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**Design and Development of GPS based Station Name Announcement and Display System**

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**Abstract**

As the population of the India is growing predominantly, the need for fully technology oriented transportation is to be established. Because of the fewer trains and unreserved coaches, more densely passengers are being accommodated. Therefore the passengers can't able to know in which station they are and even it makes difficult for disables persons. The current system is announcing the station name in the station itself and it can't announce the station name in the train, even it can't display the station name in the train. Also many of the railway stations are dark and without the appropriate lightening on the platform. So it is very difficult to find out the name of the station in the nights.

This project aims in designing a system which is capable of announcing the station name when train reaches the station and displays the name and address of the station on the Map, which will be helpful for passengers to reach their desired place.

**Keywords:** Display system, GPS Receiver, Ethernet Module, Microcontroller, GUI-Map, and Voice Module..

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**Introduction**

Public Announcement systems such as at train stations, theatres and events are traditionally based on conveying audio voice messages to loudspeaker systems in a certain area.

Understanding these messages may be difficult for persons having hearing problems, but also for many other persons when the system is inadequate due to the presence of competing background noise, poor environmental acoustics, poor system performance or other reasons. For people using a hearing aid, a number of assistive systems have been deployed that permit accessibility to public auditory information and announcements by means of analog technology devices (for example, induction loops, FM links). Although helpful in many situations, these present systems have several known limitations such as limited range, limited availability, compromised sound quality, and interferences with and from other equipment. As a result, hearing aid manufacturers and organizations working on behalf of hearing aid users have for some years considered that a 'replacement' technology is required that will provide enhanced communication possibilities in our increasingly information dependent society.

Alternatively, and additionally to auditory announcement systems, textual and image based announcement systems are increasingly used (for

instance active information panels for departures, arrivals etc). Although effective for many people with hearing problems, such developments may introduce new barriers to others in society – for example, when vision is a problem. This implies that whatever 'replacement' solution is developed, it will need to be capable of multi-modal operation in order to be fully accessible. This could include sound, vision and tactile information.

In this paper, we are proposing a system which incorporates the GPS Receiver, Voice module, PC and Ethernet modules to announce, display and to update the station names on the Google Map application. This complete system is made available inside and off the train, to make it easy for the passengers to feel happy tense free journey to the desired destination especially for blind and people with hearing aids

**Literature and Chronicle  
Existing Methods**

The current system is announcing the station name in the station itself and it can't announce the station name in the train, even it can't display the station name in the train. Also many of the railway stations are bit darker and without the appropriate lightening on the platform. So it is very difficult to find

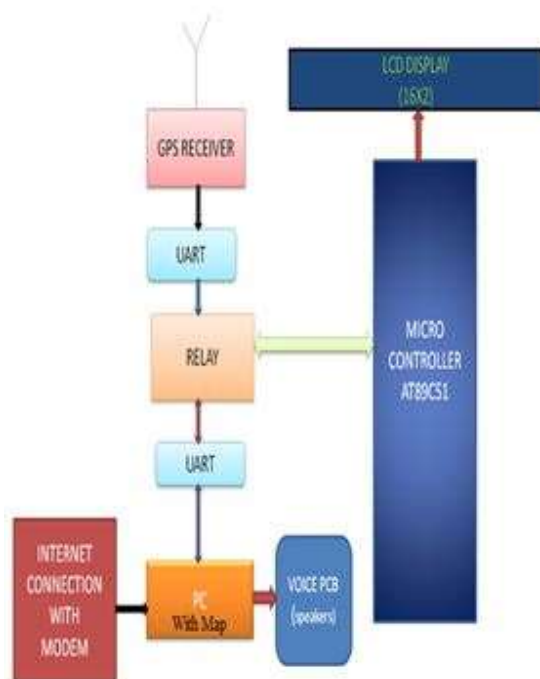
out the name of the station in the nights and even in day time for illiterate peoples.

### Proposed Method

To overcome this problem we proposed a system which identifies the station and announces its name as soon as it reaches the particular station with the help of GPS and Voice module. At the same time the system updates GPS values on to the GUI Map to display the current location and same will be displayed on the display screen. This project aims in designing a system which is capable of announcing the station name which in turn is especially useful for Blind and illiterate peoples inside and off the train.

### Hardware System Design

The complete hardware implementation of the proposed system is as shown in the figure 3.1, which consists of AT89s51 controller, GPS Receiver, PC with GUI-Map application, Ethernet Module and Voice module.



programmable and erasable read-only memory and 256 bytes of Data memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pin out. It is being used to coordinate and control all the peripheral activities in our project.

