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GPS Enabled Digital Advertisement System with Message and Audio Features

Arpita Gupta*, Siddharth Kumar Das, Vijay Singh**, Shahrukh Khan**, Aman Tyagi**, Shubham Kumar** and Prashant Kumar****

*EC Dept, KEC, Ghaziabad, UP, India
**Under Graduate Students, EC Dept, KEC, Ghaziabad, UP, India

Abstract—*In this technical paper, we discuss about the enormous possibilities of the digitalised advertisement system in this modern times. There has been rapid development and update in the advertisement system and one such system is there in which GPS, GSM and electronic display system are integrated to bring a change in the advertisement field. The Advertisements is very helpful for promotion, increasing business, providing knowledge, in educational sector, traffic control, banks, public addressing system, malls etc and has helped it in a global scale. The Global positioning system is used for the location identification & tracking. Simultaneously the GSM system is used to establish communication between server and client (server being the one who controls what information to be sent and client being the advertisement system installed at various locations).*

Keywords*: Advertisement, GSM, GPS, digitalized advertisement system, Location-based advertising (LBA)*

1. INTRODUCTION

In this advertisement system, many technologies are integrated together to bring out a state of the art system which is designed according to our marketing needs and use.

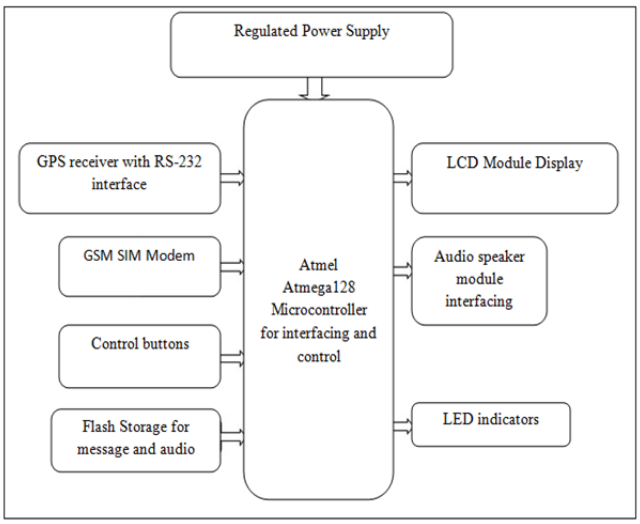
Location-based advertising (LBA) is the use of electronic devices to provide the customers with proper time and based on location, personalized information for the promotion of products, services and ideas in order to generate value for all stakeholders. With the rapid development of mobile business, localisation technologies and digital world, a new type of market for communication is possible [1].

Advertising using the real time application came into existence with the upcoming of mobile phones and thus using the technological updates and modifications new variations of system came into presence.

With the new age technologies like GPS (global positioning system) for identifying and tracking the location, GSM (Global system for mobile communication) for sending messages and calling for real time contact, LCD and LED display etc, companies are currently developing new advertisement systems using some of the above components.

Advertisement on TV's and FM's and even online advertisement is available but for these the advertisers have to pay huge amount for a limited period of advertising. A GPS based advertisement system with message and audio feature has huge application and also is cost effective. It is suitable for providing real time location based advertisement and also has a major application to being used as a "Public Addressing System" for providing necessary information to the public in disaster situations and helping them.

2. ADVERTISEMENT SYSTEM SETUP:



Conventional Products In Market

Delhi Transport Corporation (DTC)

The DTC buses that are being deployed in Delhi are under the cluster scheme which have a state-of-the-art technology to monitor and guide them. They have been equipped with GPS devices so that their movement, location and other parameters are tracked by the Automatic Vehicle Location System (AVLS) on a real-time basis.

The GPS enabled Automatic vehicle location system allows a real time tracking of the movement of bus and provides information on the location. This received information is used along with other details such as the route followed or speed of the bus etc. to provide the passengers at the bus stop with the arrival time of the bus.

This information is then displayed on LED boards installed in the bus stops as well as inside the bus. The Automatic vehicle location also helps in further improving the efficiency of operation of bus by generating various standard and reports. To improve the reliability, efficiency and the punctuality of buses in Delhi and to ensure effective deployment of the fleet which would lead to higher customer satisfaction and improved level of confidence in the bus service, Transport department of Delhi decided to implement the GPS enabled automatic vehicle location system.

