Child Tracking System on Mobile Terminal

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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 have one panic switch, with the help of which child can alert parents.

Keywords: Child Tracking System, Global Positioning System (GPS), Global System for mobile communication (GSM), ARM7

I. INTRODUCTION

The Child tracking system is necessarily required for parents as crime against children is increasing at very high rate like kidnapping, harassment, even some time harsh punishment from school etc. Child tracking system will track movement of their child while going to school and coming from school to home. Also it will alert the parents if their child is crying. In this tracking system particular area will be defined by using geo-fencing. Because of this if child is kidnapped or he/she is moved outside of define area then alert message will be sent to respective parents. So parents don't have to do continuous monitoring of child movement, system will alert the parents if child is moved outside of define area.

The system will not only provide the location of the child but also will alert the parents if child is crying and if child requires emergency help through the text message. Children tracking system is also designed by Yuichiro MORI, [3] using autonomous Clustering technique. It consist of tags which collect the information of child group, each child is given one android terminal and server which stores tracking information. Tag consist of wireless LAN which construct a mesh network and also receives and transmit the information regarding to position of child from one tag to another and finally given to computer server which is located at school control room. This system will alert the school that one of the child is missing but its fails to tell where the child is at the current moment. Also it does not concentrate whether child is crying or not.It is very difficult to place tag in different areas for a single school.

City many consist of more than one school. There is also possibility that child may missed the android device, so it become difficult to implement Yuichiro MORI's child tracking system.

II. SURVEY OF DIFFERENT CHILD TRACKING SYSTEM

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

A. 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.

B. 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.

III. OVERVIEW OF SURVEY

Child tracking system is totally remote phone tracking based on Android application. It remotely track the location of child and alert the parents if their child is moving outside of define area through SMS and also will alert parents if their child is crying continuously via SMS. Because of this parents will have a powerful tool to keep the observation on their child even when they can't physically see them. By using following techniques child activity can be tracked. [2]

- SMS tracking- To alert the parents when child is crying and if he moved away from define area.
- GPS tracking- To provide current location of child to parents and also define the boundary area.
- Browser Tracking-Monitor all web browser activity on the target phone. This will give which web sites were visited in case of cell phone tracking.
- Call tracking/blocking- Parents can track and block call from particular number if necessary, in case of cell phone tracking system

IV. SYSTEM DESIGN

On the basis above literature survey the proposed block diagram for child tracking system is shown in figure.

Setup with child consists of GPS module, GSM module, panic switch, ARM7 microcontroller, voice playback circuit and associated power supply. Set up with parents consist of Mobile phone which support internet connections.

Particular area will be defined using geo-fencing for each child module separately. Geo- fencing will be performed with the help of GPS module and ARM7. Whenever child moves outside of define area then alert message will be sent to parent through GSM modem. This message is consist of one link, by clicking on this the location of the child will be shown on the map.
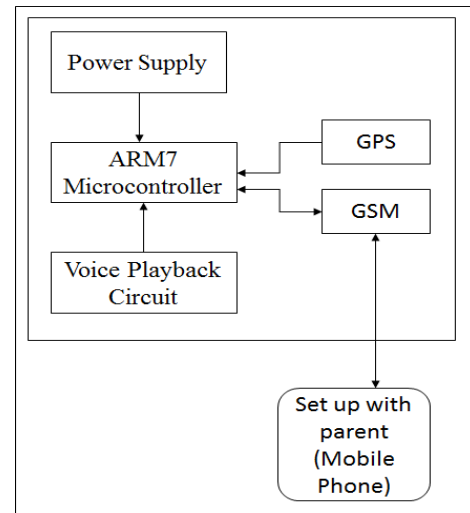

Fig. 1 Block Diagram of System

Alternatively Android app will be developed which will also show the location of child, for this android app received message will consist of latitude and longitude value. But for this android phone is necessarily required. This alert message will be send until child come back into define area or till system is shutdown. Because of this continuous monitoring of child will not be required. Even after this if parents want to see the current location of child they can send the message to child module and obtained the location of child. Short period of audio clip of crying of child will be recorded in Voice Playback Circuit of child which will detect the crying of child. If child is crying then it will trigger the microcontroller which will in result trigger the GSM modem and message of crying of child will be sent to parents.

