Improving Child Security using GPS Enabled Identification Card

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The security of children in the country is a measure issue for the future of country. Children's security can be improved by using a tracking system using Global Positioning System (GPS). In this paper we discussed a tracking system with the student Identity Card, which is GPS enabled with other tracking systems. ID card will be linked to parents mobile by which a parent can find their child's location anytime from anywhere. Further, this concept can also be extended to implement for the security of employees working in remote areas and working in night.

Key words: Global Positioning System (GPS), ID Card.

1. INTRODUCTION

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. J. Saranya et. al. proposed system includes a child module and two receiver modules for getting the information about the missed child on periodical basis [1].

The Global Positioning System (GPS) is increasingly being adopted by private and public enterprise to track and monitor humans for location based services (LBS). Some of these applications include personal locators for children, school bus [2] the elderly or those suffering from Alzheimer's and dementia patients [3], and the monitoring of parolees for law enforcement, security or personal protection purposes [4].

A location-based service (LBS) is information or entertainment service, accessible with mobile devices through the mobile network and utilizing the ability to make use of the geographical position of the mobile device. LBS can be used in a variety of contexts, such as health, indoor object search, entertainment, work, personal life, etc. LBS include services to identify a location of a person or object, such as discovering the nearest banking cash machine or the whereabouts of a friend or employee. LBS include parcel tracking and vehicle tracking services. LBS can include mobile commerce when taking the form of coupons or advertising directed at customers based on their current location. They include personalized weather services and even location-based games.

GPS tracking System is one of the most rapidly growing technologies around the world. Most developed countries have focused on the GPS technologies in resolving some of their inherent security problems. GPS has the ability to calculate the position, time, and velocity of any GPS receiver. It does so using a process of triangulation, which works on

the premise that you can find any position if the distance from three other locations is also known.

The U.S. Department of Defense first launched a Global Positioning Systems (GPS) satellite in 1978 and achieved a full constellation of 24 satellites in 1994, which the U.S. government has named Navstar. Today, GPS is used for both civil and military purposes and is controlled by a joint civilian/military executive board of the U.S. Government. The system is maintained by the U.S. Air Force on behalf of all users. GPS relies on three components: a constellation of satellites (currently 27) orbiting about 20,000km (11,500 miles) above the earth's surface which transmit ranging signals on two frequencies in the microwave part of the radio spectrum, a control segment which maintains GPS through a system of ground monitor stations and satellite upload facilities, and user receivers (civil and military) [5,6].

2. WHAT IS GPS

The GPS consists of three segments; i) The space segment: the GPS satellites, ii) The control system, operated by the U.S. military, iii) The user segment, which includes both military and civilian users and their GPS equipment.

The Global Positioning System (GPS) is actually a constellation of 32+ Earth-orbiting satellites. The U.S. military developed and implemented this satellite network as a military navigation system, but soon opened it up to everybody else. Each of these 3,000- to 4,000-pound solar-powered satellites circles the globe at about 12,000 miles speed (19,300 km), making two complete rotations every day. The orbits are arranged so that at anytime, anywhere on Earth, there are at least four satellites "visible" in the sky.

A GPS receiver's job is to locate four or more of these satellites, figure out the distance to each, and use this information to deduce its own location. This operation is based on a simple mathematical principle called ***Trilateration,*** which is the process of determining your position based on the intersection of spheres [7].

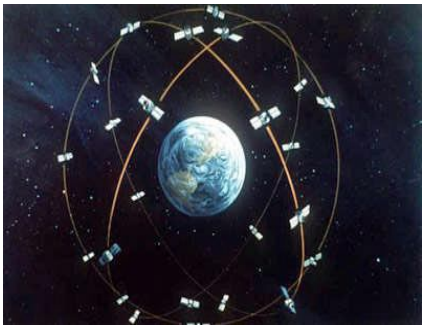


Fig. 1: GPS layout.

In order to make the simple calculation of the location, then, the GPS receiver has to

know two things:

1. The location of at least three satellites above you.
2. The distance between you and each of those satellites.

3. GPS TRACKING SYSTEM UNITS

Three Types of GPS Tracking Units are there. The categories are split into how GPS data is logged and retrieved.

3.1. Data Loggers

Data logger simply logs the position of the object at regular intervals and retains it in an internal memory. For this purpose GPS loggers have internal flash memory on board to record data that is logged. The flash memory can then be transferred and accessed using USB or accessed on the device itself. Data loggers include devices that help log location for hikers, bikers and joggers.

