BUS TRACKING SYSTEM USING GPS

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Abstract— The present generation requires the information time to time.The use of technogology have been increasing day by day.So we are planning for the combination of present technology with the requirement of information transmission, we planned for the creative approach of "Vehicle Tracking System using GPS and GSM".To overcome the drawbacks of the previous methods of paper based and we introduce a project to track a **bus using GPS and GSM**. This **bus Tracking System** can also be used for Accident Detection Alert System, Soldier Tracking System and many more, by just making few changes in hardware andsoftware and widely in tracking Cabs/Taxis, stolen vehicles, school/colleges buses etc.

Keywords:- *Bus tracking system, Real-time bus tracking, GPS tracking, Mobile tracking applications,Route optimization*

I. INTRODUCTION

College bus Tracking System (VTS) is the technology used to determine the location of a vehicle using different methods like GPS and other radio navigation systems operating through satellites and ground based stations. By following triangulation or trilateration methods the tracking system enables to calculate easy and accurate location of the vehicle. Vehicle information like location details, speed, distance traveled etc. can be viewed on a digital mapping with the help of a software via Internet. Even data can be stored and downloaded to a computer from the GPS unit at a base station and that can later be used for analysis. This system is an important tool for tracking each vehicle at a given period of time and now it is becoming increasingly popular for people having expensive cars and hence as a theft prevention and retrieval device.

i. The system consists of modern hardware and software components enabling one to track their vehicle online or offline. Any vehicle tracking system consists of mainly three parts mobile vehicle unit, fixed based station and, database and software system.

ii. Vehicle Unit: It is the hardware component attached to the vehicle having either a GPS/GSM modem. The unit is configured around a primary modem that functions with the tracking software by receiving signals from GPS satellites or radio station points with the help of antenna. The controller modem converts the data and sends the vehicle location data to the server.

iii. Fixed Based Station: Consists of a wireless network to receive and forward the data to the data center. Base stations are equipped with tracking software and geographic map useful for determining the vehicle location. Maps of every city and landmarks are available in the based station that has an in-built Web Server.

iv. Database and Software: The position information or the coordinates of each visiting points are stored in a database, which later can be viewed in a display screenusing digital maps. However, the users have to connect themselves to the web server with the respective vehicle ID stored in the database and only then she/he can view the location of vehicle traveled.

I. LITERATURE SURVEY

recently, all over the world, crime against children is increasing at higher rates and it is high time to offer safety support system for the children going to schools. This paper focuses on implementing children tracking system for every child attending school. However the existing systems are not powerful enough to prevent the crime against children since these systems give information about the children group and not about each child resulting in low assurance about their child safety to parents and also does not concentrate on sensing the cry of the child and intimating the same to its parents. The proposed system includes a child module and two receiver modules for getting the information about the missed child on periodical basis. The child module includes ARM7 microcontroller (lpc 2378), Global positioning system (GPS), Global system for mobile communication (GSM), Voice playback circuit and the receiver module includes Android mobile device in parent's hand and the other as monitoring database in control room of the school. Finally, implementation results for the proposed system are provided in this paper.

Hiroshima City Children Tracking System is a safety support system for children based on ad hoc network technologies. Field experiments have been conducted in cooperation with an elementary school in Hiroshima. In this paper, we propose a new generation children tracking system which is based on experiences and findings of the field experiments for Hiroshima City Children Tracking System. Our proposed system consists of Android terminals which has Wireless LAN device and Bluetooth device with the ad hoc communication function. Our system manages groups of Android terminals using Autonomous Clustering technique. In this paper, we show the system requirements for our children tracking system and describe the implementation features to satisfy the system requirements. Finally, we provide some preliminary implemented results for our proposed system.

In present time due to increase in number of kidnapping and road accident cases, Parentsalways worry about their children. This paper proposes a SMS based solution to aid parents to track their children location in real time. The proposed system takes the advantage of the location services provided by module kit which carry by the Childs in their school bag. It allows the parent to get their child's location on a real time map by the geographical coordinates which send by the module kit. Information such as GPS coordinates and time are gathered and sent to the parent's phone that's preregistered on the module kit. The communication between the parent and the child module kit is done using Short Message Service (SMS). SMS offers the system uniquefeatures. It will allow the system to work without the need of internet connection. The system sends

the location of child's smart phone to parent's smart phone when the parent wishes to check on the child.