Delhi Metro Rail Corporation (DMRC)

The Delhi Metro Rail uses coach signaling along with a central automatic train controlling system which consist modules for Automatic Train Protection, automatic train operation and automatic train signaling. A digital trunked (TETRA) radio communication system from Motorola company is used on all the lines to carry both data and voice information. An integrated system consisting of optical fiber cable, CCTV, on-train radio and a central clock and public addressing system is used for communication during train operations as well as emergencies.

Intercoms are also provided for communication during emergency situation between the driver and passengers in each coach, and on-train announcements which are in Hindi and English formats. There are also en-route maps and LED dot matrix display systems in every coach.

Omnivex Solutions

This LOS ANGELES based company has provided advertisement system solutions to a bus transport company by effectively installing a Windows 7 based technology.

WORKING - For display, use of industrial quality rigged screen LCD running windows7. Behind the screen, there is a PC installed connected to GPS reader from Microsoft, providing longitude, latitude and speed , directions in real time adding context and content shown in screen. It uses software of OMNIVEX MOXIE, which provides weather information, news and advertisement. The software also shows, the bus movement and other shuttles, from airport to hotel and approximately arrival time. The data uploading and checking is done from the OMNIVEX Co. Headquarter with trained professionals handling what advertising to provide.

Technologies Used:

GPS Receiver-

The first module used is the GPS system which enables the user to locate, track, calculate the speed & position. The GPS is a satellite navigation system that works in coordination with the mobile devices which are equipped with the GPS receivers to give output in either a two or three dimensional positional data. [2]This helps in the proper identification of our system's location. The GPS system is very important part of the Location based advertisement system to correctly send the position coordinates to the user.

The unit uses GPS receiver to calculate the current location information and the vehicle speed from the tracking antenna. Location and speed data that are provided by it is not in understandable format by human. This raw data needs to be processed to convert it into useful information that can be displayed via the LCD display or it can be send to the mobile through GSM modem. Some GPS module comes with pre fitted data conversion module. [3]

GPS receiver can also provide information of altitude, time of GPS reported location, the status of GPS, and the number of satellite that can be used to compute current location information along with location & speed. For the racking purpose, speed and location data is required for the transmission.

Feature- Powered by USB, Uses MTKMT 3329 chipset, Output data in standard NMEA-0183 @9600 bps, Tracking sensitivity of ON module antenna -165dbm,Accuracy: 3m.

GSM Modem-

The second system used is the GSM system which is the main communication module of our advertisement system. The GSM module is a wireless MODEM, which works with GSM wireless network. Wireless MODEM sends and receives data through radio waves [4].

If the advertisement information transmission and receiving is to be done in a real-time, then a proper communication channel is required and for this the GSM modem system comes in use. In this advertisement, system GSM is used to send the current position coordinates over to the user, the location based advertisement, information & audio and also to address the public focused on. GPS system is needed to properly coordinate and establish a reliable channel between the client and server**.** [5]

The current available technologies for data transfer via mobile are Circuit Switched Data(CSD), General Packet Radio Systems (GPRS), High Speed Circuit Switched Data (HSCSD) and the 3G services. Like the case in audio transmission on landline phones, both HSCSD and CSD charges incurred are based on the total time spent on dial-up connection. However, the GPRS systems are referred as always being connected and it is not necessary to use dial-up modem connection, so in comparison to CSD, immediate sending of information is one of the advantages of GPRS (and SMS). GPRS is a non-voice VAS that allows sending and receiving of data across a mobile network which was designed to run on GSM. GPRS is a packet switched process with

"always on" technology supporting the required Internet Protocols (IP) with a theoretical speed of up to 114kbps. This network can be seen as a subsets of the Internet because GPRS uses the same Internet protocols as the Internet, with each of the GPRS devices as hosts and consisting of their own IP addresses.

Features- GSM SIM 900A Modem, Dual band GSM/GPRS 900/1800MHz., RS232 interface for communication with MCU kit, Configurable band rate, Wire antenna, SIM cardholder, built in N/W status LED.

