

Developing the Techniques to Track the Bus and Monitoring the Fuel

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ABSTRACT:The need for efficient public transportation system such as buses is rapidly increased due to the increasing in population, the passengers need to know the accurate arrival time of the particular bus to particular station and then plan their journey from their home .Fuel monitoring have been the major problem that most of bus companies looking to solve. This paper developed a bus tracking and monitoring the fuel and speed system to provide a facility for the management requirements by the administrator. The system contains single Android mobile that is equipped with GPS and GSM modems along with processor that is installed in vehicle. The proposed system based on Arduino, GSM/GPS and map suit ASP.MVC which provide the actuated arrival time in addition to graphically showing the bus location on Google map. This paper presents the prototype implementation of real-time bus arrival information system. The design also enables the owner of the buses to monitor the bus instantaneously because the system administrator can easily maintained database information of buses and its fuel tank at any time of the service. The prototype is implemented using ATmega8 microcontroller and GSM module.

KEYWORDS: bus track, MVC, Arduino, GPS, GSM, Fuel, A Bus arrival information system, ATmega8 microcontroller

I. INTRODUCTION

The bus tracking system is a cost effective and efficient system, at the bus station people have to wait for long time without even knowing when the bus will arrive, the passengers, can't find the time of arrival of particular bus at the particular destination even at their homes and plan their journey accordingly. The proposed system present the bus arrival time prediction and fuel monitoring system that provide the accurate arrival time and bus view to the passengers ,and provide bus monitoring, schedule management and fuel monitoring to the bus company owner . Fuel level detection circuit calculates the fuel level from the fuel gauge which is present in all the vehicles the current position of the vehicle was acquired by Global Position System (GPS) receiver.

The Arduino collect the data from fuel sensor, GPS and speed sensor send it to the server at the base station using GSM. The data at server side are stored in a database tables witch designed to and can be retrieved as request for position browsing on map. A web site is developed using ASP.MVC web edition, Visual a Studio201 designed using ASP.MVC desktop edition to enable the owner to view the fuel level and the current in location of the buses 3 with embedded Google Map to retrieve and display on track details. A desktop GUI is designed using ASP.MVC desktop edition to enable the owner to view the fuel level and the current in location of the buses in the map. We propose the design, development and deployment of GPS (global positioning system) / GSM (global system for mobile communication).It presents a real-time tracking Arduino. This system that provides accurate localizations of tracked vehicle with low cost. This describes a practical model for routing and tracking with bus vehicle in a large area outdoor environment based on GPS and GSM. Only agencies who procured their system in 1980's or earlier 1990's who are upgrading their existing signpost system. In the presence of bus tracking system arrivals time can be forecasted for a timed transfer terminal using the conditional distribution model. In many existing studies this issue is circum-vented by assuming that bus running direction, this paper has presented an algorithm for real time prediction of bus arrival time. This system is capable of tracking a large number of buses simultaneously.

The present study is one step in this direction to provide accurate bus arrival in advance to passengers to make the public transit system more reliable under the heterogeneous traffic conditions, such as the one existing in India. The overall outcomes functionality of the system comes from the interaction between the system components, which are a device on the bus, web application and desktop application. A device on the bus consist of Arduino, GPS, GSM, fuel sensor and speed sensor. The GPS receive the coordinate information from satellites and send it the Arduino, the fuel and speed sensors used to measure the speed and fuel level and send it to the Arduino, which collect all this data and send it to the server through the GSM.

II. RELATED WORK

SYSTEM DESIGN

- **GPS TECHNOLOGY**

The global positioning system (GPS) is a satellite-based navigation system consists of a network of 24 satellites located into orbit as shown at figure 2. The system provides essential information to military, civil and commercial users around the world and which is freely accessible to anyone with a GPS receiver. GPS works in any weather circumstances at anywhere in the world. Normally no subscription fees or system charges to utilize GPS.



Fig 1:GPS Module

- **GSM MODULE**

The GSM modem is a specialized type of modem which accepts a SIM card operates on a subscriber's mobile number over a network, just like a cellular phone. It is a cell phone without display.