Millions of children need to be moved from home to school and vice versa every day. For parents, obtaining a safe transport for their children is a critical issue. Many children find themselves locked in a school bus in the bus parking lot after falling asleep on their way to school, miss the bus, step into the wrong bus, or leave at the wrong station with no method to track them. This research tested the applicability of radio frequency identification (RFID) technology in tracking and monitoring children during their trip to and from school on school busses. The child safety system developed in thisresearch utilized the passive RFID tracking technology due to its efficient tracking capabilities, low cost, and easy maintenance. Toexplore the technical feasibility of the proposed system, a set of tests were performed in the lab and with the public. These experiments showed that the RFID tags were effective and stable enough to be used for successfully tracking and monitoring children using the bus. When asked to give their feedback of the solution through a questionnaire, more than 95% of the parents see that such a solution will take their anxiety and worry away and will provide them a tool to track their kids during commuting to and from their schools.

This paper presents the recent technical research on the problems of privacy and security for radio frequency identification (RFID). RFID technology is already used widely and is increasingly becoming a part of daily life. However, issues regarding security and privacy with respect to RFID technology have not been resolved satisfactorily. There are huge number of challenges, which must be overcome to resolve RFID security and privacy issues. It is because of the many constraints attached to the provision of security and privacy in RFID systems. These challenges are chiefly technical and economic in nature but also include ethical and social issues. Along with meeting the security and privacy needs of RFID technology, solutions must be inexpensive, practical, reliable, scalable, flexible, inter-organizational, and long lasting. This paper reviews the approaches which had been proposed by scientists for privacy protection and integrity assurance in RFID systems, and treats the social and technical context of their work. This paper can be useful as a reference for non specialist, as well as for specialist readers.

II. PROPOSED METHODOLOGY

The proposed system is operated by the Android platform smartphone, with the built-in GPS receiver. The bus location is tracked using GPS, which is based on the trilateration mathematical principle. The location of the GPS can be determined as it is capable of receiving data from at least three satellites. To receive the signal from the satellite, the conductor should turn on the GPS in his Android smartphone. The device receives the GPS data and sends the latitude and longitude values of the location of the bus to the server at regular intervals.

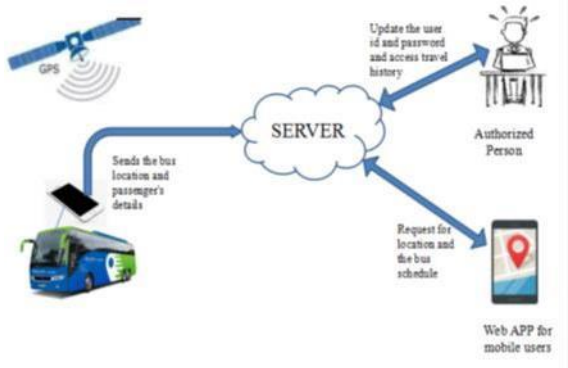


Fig -1: Architecture of proposed system

In this system, the server is the most important module and acts as the central repository of the system. It acts as the intermediate between the bus module and the user module. Here, the whole information is stored and maintained in the MySQL database. A web application is used to facilitate the submission and request of information to thedatabase server. In MySQL, tables are created to store various types of data. Each table comprises theusername and password of the conductor or the authorized person, live coordinates of GPS, route ID,bus number of all the buses, bus schedule, passengerdetails, longitude, the latitude of all the buses and

distance between them and also the order of bus stops for various routes.

To distinguish each bus among the various buses, it is thus, provided with a particular ID that is unique and is stored in the database. Additionally, along the routes in which the bus travels, points are set up at the closest bus stops. These points are stored in the database and are necessary to calculate the distance between the passenger and the bus. This increases precision in obtaining the data. To depict the route in which the bus is traveling, each route is provided with a route ID and the order of bus stops on that route are stored. The order of bus stops, and the route id helps to depict the direction of bus, and also to provide the longitude and latitude values of bus to calculate the distance. Google Maps are used to plot the location of the bus. To increase the accuracy in locating the real-time location of the bus on the map, real-time coordinates of the current bus are uploaded to the server where it is compared with the coordinates of the closest bus stop and the distance between them is calculated.

Bing Maps Distance Matrix API is used as it provides the distance and travel time for a set of origin and destination. To calculate the distance and arrival time, we consider longitude and latitude values of bus location as origin and location values of the bus stop as the destination. It calculates the arrival time based on predictive traffic information, mode of transportation, start and end time, and more. Moreover, it has the advantage of calculating the speed automatically. The map retrieves information from the database using PHP and JavaScript. PHP is used to export the bus location and other details from the database and to display it on the web application.

