Location Finder using ARM7 by GPS & GSM by Android phone

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Abstract

Now a day both parent are working outside for their respective job, so because of this no one is with their child who can keep observation like whether child is coming safely from school or not, whether child is happy at school atmosphere or not etc. So point arises how parent can keep these observation while seating in their respective office. The answer is child tracking system on mobile terminal. The proposed system includes a child module which have GPS, GSM, and ARM7 and voice playback circuit and parent module which includes mobile phone (which supports internet connectivity) for getting the information about the missed child on periodical basis. Addition to the proposed system is that parents don't have to continuously monitor the location of child, if child is going outside of define area then alert message will be given to parents. Also if child is crying then also alert message will be send to parents. Child module has one panic switch, with the help of which child can alert parents.

Keywords: Android; ARM7; GPS; GSM; lpc2378

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. 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 school authorities and also does not concentrate on sensing the cry of the child and intimating the same. Children Tracking system is widely used all over the world to assure parents that their wards are safe from suspicious actions and their kid is happy in school atmosphere without crying.

The proposed system includes tracking the child's movement to and from school. The information pertaining to missed child is sent to the control room of the school as well as to their respective parents, if they move beyond

the coverage area. Not only the information about the child's whereabouts but also whether the child is crying is sent to parents through text message to their Android mobile device. The proposed implementation is to provide security to the children going to schools and also to see whether the child is happy or not. This proposed system also concentrates on giving the information whether child is present in the school or not to both the parent and to the school database.

2. Related Work

2.1 Survey of Different Child Tracking System:

There are three main systems with the help of which child tracking system can be implemented.[2]

Cell Phone Tracking:

The In cell phone tracking system every child is given one small cell phone with the help of which parents can call or message their child whenever they want, so they get detail information about the location and about the happiness of child. There is possibility that child may delete the call log and SMS details manually, for this all deleted data is saved in server. Also content of message and call log can be viewed by their parents even if their child changes the number. This system also provides GPS location of the child so that parents can track the location of the child and

can set up alerts if their child is moving outside of define area. This system can also track the browser activities and provides call block and message from specific number. But this system is similar to carrying a cellular phone. Though today"s generation is very well familiar with every mobile phone but children between edges of 4-8 may get problem with handling of cellular phone. Such children have huge tendency of playing, so they may missed cellular phone or they may not carry the cellular phone during play. In that case tracking of child activities will not be possible.

Android:

In this system a particular android app is created and that will display child"s location to the parents. Android is an operating system based on the Linux kernel, and designed primarily for touch screen mobile devices such as smart phones and tablet computers. The proposed child tracking system uses this android based approach, to develop one android app that can show the location of child whenever parent's want and also alerts the parents if child is moving outside of define area.

GPS:

The Global Positioning System (GPS) is space based navigation system that provides location information in terms of latitude and longitude, anywhere on the earth by using satellite. There

are lots of application are of GPS which are mainly used in military, civil and in commercial purpose. In some of school of America, uses this GPS based system in which one small GPS module is placed in the bag of each child. But the problem with this is child may or may not carry the bag each and every time or bag is not necessarily with child every time. The proposed child tracking system uses this GPS module as one of the function block which will track the location of the child and also alert the parents if child is moving outside of define area with the help of ARM7.

The proposed system includes a child module and receiver module for getting the information about the missed child. The child module includes Cortex M3 (Lpc1768),Global positioning system (GPS), Global system for mobile communication (GSM) ,Voice recognition module, RFID tag and the receiver modules includes android phone and school module contains Global system for mobile communication (GSM) ,RFID reader and the other as monitoring database in control room of the school. This proposed system transmitting section describes the conceptual design of a Children Tracking System (Figure1). The children information is transmitted and received using GSM technology. The Child module acts as a transmitter which includes Arm cortex M3 microcontroller LPC1768, GSM module, GPS module and Voice recognition module. RFID