MICRO-CONTROLLER (ATMEGA 128) -

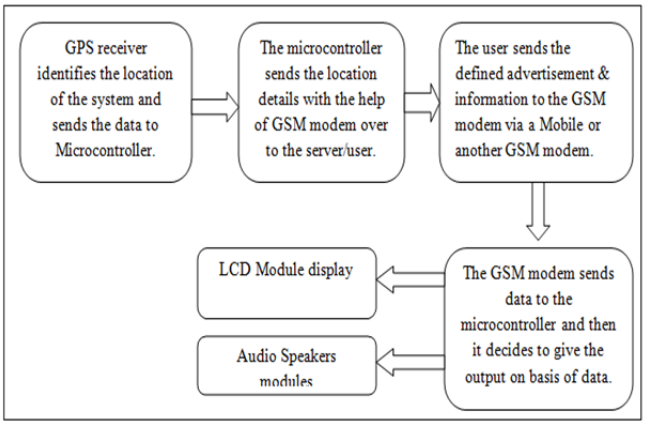
The programming system being used in this project is Atmel Atmega128. This controller has a 64-pin package with 7 ports of bidirectional I/O ports. It features include a EEPROM memory for the storage of data. The Atmega128 chip is organized into 64Kx16 bits and has a 128kB of on-chip programmable flash memory for program storing [6].

Through these pins we are able to interface the modules used i.e. GPS, GSM, LCD matrix display & Audio speaker modules.

The working of all these systems, the data transfer & tracking and complete controlling will be done using the Atmel Atmega128 microcontroller. The microcontroller is programmed in Embedded C language and is the heart of the system as all the modules are interfaced with it. At first, the GPS sends the location coordinates to the microcontroller which sends it to the user via the GSM system. When the user receives the coordinates then the advertisements or information is sent to the GSM system and through this the microcontroller gives the output. The output is taken through Audio speaker if in the form of voice/audio and uses LCD display for message output.

Working Methodology:

BLOCK DIAGRAM:



The GPS module with the help of antenna and satellite communication system measures the location coordinates in NMEA format and is converted when connected through USB, the virtual communication ports on computer allows to write program to process the data in readable format.

- The microcontroller ATMEGA128, interface with GPS and records the data and programmed to send the data via GSM module.
- The GSM module is a SIM 900A modem, with 900/1800MHz. The modem is interfaced via RS232. It is suitable for voice as well as data transferring M2M interface make audio call, SMS, read SMS and attend call [7-8]. The location information is send via the GSM via SMS and reaches the user.
- When the location is verified, then the advertisement or information is send and received via GSM module. The server uses mobile application. Information can be send through SMS and GPRS.
- The information is first stored in flash drive and then the microcontroller access the most recent information and decides whether the information is message or media and then display it via LCD screen or is an audio message and give output via audio speakers. It will continue to display until next message is receive or can be programmed to run for few minutes.
- Database of important location is to be maintained. So that, on coming to that location, the microcontroller displays the message shown earlier for that locations.

Advantages:

- Using GSM/GPRS we can send message & audio to any distant locations from wherever we are.
- Notifications can be delivered within seconds.
- Automatic identification of location, speed & altitude of vehicle in which system is installed.
- Advertisement based on location.
- Real-time information delivery & location access.
- Prevents unauthorized access.
- Can be used as a Public Addressing System.

Conclusion

In this paper, we have proposed a location based digital Advertisement system, using several hardware components. The Proposed system is an application framework Advertisement system with tracking management integrated with GPS and GSM technology for effective and efficient information delivery and management. The system being worked on has huge applications and future use as well as an important application of Public Addressing system. The model enables real time control and tracking. The tracking system shows the feasibility of using it in any public transport system

like bus and metro. It is believed that the application of this system will lead to important changes in the advertisement system. In the future, the system can be integrated with other related modules in a vehicle.

Applications

- Educational organisations, institutions, Companies for information delivery.
- During Disaster management, for announcements related to specific areas.
- For Advertisements in Buses, Railways & Metro or any public vehicle.
- In remote locations where proper public addressing system are not used.
- Railway stations and any public utility places.

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