III. IMPLEMENTATION

1. NodeMCU ESP8266

The **NodeMCU ESP8266 development board** comes with the ESP-12E module containing ESP8266 chip having Tensilica Xtensa 32-bit LX106 RISC microprocessor. This microprocessor supports RTOS and operates at 80MHz to 160 MHz adjustable clock frequency. NodeMCU has 128 KB RAM and 4MB of Flash memory to store data and programs. Its high processing power with in-built Wi-Fi / Bluetooth and Deep Sleep Operating features make it ideal for IoT projects.

NodeMCU can be powered using Micro USB jack and VIN pin (External Supply Pin). It supports UART, SPI, and I2C interface.

NodeMCU ESP8266 Specifications & Features

- Microcontroller: Tensilica 32-bit RISC CPU Xtensa LX106
- Operating Voltage: 3.3V
- Input Voltage: 7-12V
- Digital I/O Pins (DIO): 16
- Analog Input Pins (ADC): 1
- UARTs: 1
- SPIs: 1
- I2Cs: 1
- Flash Memory: 4 MB
- SRAM: 64 KB
- Clock Speed: 80 MHz
- USB-TTL based on CP2102 is included onboard, Enabling Plug n Play
- PCB Antenna
- Small Sized module to fit smartly inside your IoT projects

2. NEO-6M GPS Module

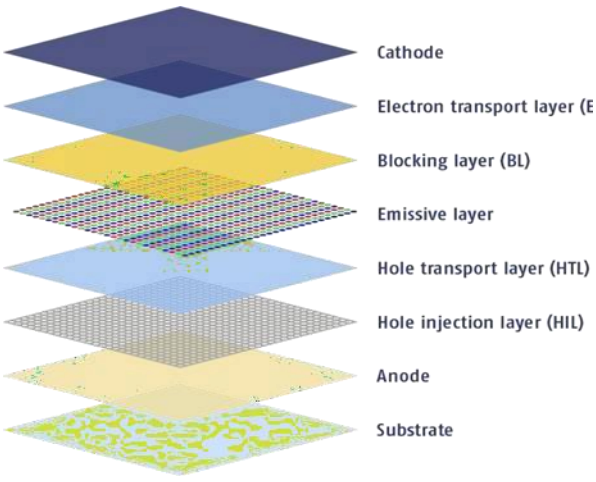
At the heart of the module is a NEO-6M GPS chip from u-blox. The chip measures less than the size of a postage stamp but packs a surprising amount of features into its little frame.

It can track up to 22 satellites on 50 channels and achieves the industry's highest level ofsensitivity i.e. -161 dB tracking, while consuming only 45mA supply current.Unlike other GPS modules, it can do up to 5 location updates a second with 2.5m Horizontal position

accuracy. The u-blox 6 positioning engine also boasts a Time-To-First-Fix (TTFF) of under 1 second.One of the best features the chip provides is Power Save Mode(PSM). It allows a reduction in system power consumption by selectively switching parts of the receiver ON and OFF. This dramatically reduces power consumption of the module to just 11mA making it suitable for power sensitive applications like GPS wristwatch.The necessary data pins of NEO-6M GPS chip are broken out to a 0.1″ pitch headers. This includes pins required for communication with a microcontroller over UART. The module supports baud rate from 4800bps to 230400bps with default baud of 9600.

3. OLED Display Module

The basic OLED structure is simple - an organic emitter placed between two electrodes. But in order to create efficient and long-lasting devices, commercial OLEDs use several intermediate layers, like electron transport and blocking layers. The whole organic stack is placed between the electrodes, and this whole structure is deposited on the substrate (glass or plastic) and the display backplane (driver electronics). Some OLED displays on the market make use of dozens of different layers, one on top of the other.



Currently, almost all OLED displays on the market are produced using an evaporation-based process, in which the OLED materials are deposited in a vacuum chamber. This has proven to be a great way to make OLEDs, but the process has its limitations - mainly material waste and high cost.

Companies are now developing next-generation deposition processes to enable more efficient production. One example is ink-jet printing, which makes use of soluble OLED inks that can be deposited using huge printers. This process is faster than the current evaporation process, and has almost no waste of materials. While there are still some challenges to overcome, it is expected that printed OLEDs will start entering the market soon - starting with TVs and monitor panels.