tag will be inserted in the child ID card. Child module is fixed to each and every child. The position of the moving child is tracked by GPS and is sent to ARM cortex LPC1768 microcontroller. This Controller forwards the GPS data (latitude & longitude) to GSM board. GSM will in turn send the position of the moving child to two receivers. When the child cries, voice recognition module is triggered by ARM LPC1768 microcontroller and intimation about corresponding child is given through text message to their parents and to the school module. Whenever switch is pressed GPS data will be sent to the parents and school database by using GSM. An app is also included in the parent mobile to locate the GPS location values on the GMAP.
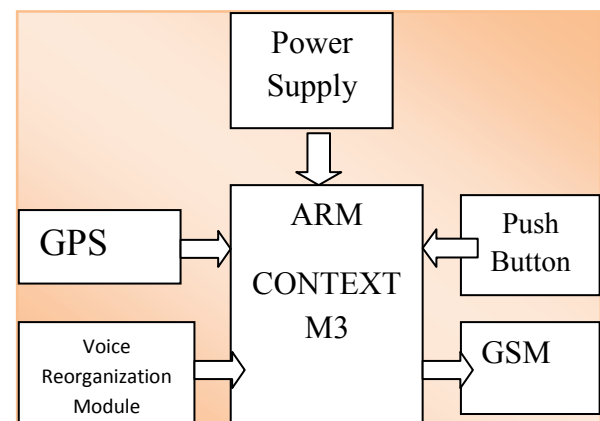
Fig 1: Block Diagram of Child module.
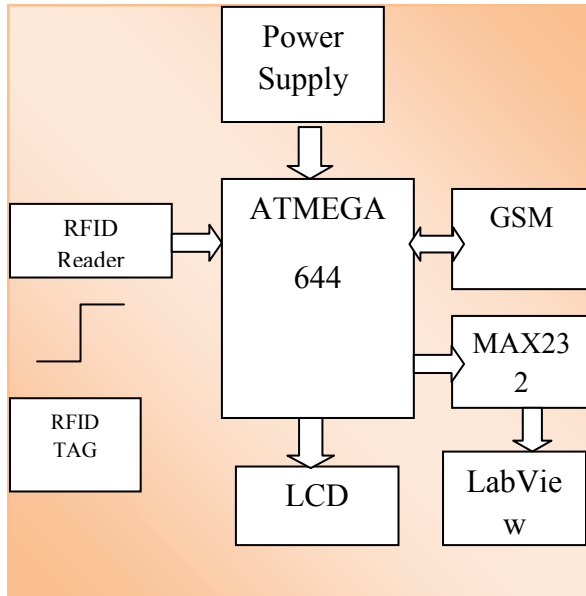
Fig 2: Block Diagram of School module.

School module (Figure 2) includes RFID reader module,ATMEGA644 controller. GSM module, LCD and lab view for monitoring in the school. LCD is used to know whenever tag is to be placed and to know whether it is a valid card or not. RFID tag unique number is read by reader and is sent to ATMEGA 644P controller. If it is a valid card then a msg will be sent to the parent android phone that the child is present in the school and whenever the card is swiped second time then a msg will be sent that your child has left the school through GSM module and the same information will be shown in school mode in excel sheet by using Lab view software. Also whenever child cries or switch is pressed, GPS data also be displayed in school database. Children Tracking system is widely used all over the world to assure parents that their wards are safe from suspicious actions and their kid is

happy in school atmosphere without crying. The proposed system includes tracking the child's movement to and from school. The information pertaining to missed child is sent to control room of the school as well as to their respective parents, if they move beyond the coverage area. Not only the information about the child's whereabouts but also whether the child is crying is sent to parents through text message to their Android mobile device. System developed by Yuichiro MORI, et.al, uses "Autonomous Clustering technique" for managing groups of Android terminals attached to children in school. Android terminals have wireless LAN and Bluetooth device. It adopts Bluetooth communication among Android mobile terminals in every cluster to collect information and cluster head delivers the same through tags to server at school using wireless LAN. It results in lack of individual attention towards the children since the cluster head sends the information about the children group and not about each individual & also does not concentrate on child crying inside the school. It offers less security [1].

Children tracking system is also developed based on mobile adhoc networks. System developed in [2] says that in GPS system and tag based system, each parent cannot obtain group information on the vicinity of the child. Through field experiments, it is confirmed that, as long as children walked at normal

speed on the predetermined way to and back rom school, the system could provide location and group information of children to their parents. From experimental analysis, it is found that system independent factors such as power shortage in phone and performing wrong registrations in Bluetooth tags dominate in lowering average tag recognition rates for school routes. Tracking system in hospital environment is performed using integrated Ultra wideband and GPS technologies for performing efficient indoor/outdoor tracking. Experiments show that system may provide extra protection for patients but system rely on WiFi network to transmit data and updation rate is quite low due to network jam. It includes complicated calibration procedure as well as high set up cost for the UWB sensor network [3]. Multihop Clustering scheme can be incorporated for adhoc network and it includes dynamic change in topology of adhoc networks, overhead for the management of the network is small and uniformly distributed. It does not include design of generic function to evaluate adaptability of clustering schemes [5]. The above mentioned system [4] inspired me to make an attempt to reconfigure it by adding few features and thus making it more secure compared to the existing one.

3. Implementation

3.1 GPS Technology:

The Global Positioning System, usually called GPS, and originally named NAVSTAR, is a satellite navigation system used for determining one's precise location almost anywhere on Earth. A GPS unit receives time signal transmissions from multiple satellites, and calculates its position by triangulating this data. The GPS was designed by and is controlled by the United States Department of Defence and can be used by anybody for free. The cost of maintaining the system is approximately $400 million per year.

3.2 GPS Principle:

The GPS satellites act as reference points from which receivers on the ground detect their position. The fundamental navigation principle is based on the measurement of pseudo ranges between the user and four satellites. Ground stations precisely monitor the orbit of every satellite and by measuring the travel time of the signals transmitted from the satellite four distances between receiver and satellites will yield accurate position, direction and speed. Though three – range measurements are sufficient, the fourth observation is essential for solving clock synchronization error between receiver and satellite. Thus, the term ―pseudo ranges‖ is derived. The secret of GPS measurement is due to the ability of measuring carrier phases to about 1/100 of a cycle equalling to 2 to 3 mm in linear distance. Moreover the high frequency L1 and L2

carrier signal can easily penetrate the ionosphere to reduce its effect. Dual frequency observations are important for large station separation and for eliminating most of the error parameters.

