Smart Reporting and Announcement System For Public Transportation

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Abstract

In today's bus transportation system, at every bus terminal driver has to get in and out from the bus to report bus number, bus arrival-departure timing, and information about further stop to terminal controller. This process consumes minimum 4-5 minutes for each stop that results in unnecessary wastage of time. Also many times passengers are unable to get the accurate information of arrivals & departures of buses. To address this issue here we are proposing global positioning system (GPS) enabled intelligent structure comprises of RF trans-receiver and Arduino board connected to server that provides automated reporting and announcement of buses. The developed system completely eliminates manual reporting of driver which may save around 15-20 minutes of passengers that may increase depending upon number of stops in journey. Complications regarding time of bus arrival or departure were also minimized. In addition, system eliminate human intervention which nullifies possible mistakes occurred during reporting and announcement. Moreover to these outcomes, expenditures on dedicated staff only for reporting and announcement can be reduced. From this system many stake holders such as passengers, driver and also bus transportation department will be benefitted.

IndexTerms - Arduino, Global positioning system (GPS), RF transceiver, Server

INTRODUCTION

We are proposing GPS based system for identification of bus location.Once bus is arrived in territory of 1km, it will be tracked throughout till its arrival at bus location. As it gets arrived at bus terminal automated speech enabled system announces the information regarding arrival and departure with bus detail information. At same time, through RF based communication, bus information will be entered in the database of bus transportation system. The novelty of the work relies on automated announcement and reporting of buses which currently executed with human intervention [2].

The real time bus monitoring and reporting information system is which display the real time location(s) of buses nearby depot. This system can be deployed at various bus depots in cities. To reduce confusion and inconvenience, a message will be shown on screen or announcement will be done which will provide real time information about bus arriving which could reduce the anxiety of passengers waiting for the bus [3].

The RF Trans receiver will be used to poll a signal from the systems installed on buses that contains GPS data of each bus location [1]. This data is then analyzed with location of nearby bus depot. If it falls in the range it is processed by Arduino connected to RF Tran's receiver and used to display on the screen. Also if data through GPS matches the location of bus depot it gets directly saved in the depot server. The Platform chosen for this kind of system is using RF Technology, reason being technology has come up on a very large scale and it is owned by almost every second person for wireless communicating purpose. It enables ease of access for all users; as no manual interaction is get required.

The need of the work is automated reporting to the server after arriving of bus at its depot. This is beneficial for conductor/driver for saving their time along with the passenger [11]. And also basically, observing the problems faced by the common people we thought there should be a need or the solution which can reduce their effort during their daily travelling. Also as no manual interaction is get required with the system, illiterate people can also easy access with the system [13]. So load of keeping record for each and every bus arriving at the depot get reduced. Buses are the major part of the public transport system. Increased use of buses will automatically result in decreased use to private transport, thereby reducing traffic congestion problems on road [5]. Bus services also help in reducing the usage of fuel consumption. Most of the people use buses as their mode of transportation. But, when traveling with buses, travelers want to know the accurate arrival time of the bus so as to save their time. We did survey on various bus terminals and also

analyses their role playing in their day to day life. In that we found, at each depot driver/conductor has to report after arriving of bus which take most of the time. So we tried to make a system which is also comfortable for all passengers and save much time of reporting at each depot [7].

DESIGN PROCEDURE

Block Diagram

Fig.1 describes the block diagram of system when it is in 1Km circumference of Bus Station where GPS is used to track the location and interface with Arduino and RF pair for communication purpose [6]. LCD Display/Mike is get used at the Bus station [9].