### GPS Receiver

The Global Positioning System (GPS) is a satellite-based navigation system that sends and receives radio signals. A GPS receiver acquires these signals and provides with valid information. Using GPS technology, one can determine location, velocity, and time, 24 hours a day, in any weather conditions anywhere in the world—for free. GPS, formally known as the NAVSTAR (Navigation Satellite Timing and Ranging). Global Positioning System originally was developed for the military. Because of its popular navigation capabilities and because one can access GPS technology using small, inexpensive equipment, the government made the system available for civilian use. The USA owns GPS technology and the Department of Defense maintains it.

The GPS receiver which is being used in our system design is DGPS (Differential GPS) as shown in the figure 3.2. It has many attractive features, those as follows,

- L1 band (1575.42 MHz) Receive Frequency
- Supports up to 88 channels (with 66 search channels and 22 simultaneous tracking channels)
- Chipset: JRC GPS module, G591
- Operating temperature: -40 °C to +85 °C
- Storage temperature: -40 °C to +85 °C
- Output data format: NMEA0183V3.01
- Position accuracy: 3 meters (without aid); 2.5 meters (DGPS)
- Operating voltage: 1.8V/3.3V
- Data update cycle: One second
- Cable length: 5M
- Hot Start (approximately): 1.5s
- Warm Start (approximately): 34s
- Cold Start (approximately): 35s



Fig. 3.2 GPS Receiver

### LCD (Liquid crystal display)

The most commonly used Character based LCDs are based on Hitachi's HD44780 controller or other which

are compatible with HD44580. In this tutorial, we will discuss about character based LCDs, their interfacing with various microcontrollers, various interfaces (8-bit/4-bit), programming, special stuff.

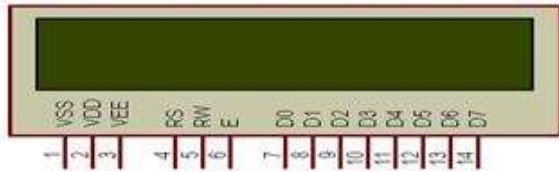


Fig. 3.4 LCD Module (HD47780)

The LCD Module I as shown in the figure 3.4, it is a 16x2 Alphanumeric Display, Having 8 data lines (D0-D7) are used to write command and data onto to the LCD and 3 control lines or pins RS (Register select), R/Wb (Read/write bar) & Enable, apart from these pins it has contrast pins called V<sub>EE</sub>, V<sub>CC</sub> and GND are used to adjust the brightness of the LCD.

The LCD initialization/operation is as shown in the figure 3.5.

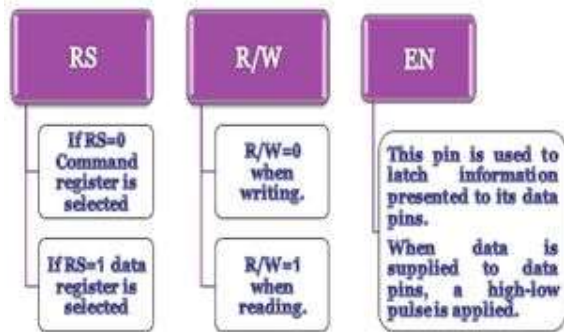


Fig. 3.5 LCD operation/initialization using control pins

### Software design

The software design process involves various tools that are being used to develop the system which in turn help the hardware to coordinate all its activities and the external peripherals connected to the system. The software tools which are used to program and simulate the hardware are 1.Keil uv3, 2.Proload (Flash Programming application), 3. Proteus (Virtual hardware simulator) and 4.VB.NET (GUI Map application).

Once the complete hardware system is powered, it initializes the serial port and then the GPS Receiver. Upon initialization of GPS, the controller first reads the Latitude and the Longitude values and then updates the Latitude and Longitude values on the Map, so the object is displayed as a spot on the Map, which shows the location/ place name at the address bar on the map, that indicates the location where the vehicle / train is heading to the next stations.

If the Latitude and Longitude of any station matches with the values read from the GPS are nearly same then the particular station name will be displayed on the LCD screens both inside and outside the Train, at the same time the station name will be announced using voice module (Speakers) inside the train. The complete system operation is elaborated with the aid of flow chart as shown in the figure 4.1.