Setup with parents may have android phone or any other phone which is capable of supporting browsing option. On the google map location of the child will be shown to parents.

V. HARDWARE SYSTEM DESIGN

The hardware required for child module is GSM module, GPS module, ARM7 microcontroller and voice playback circuit:

A. ARM7 (LPC 2138)

LPC 2138 belongs to ARM7 (Advance Risc Machine) family. Clocking speed of ARM7 is very high and it have great interfacing features which will be required for GSM, GPS and voice playback circuit. The main advantage of using ARM7 is it needs low power for its functioning. The power factor at child module is most important, if power goes down it will result in system failure. ARM7 has the knowledge to give AT commands to initiate and send the child information message to Mobile phone through GSM module.

B. GPS

GPS is a multiple – satellite based radio positioning system in which each GPS satellite transmits data that

allows user to precisely measure the distance from the selected satellite to his antenna and to compute position, velocity and time parameters to high degree of accuracy. GPS delivers with high sensitivity and accuracy with low power consumption. In this project main use of GPS module is to sense the current location of child. GPS module used for this project is GR-301, which provides latitude and longitude values.

Features of GPS:

- low power single chip High performance: -159dBm tracking sensitivity Low power:
- Backup battery support for faster position fix Blue LED for position fix indication IPX7
- Waterproof Built-in magnet
- Industrial operating temperature range: -40 ~ 85℃

C. GSM

The advantage of GSM is, its international roaming capability in over 100 countries, it have improved battery life, advanced features such as short messaging, Easy to use over air activation, and all account information is held in a smart card, which can be moved from modem to modem. The GSM module used in this project is SIM300. The main used of GSM modem is to send and receive the message from child module to parent mobile.

D. Voice Playback Circuit (easyVR)

In this project voice play circuit used to detect the crying of child. For this easyVR voice playback circuit is used. First one short duration voice clip of crying of child is saved, which will be used as reference. Some of the features of easyVR are:

a) Non-volatile Flash memory technology.
b) No battery backup required.
c) 100K record cycles (typical)
d) Low power consumption
e) Automatic power-down feature for longer battery life.
f) Single 5V power supply.
g) User-friendly, easy-to-use operation.
h) Programming & development systems not required.
i) Level-activated recording & edge-activated playback switches.

VI.SOFTWARE SYSTEM DESIGN

A.   Keil uVersion4 & flash magic

Keil software is used to generate hex file which will be loaded in ARM7 (LPC 2138) by using flash magic. The code is written using 'C' language. Code is written for interfacing GPS, GSM and voice playback circuit with ARM7 at child module which is nothing but transmitter side. Code written in ARM7 in such way that it will generate appropriate output at receiver side. Flash Magic is used to burn the hex file into ARM7.

B.   Android Studio

Android Studio is new software developed by 'Google' to generate android app. This software have much larger features about 'google map' related activities than ECLIPSE.   Java language is basic platform for app

creation. This app is only created for android mobiles for other there is no need of such app.

VII. RESULTS AND DISCUSSION

Figure 2 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.
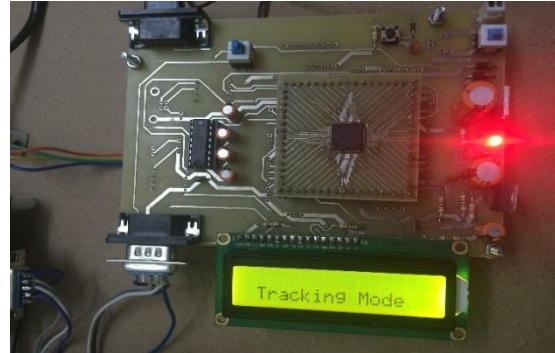

Fig. 2 ARM7 board (lpc 2138)