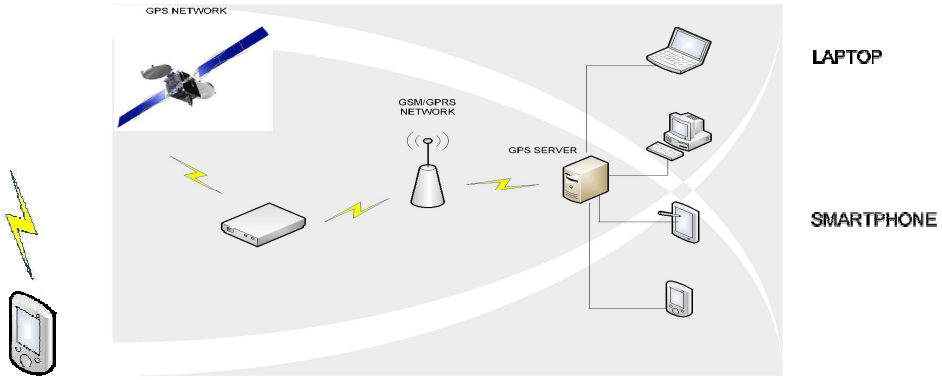
3.2. Data Pushers

Data Pushers are GPS tracking units that are mainly used for security purposes of assets, personal or movable items like vehicles and animals. A data pusher GPS tracking unit sends data from the device to a determined server at regular intervals, updating location, direction, speed and distance. Data pushers are common in fleet control to manage trucks and other vehicles. Virtually every cell phone is in this mode per user agreement, even if shut off or disabled storing the data for future transmission. With the help of data pushers delivery vehicles can be located instantly and their progress can be tracked. Other uses include the ability to track valuable assets. If valuable goods are being transported or even if they reside in a specific location, they can constantly be monitored to avoid theft. Data pushers are also common for espionage type tasks. This particular use of GPS tracking has become an important issue in the field of security.

3.3. Data Pullers

GPS data pullers are also known as "GPS transponders". Data pullers are always on, and can be queried as often as required. This technology is not in widespread use, but an example of this kind of device is a computer connected to the Internet. These are often used in the case where the location of the tracker will only need to be known occasionally e.g. placed in property that may be stolen, or that does not have a constant source of energy to send data on a regular basis, like freight or containers [8].

4. THE ARCHITECTURE OF A GPS TRACKING SYSTEM



5. MAIN FEATURES OF THE GPS TRACKING SYSTEM

Generally all of the GPS Tracking System has some of the common features that are listed below:-

5.1. GSM/GPRS Module for Real Time Mapping

It is used to send the location to the user online. In some case, if the user wants the location through the internet then this module is very useful. By the help of the GSM/GPRS module, we can send data real time. It can be seen on the internet enabled any device as a PC, mobile phone etc.

5.2. Track Playback

Animates daily driven route of your device so that you can follow every move. The track animation line is colour coded to indicate the speed of device was travelling during his route.

5.3. Idle Time Report

Gives you an accurate report detailing when your device/driver was stopped and when it moved again.

5.4. Track Detail

Provides you with a split screen view when reviewing your device/driver's route. Stop and transit times, as well as speed information, are displayed in the bottom pane. You can easily toggle between stops by clicking the stop number on the track detail pane.

5.5. Landmark and Geo Fencing

It allows us to limit some region of area and if your device/vehicle goes beyond the boundary of that region then urgent message will be sent by the system to the manager.

5.6. Ignition ON/OFF detection

The system can save the information about the vehicle engine that it is in working condition or stop by ignition ON/OFF detection so that the manager can know for how many times the driver stopped the fleet.

5.7. SMS / GPRS Communication

The location about the fleet or the person can be send by SMS or email by this facility.

5.8. On-Line and Off-Line tracking

Every user has different requirement and as per the requirement the data can be viewed real time or it can be saved in the unit and when the device/vehicle reach to its manager, manager can download data and see the every detail that can be seen by the real time.

5.9. Buzzer for alerting the device/driver

Some system uses the buzzer system to alert the device/driver that he is going out of the boundary or the speed is very high or anything that is restricted. So that the person or driver is able to know that he is going wrong.

5.10. Monitoring digital events

If you need to know when a piece of machinery was turned On/Off or when a door was Open/Shut, this system will provide you with best options [9].

6. PROPOSED SYSTEM

We plan for a system that increases the child security using GPS system enabled Identification card. In every school it is almost mandatory that every student should possess ID card. If an ID card with a GPS chip is used such that it will remain in touch of the skin of child e.g. watch or band, then it will improve the security of child. To activate this GPS chip, we also embed a sensor. This sensor will be used to charge a battery in ID card and then GPS chip will be activated to send the information on the respective parents mobile. If the child removes the ID card from his body, the sensor will immediately send a command to stop charging the battery and also will deactivate the GPS chip. But before deactivating the GPS, it first sends a message to parent mobile that is linked cell phone along with the current location of the child by an algorithm.

A parent also can track whether his child attended the classes or skipped the school and went out of the school campus. Even the parent can track the route of the school bus

that carries his/her child to school and the speed of bus also.

This system also can be implemented for the employees who stay back at the offices late night or working in remote areas for their security. Their position and can be tracked by the organization/company. This system makes the cops work also much easier and locate the missing child/employee within seconds and can catch the culprits before any harm is done to the kidnaped person.

7. CONCLUSION

Identification card connected with GPS tracking will increase the child security and simultaneously it can be monitored by the parent. It also provides the information to the parents about their child behavior on road and their attendance in the school/college. The GPS enabled Identification card system will also help companies and Government for security of their employees working in critical conditions.

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