3.2 GSM Technology:

The Global System for Mobile communication, usually called GSM, Telecommunications Standards Institute (ETSI) to describe protocols for second generation (2G) digital cellular networks used by mobile phones. The GSM standard was developed as a replacement for first generation (1G) analog cellular networks, and originally described a digital, circuit switched network optimized for full duplex voice telephony. This was expanded over time to include data communications, first by circuit switched transport, then packet data transport via GPRS (General Packet Radio Services) and EDGE (Enhanced Data rates for GSM Evolution or EGPRS).. GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 900 MHz or 1800 MHz frequency band. GSM is the de facto wireless telephone standard in Europe. GSM has over 120 million users worldwide and is available in 120 countries, according to the GSM MOU Association. Since many GSM network operators have roaming agreements with foreign operators, users can often

continue to use their mobile phones when they travel to other countries.
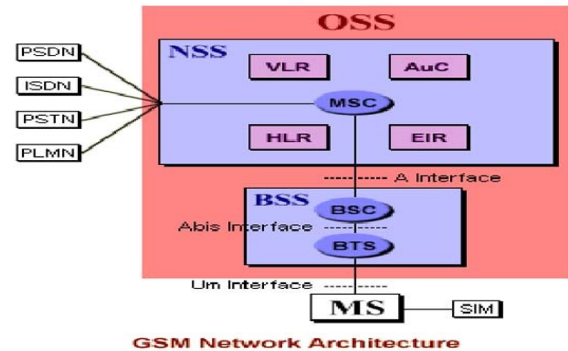
Fig 3: GSM Architecture.

3.3 RFID (Radio Frequency Identification):

Radio-frequency identification (RFID) is the wireless non-contact use of radio-frequency electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects. The tags contain electronically stored information.

Fig 4: RFID Reader Board.

Basic RFID consists of an antenna, transceiver and transponder. Antenna emits the radio signals to activate tag and to read as well as

write information to it. Reader emits the radio waves, ranging from one to 100 inches, on the basis of used radio frequency and power output. While passing through electronic magnetic zone, RFID tag detects activation signals of reader Powered by its internal battery or by the reader signals, the tag sends radio waves back to the reader. Reader receives these waves and identifies the frequency to generate a unique ID. Reader then decodes data encoded in integrated circuit of tags and transmits it to the computers for use.

4. Experimental Results

Figure 5 shows ARM7 (lpc 2138) development board. It receives the data from GPS module and sort it with required latitude and longitude values which are then forwards to GSM. It also operate easy VR for voice recognition.

Fig 5: ARM7 board (lpc 2138)

Figure 6 shows GPS module. When power supply is given to GPS module (GR-301) it

continuously sense current position and gives the data to ARM7.

Fig 6: GPS Module.

Main use of GSM modem is for communication with parents. GSM modem (SIM 900) receives the latitude and longitude values from the ARM7 send it to the parents mobile. It also send the message when child is crying. Figure 7 shows GSM modem.
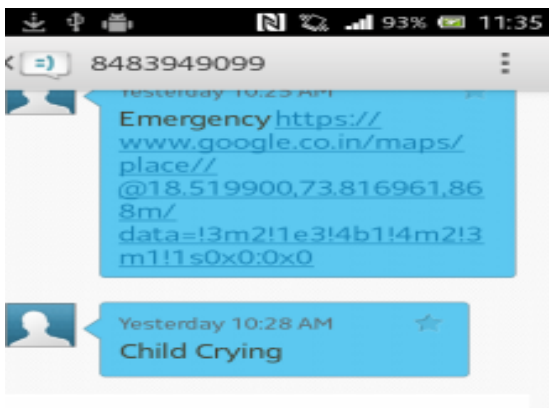

Fig 7: GSM Modem.

Figure 8 shows. Voice playback circuit is used to track the crying of the child. Whenever child cries it will sense its crying and trigger the ARM7.

Fig 8: Voice Play-Back Circuit.

Fig 9: SMS output when child cries.

Fig 10: Android Application.

Figure 10 showsthe screen shot of the android application,which shows the child"s location and parent"s location.

Fig 11:Total Transmitter Model.

Figure 11 indicates the full view of transmitter module. The following table shows the comparison of existing system and our system.

5. Conclusion

In this paper implementation primarily focuses on tracking a child's position and its location is sent to its school control room and parent's mobile. It also focuses on whether the child is present or not in the school and intimating the same to the school and the parent. This paper also focuses on recording a child's cry and when it matches with crying of the child in school the text message containing the location of a child will be sent to the parent and by using longitude and latitude values the location of a child can be traced by using app in the parent's mobile. In future It can be extended to perform the same for all children in the school by reducing the size of the child module. It can be also extended by interfacing a camera to the child module and intimating the missing child or child cry information both

to the parents mobile and to the police control room.

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