Figure 3 shows GPS module. When power supply is given to GPS module (GR-301) it continuously sense current position and gives the data to ARM7. Figure 4 shows GPS output.
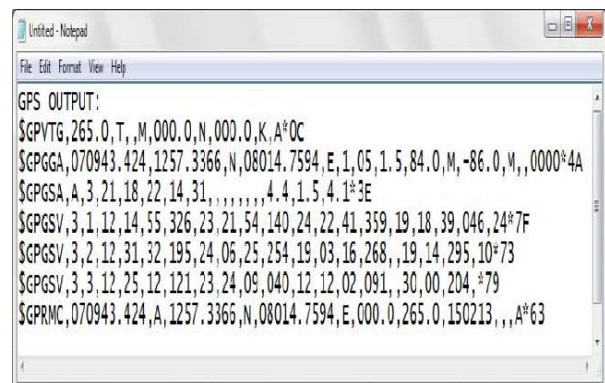

Fig. 3 GPS Module

Fig. 4 GPS Output

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 5 shows GSM modem.
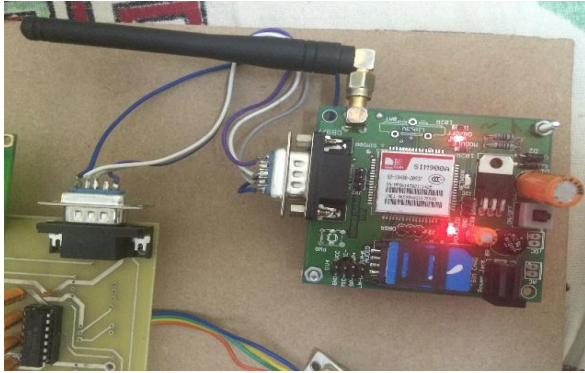
Fig. 5 GSM Modem

Figure 6 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.
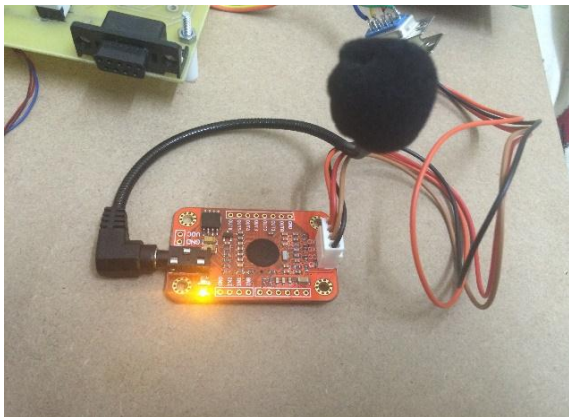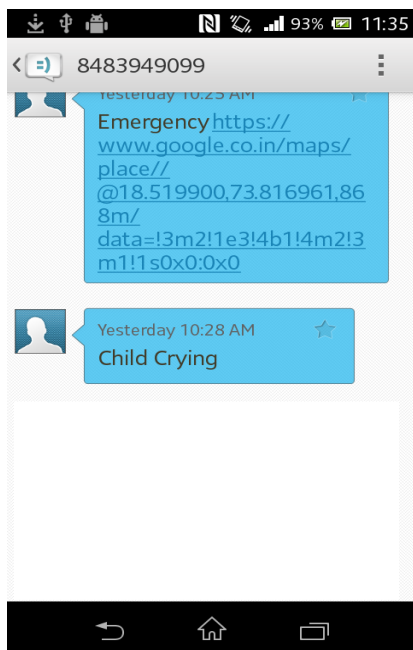

Fig. 6 Voice Play-Back Circuit

Fig.6 SMS Output when child cries

Fig. 7 Android application

Figure 7 showsthe screen shot of the android application,which shows the child's location and parent's location.

Fig. 8 Total Transmitter Model

Figure 8 indicates the full view of transmitter module.
The following table shows the comparison of existing system and our system.

TABLE 1

Parameters	Existing System	Our System
Geofencing	Not Available	Available
Panic Switch	Not Available	Available
SMS-Link	Not Available	Available
Continuous Monitoring	Required	Not Required

VIII. CONCLUSION

The system implementation mainly concentrates on tracking of child's movement to and from school. A particular area can be defined for each child separately, so if child is moved outside of define area alert message will be given to parents. Also if child is crying in that case alert message will be sent to parents. The panic switch is provided at child module that can be used by child to alert his parents. Because of this parents will have a powerful tool to keep the observation on their child even when they can't physically see them.

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BIOGRAPHIES

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