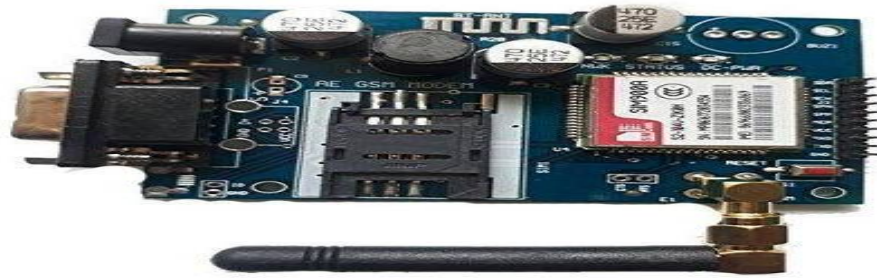


Fig 2:GSM Module

SYSTEM ARCHITECTURE

A system architecture or systems architecture is the conceptual model that defines the structure, behavior and more views of a system. An architecture description is a format description and representation of a system, organized in a way that supports reasoning about the structures and behaviors of the system. A system architecture can comprise system components, the expand systems developed, that will work together to implement the overall system. System architecture conveys the informational content of the elements comprising a system, the relationship among those elements, and the rules governing those relationships. The architectural components and set of relationships between these components that an architecture description may consist of hardware, software, documentation, facilities, manual procedures or roles played by organizations or people. The below figure shows the system architecture or the block diagram of our project which portrays the system components and their working and also their interaction.

Here the fuel sensor is use to check the level of the fuel in an particular vehicle and in case of overload sensor, if the passengers got overload in that particular vehicle than this overload sensor will make sense and exhibit the required output.

- **MODULES DESIGN**

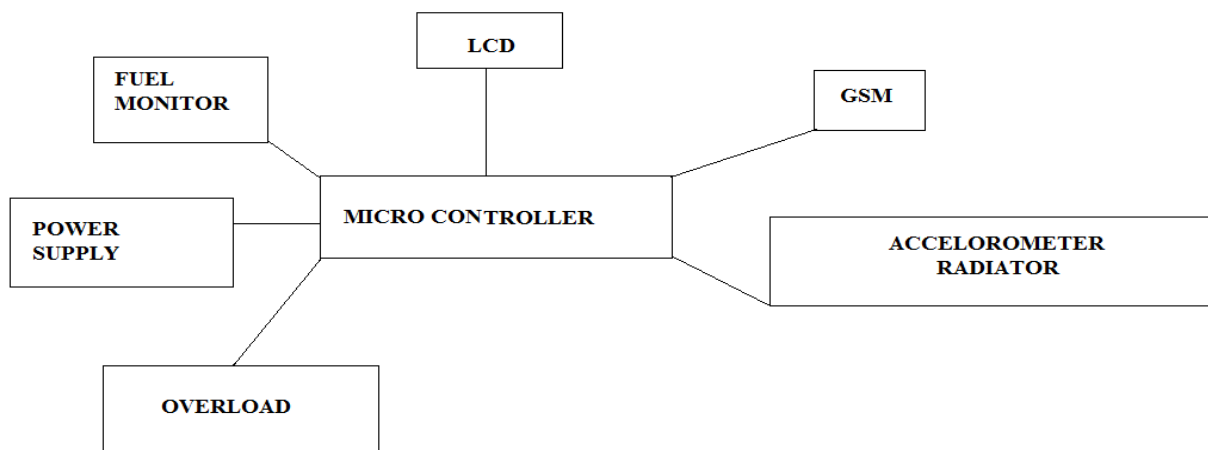


Fig 3: System Architecture

- **Micro Controller**



Fig4 : Micro Controller

As we know that a microcontroller is a small computer on a single integrated circuit. In modern technology it is similar to, but less sophisticated than, a system on a chip. The AT89C51 is a low power, high performance CMOS 8-bit microcomputer with 4K bytes of Flash programmable and erasable read only memory. It control unit of the entire project. Here we are using a 40 pin IC and the IC Number is SST89E516RD2(Silicon Storage Technology) MAX 232 IC is used to convert RS (register select) to TTL(translator transistor logic). Two types of capacitor are used one is ceramic capacitor of 0.01MF for the purpose of synchronization and other is the electrolyte capacitor of 4.7MF. And overall a 12V power supply is given to it. This device is manufactured using Atmel's high-density non-volatile memory technology. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C51 will act as a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control applications. A microcontroller is a small and low cost computer built for the purpose of dealing with specific tasks, such as displaying information in a microwave LED or receiving information from a television's remote control. A microcontroller is a computer present in a single integrated circuit which is dedicated to perform one task and execute it.

