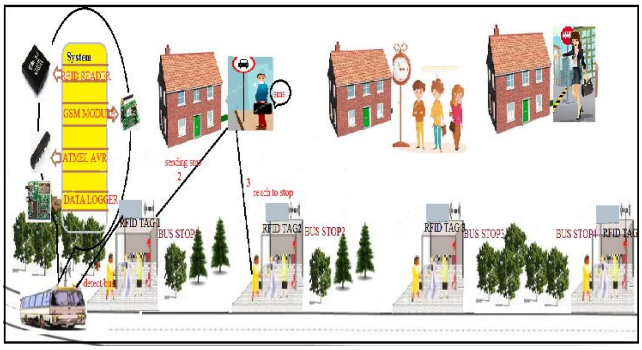

Fig. 3 Layout of the proposed system

5) If anything happens with bus in between two bus stops it cause delay bus then warning message also send to user.

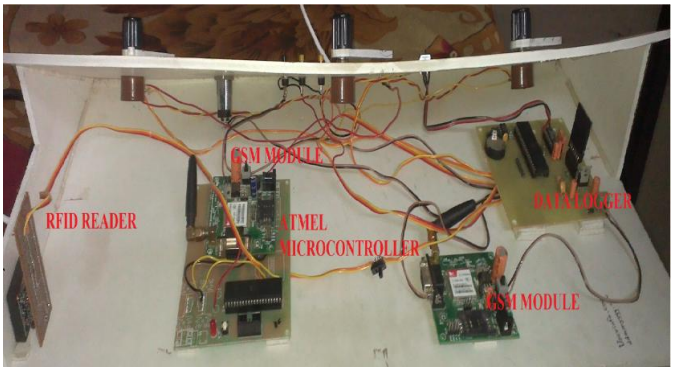

Fig. 5 Hardware implementation

6) A GUI (Graphical User Interface) is created for registration of service to record, enquire, store and update user information.
7) The data logger is used to store all bus information per second.

V. CONCLUSION

In this project, we describe intelligent system that overcomes issues faced by other existing system. In this project we can easily access the vehicle reach time by receiving message. Bus system that contribute to delay, safety, security, traffic management or efficient passenger transport to fulfill the requirements .The tracking system is deployed by using RFID tag and tag reader at the bus stop and embedded system using the ATMel Microcontroller is incorporated the connectivity of RFID and GSM module to send message user.

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