Fig.2 describes the block diagram of system to report at Bus Station when actually bus get reached at the bus terminal. A memory storage device such as PC/Laptop device is used.
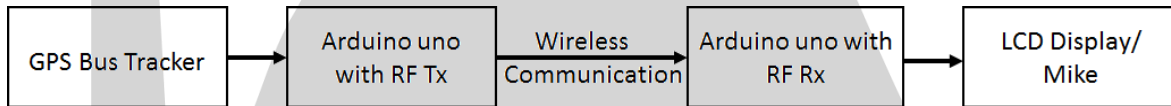

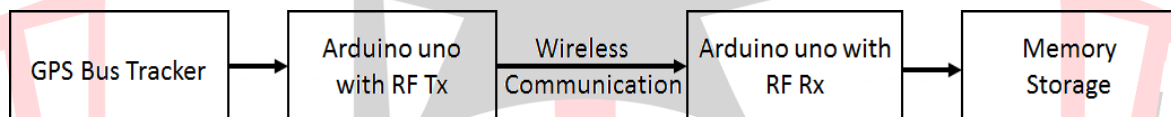*Fig1: Block Diagram of System When is in 1Km Circumference of Bus Station*

Fig2: Block Diagram of System to Report at Bus Station
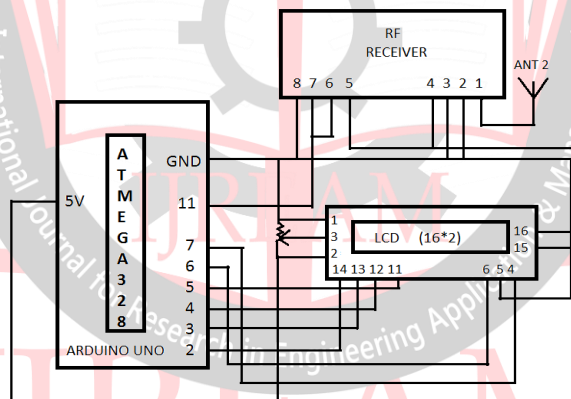
Circuit Diagram

Fig.3: System Design at Transmitter side

Fig.3 describes circuit diagram at transmitter side. In which GPS module and RF transmitter module is get interfaced with arduino. Antenna is used for communicating purpose in the range of module or technology used.
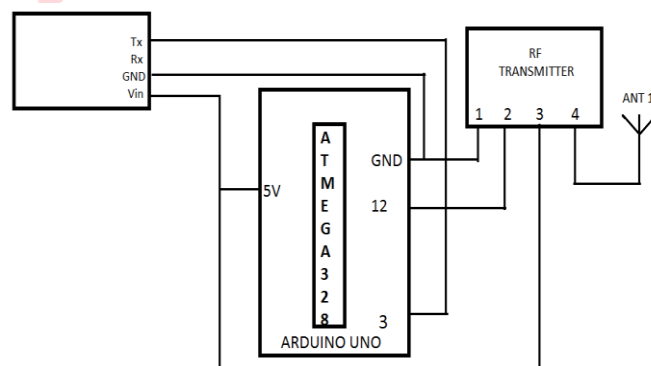
Fig.4: System Design at Receiver Side

Fig.4 describes the circuit diagram at receiver side. In which LCD module and RF receiver module is get interfaced with arduino. Here, also antennea is get used for fetching the data transmitted by transmitter. LCD is used for displaying purpose. Rather than it can also use Mike/Speaker for announcement purpose of view.

Hardware and Software Requirements

Table I depict the brief about function of each components whereas their detail working has been mentioned in further Subsections.

TABLE I. Hardware Requirements

Sr. No	Component	Function
1	Arduino Uno	Output signal from GPS is given as input to Arduino Uno with bus number and source-destination address.
2	GPS	Track the position of the particular bus coming at the bus station
3	RF module	Used for wireless communication
4	LCD	For displaying the info about bus
5	Speaker/Mike	To announce the bus which is about to arrive at the bus station

Component Description

- Automated Bus Reporting and Announcement system is implemented by using four modules:
- Adafruit Ultimate GPS Breakout module
- RF Trans receiver module
- LCD module
- Arduino Uno Board

Adafruit Ultimate GPS Breakout module

This GPS module we have selected on the basis of high-quality which can track up to 22 satellites on 66 channels, has an excellent high-sensitivity receiver (-165 dB tracking!), and a built in antenna. It can do up to 10 location updates a second for high speed, high sensitivity logging or tracking. Power usage is incredibly low, only 20 mA during navigation. This GPS's are very sensitive, so as we want a nice and quiet power supply we require 3.3V-5V DC. This GPS is used for tracking purpose in our system which is then feeded to transmitter containing Arduino and RF transmitter.