- **LCD 16*2**



Fig 5 : LCD 16*2

LCD stands for Liquid Crystal Display which is used to display the location of bus. We are using 14 pins LCD which are given below:

- Pin 7 to Pin 14 All 8 pins are responsible for the transfer of data.
- Pin 4 This is RS i.e, register select pin. 5 This is R/W.
- Pin 6 This is Enable pin
- Pin 2 This is VDD
- Pin 1 This is VSS
- Pin 3 This is short pin

- A liquid crystal display is a thin, flat electronic visual display that uses the light modulating properties of liquid crystals (LCs). LCs does not emit light directly. In liquid crystal displays (LCDs) of liquid crystal technology is the most common applications. An advanced VGA computer screen from the pervasive wrist watch and pocket calculator, this type of display has evolved into an important and ambidextrous interface.
- Consist of a liquid crystal display, an array of tiny segments (called pixels) and to present the information that can be manipulated. This basic common idea is to all displays, alienate from simple calculators to a full color LCD television.
- The primary factor was size, an LCD consisting of primarily with some liquid crystal material between them of two glass plates. There is no bulk amount picture tube. This gives LCDs practical for applications where size (as well as weight) is necessary.
- In general, LCDs uses very low power than the cathode-ray tube (CRT) counterparts. Many LCDs are ruminative, means that they use only atmosphere light to illuminate the display. Even displays that do consume much less power than CRT devices require an external light source (i.e. computer displays).

- **SIM908 GPS/GSM**



Fig6 : SIM908 GPS/GSM

SIM908 is a Tri-band GSM/GPRS engine that works on frequencies EGSM 900 MHz, DCS 1800 MHz and PCS 1900 MHz. SIM300 features GPRS multi-slot class 10/ class 8 (optional) and supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4. You can use AT Command to get information in SIM card. The SIM interface supports the functionality of the GSM Phase 1 specification and also supports the functionality of the new GSM Phase 2+

specification for FAST 64 kbps SIM (intended for use with a SIM application Tool-kit).Both 1.8V and 3.0V SIM Cards are supported. The SIM interface is powered from an internal regulator in the module having nominal voltage 2.8V. All pins reset as outputs driving low. The "AT" or "at" prefix must be set at the beginning of each command line. To terminate a command line enter <CR>. Commands are usually followed by a response that includes."<CR><LF><response><CR><LF>". Throughout this document, only the responses are presented, <CR><LF> are omitted intentionally.

Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication. GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900 MHz. It is estimated that many countries outside of Europe will join the GSM partnership.

III. IMPLEMENTATION

In order to make our Web Application flexible and extendable, we have adapted the REST (RESTful) architecture. And our implemented system has used the three-tier architecture.

- 1) A front-end which relate to the client side. The user interface is based on a web-browsers application. It contains a responsive web page developed using Hypertext Transfer Markup Language v.5 HTML5 ,Javascript , JQuery library and Cascading Style Sheet (CSS) whose application is tested on both desktop and smartphone web browsers. This web page uses Asynchronous JavaScript AJAX in order to build bidirectional data flow with middle layer.
- 2) A middle layer which includes a dynamic PHP program running on top of Apache web server. This program exposes its internal functionality through a RESTful interface towards the front-end and it uses the MySQL native driver for PHP for storing and retrieving data.
- 3) A back-end containing MySQL database server used to store all known roads in the region, system users, users profiles and user alerts. This component is a relational database that is used to store and retrieve the data. Note that the positioning and speed data are time-stamped according to the UTC time reference. In RESTful vocabulary things are resources. Each resource is a uniquely addressable entity by a Universal Unique Identifier (URI) attached to it. Moreover, each resource has a representation which can be transferred and manipulated by means of four verbs. These verbs are create, read, update and delete (CRUD).

IV. EXPERIMENTAL RESULT

Passenger installs the application on android platform and selects the information like Route and Bus number from the drop down list. If Passenger clicks on Map then current position of bus and passenger are displayed on the Google map



Fig 7 :Current position of Bus and the Passenger

V. CONCLUSION

This paper offers a smart design of tracking and monitoring the busses which helps the bus companies to provide high quality of service. This design can provide the location of the busses of the service with an error less than 10m in the case of slow speed and clear environment and the system give the accurate arrival time of the bus and provide the location of the bus in Google map for both user and administrator. This system reduces the waiting time of remote users for bus and provides bus tracking at any location, management and fuel monitoring.

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