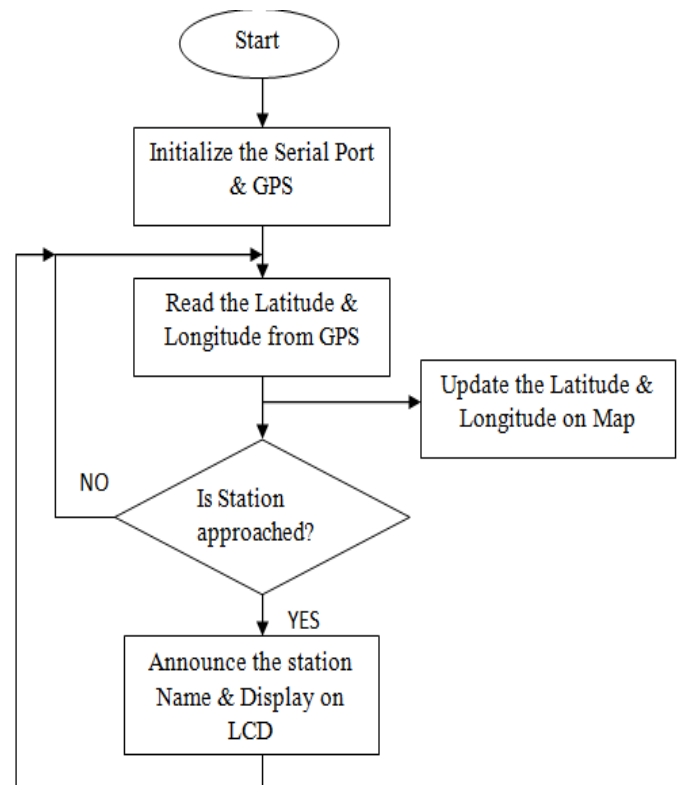
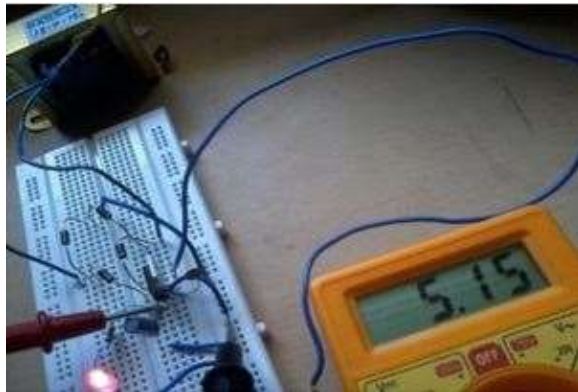


Fig. 4.1 System operation flow chart

### Results & discussion

Before going to develop the complete working module, many experiments have been conducted to design (interface) and/or test the individual modules or external hardware's like Power supply design, LCD Interface testing, serial communication and GPS testing.

Figure 5.1 shows the experimental result for designing 5V power supply, to power up to the entire system.



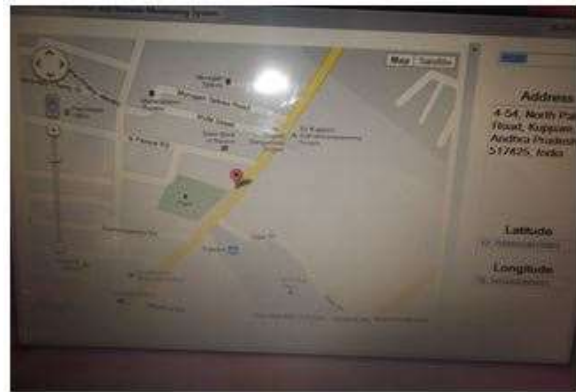
**Fig. 5.1 Power supply design**

The figure 5.2 shows the complete set-up of the hardware system



**Fig. 5.2 Proposed Hardware system assemblies**

In the figure 5.2, it shows that the location name is displayed on the LCD Display in accordance with the GPS Values. The GPS receiver collects Latitude, Longitude and Universal time constant in the defined NEMA format from the satellites. These GPS values compared against the predefined values in the database and then the corresponding station names will be displayed on the LCD.



**Fig. 5.3 Google map application**

The figure 5.3 shows the address of the station and the location of the train on the Google map. The Latitude and Longitude values are being updated on the Google map through the Ethernet or Modem connection to the server. The programming has been done in Visual Studio (VB.Net) and SQL (Software Query Language).

### Conclusion & future scope

In this paper we have designed and implemented station name announcement and display system for trains/Buses using an embedded technology to ease the burden for passengers to ask about the destination places all the time to the neighbors. This helps the passengers especially to the blind and illiterate peoples to reach their desired place with the help of this system.

All the necessary interfaces have been done and tested successfully in the college campus. As soon as the train/bus approaches to the upcoming station its name is displayed on the screen and announced with help of speakers. GPS is being read continuously to check against the station latitude and longitude values and the same will be updated on the Google map.

The system can further be enhanced by providing "SMS on Demand" service. In this service an alert message is forwarded to the requesting users about the location information through the GSM/GPRS service or the server. This feature will ease the waiting time for the passengers for trains, as they can track it through the SMS request to the system.

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