RF Transceiver module

The corresponding frequency range of RF varies between 30 kHz & 300 GHz. For representing the digital data is represented as variations in the amplitude of carrier wave, Amplitude Shift Keying (ASK) modulation has been used. This RF module comprises of an RF Transmitter and an RF Receiver. The transmitter/receiver (Tx/Rx) pair operates at a frequency of 434 MHz. An RF transmitter receives serial data and transmits it wirelessly through RF through its antenna connected at pin4. The transmission occurs at the rate of 1Kbps - 10Kbps.The transmitted data is received by an RF receiver operating at the same frequency as that of the transmitter. For wireless communicating purpose RF pair is get used in this system.

LCD module

Alphanumeric displays are used in a wide range of applications, including palmtop computers, word processors, photocopiers, point of sale terminals, medical instruments, cellular phones, etc. The 16 x 2 intelligent alphanumeric dot matrix displays is capable of

displaying 224 different characters and symbols. It is used for displaying the information   regarding the bus which is getting to be arrived at that depot.

Arduino Uno Board

The Arduino Uno is a micro controller board based on the Atmega32. This Arduino Uno board serves as like micro controller in our system. Arduino Uno board is with ATMEGA328 P-PU IC loaded into it. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. Arduino is selected, as the work is to be done on Arduino setup platform purposefully. It is also used for controlling or supporting purpose in system for transmitting and receiving purpose. Also for saving the data Arduino provides 2 KB SRAM and 1KB EEPROM. It can also be used as for supplying power to the system. Arduino Uno has a number of facilities for communicating with a computer or with other Arduino placed at receiver side.

Software Requirements

Table II depict the brief about function of software used whereas their detail has been mentioned in further subsections.

TABLE II. Software Requirements

Sr. No	Software	Function
1	PROTEUSV7.8	for simulating the electronics circuits
2	Arduino IDE	Programming is done in this software

Software Designing

PROTEUSV7.8 Software

It is used for simulating the electronics circuits. Proteus is the best and user Friendly software for designing. We use Proteus for simulating the transmitter and receiver section of our work. It has inbuilt some libraries and some libraries must be added simulation point of view. Figure.5andFigure.6 shows the simulation of transmitter & receiver system in Proteus Software.
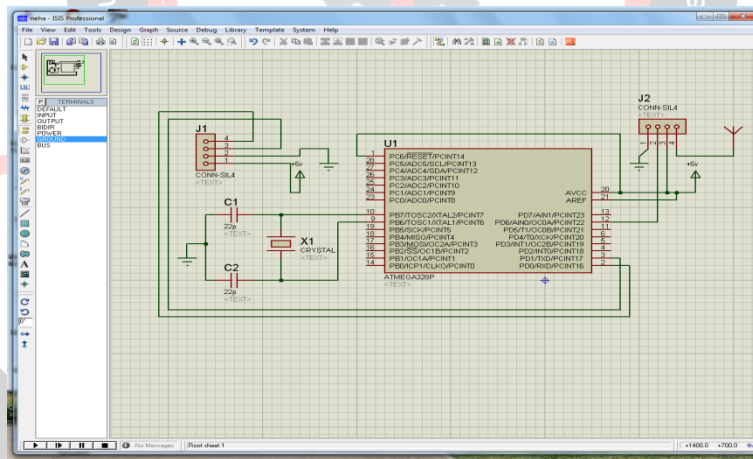

Fig.5 Simulation of transmitter in Proteus software

Fig.6Simulation of receiver in Proteus software

ARDUINO GENUINO (2016) UN Software

ARDUINO (IDE) contains a text editor for texting code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them. For this work, we require to add additional Virtual Wire library and Tiny GPS library in library function of software. Here, first we load the program in Transmitter and Receiver section. After loading the program we can check the running of program by just transmitting data through transmitter end of Arduino. And then just by checking whether same transmitted data is received at receiver end through module [12].