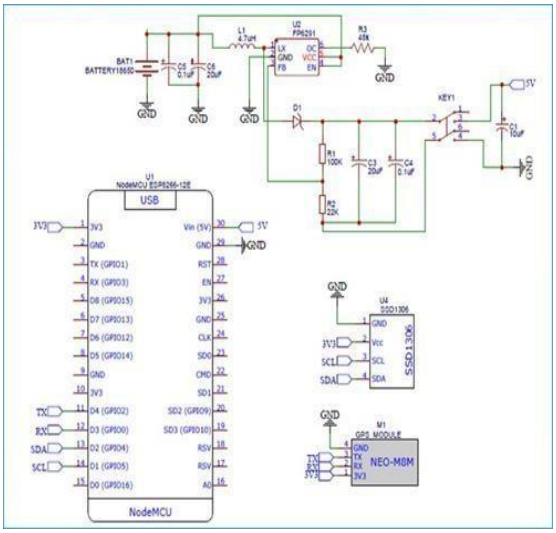
The future of OLEDs seems bright as their presence in the smartphone and TV markets is continuously growing, in addition to other markets (such as wearables, VR and more).

OLED technology is still an emerging technology, and many avenues are still open for new materials to be found and new processes to be developed that could further enhance OLED displays.

IoT Based Location Tracker Circuit Diagram

The complete circuit diagram for **NodeMCU GPS Tracker** Board is shown below. The schematic was drawn using EasyEDA. This HAT consists of a NodeMCU with NEO-6M GPS Module, OLED Display Module, and Booster circuit. The booster circuit is designed around a dedicated FP6291 Boost Converter IC to boost the battery voltage from 3.7v to 6V. This location tracking board can be used to track Cars/Bikes/almost anything.FP6291 IC is a 1 MHz DC-DC Step-Up Booster IC, mainly used in the application, for example, getting stable 5V from 3V battery. You only need few extra components to design a booster circuit with this IC. Here, in this circuit, the Boost Converter circuit gets the input supply through battery terminals (+ and -). This input voltage is then processed by FP6291 IC to give a stable 6V DC supply to the VIN pin of NodeMCU.

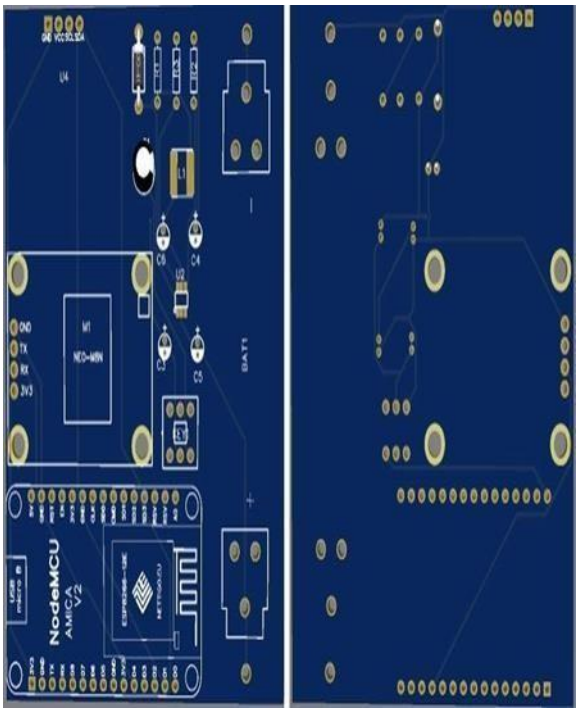
The output voltage from this IC can be configured using the potential divider circuit.The formula to calculate the output voltage is:



Fabricating PCB for NodeMCU GPS Tracker Board

Now that we understand how the schematics works, we can proceed with building the PCB for our project. You can design the PCB using any PCB software of your choice. We have used EasyEDA to fabricate PCB for this project. We have previously used EasyEDA many times and found it very convenient to use compared to other PCB fabricators. Click on the link to check all the PCB projects. They also offer a component sourcing service where they have a large stock of electronic components, and users can order their required components along with the PCB order.

While designing the circuits and PCBs, you can also make your circuit, and PCB designs public so that other users can copy or edit them and can take benefit from your work. We have also made this NodeMCU GPS Tracker PCB design file and GERBER file public, check the link given below:



IV. CONCLUSION

The project titled "tracing down the vehicle using GSM and satellite communication" is a model for vehicle tracking unit with the help of gps receivers and GSM modem. Vehicle Tracking System resulted in improving overall productivity with better fleet management that in turn offers better return on your investments. Better scheduling or route planning can enable you handle larger jobs loads within a particular time. Vehicle tracking both in case of personal as well as business purpose improves safety and security, communication medium, performance monitoring and increases productivity. So in the coming year, it is going to play a major role in our day-to-day living.

We have completed the project as per the requirements of our project. Finally the aim of the project i.e. to trace the bus is successfully achieved.

V. REFERENCES

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