Fig.7 shows the example of interfacing Arduino setup with RF transmitter. Here, transmitter code has been downloaded into Arduino Uno with the help of Arduino Genuino software. After that the code is compiled and then data is transmitted by serial monitor
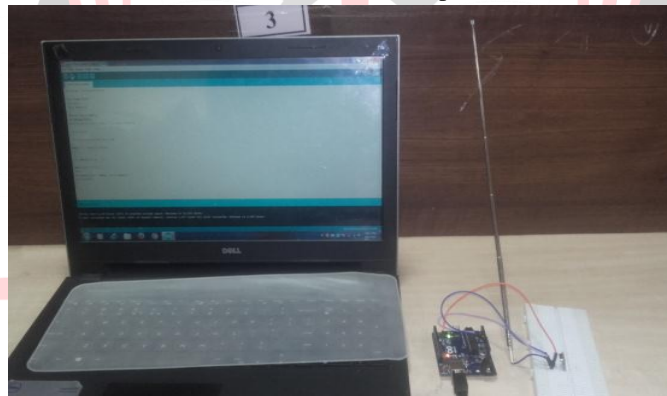

Fig.7 Example of Interfacing and downloading of code at transmitter side

Fig.8 shows the result of wireless communication at receiver side. Here, receiver code has been downloaded into Arduino Uno with the help of Arduino Genuino software. After that the code is compiled and then transmitted data is received by receiver and displayed on LCD.
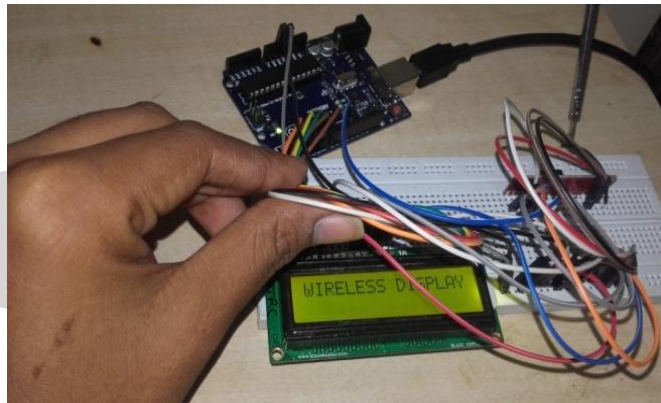
Fig.8 Example of wireless communication at receiver side

INNOVATIVENESS OF THE PROPOSED SOLUTION

Existing system consist of bus tracking and displaying it on LCD or showing detail information on android application whereas this proposed system gives the arrival of bus to the bus station with its bus no. and source to destination address 5-10 min before.Also this system consist for reporting of bus to depot automatically which is not done before any existing system.Also here the GPS will used only at transmitter side in bus. So no power consumption of battery take place in mobile as no interaction with android application is taking place [2].

CONCLUSION AND FUTURE SCOPE

Buses are the major source of transportation system. Passengers are always in need to know the source & destination of buses, their arrival-departure schedule. Although bus timing are prescheduled but due to traffic or other issues they are unable arrive/depart as per the schedule. The proposed system addresses these issues and conveys accurate time of arrival of bus. The proposed work provides complete track that of the buses around the city mostly when buses are nearby station. The display at the bus stop saves the commuter's time. The voice over at the bus stop helps illiterate and blind person. This system reduces the work of a conductor and also gives the complete details of all the buses to passengers. Work can be extended by communicating using newer technologies. A GPS module having greater accuracy and enhanced features can be used in the system. A system directly reporting without analysis can also be developed.

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