

RFID and GPS based child tracking system with voice recognition for security

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Abstract— Everywhere, 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. The main aim of the project is to implement children tracking system for every small child who attends the school. However the existing systems are not so impactful to stop the crime or kidnapping of small children going to school, as this system provides an idea about the children group and not about the particular child having low safety to their parents and it is unable to sense the voice of crying of the child and inform this to their parents. The proposed system includes a child module and a receiver module for getting the information about the missed child on Periodical basis. The child module includes Atmega328 microcontroller, Global positioning communication (GSM), Voice playback circuit and the receiver module includes smart 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 project. Thus this system tracking the child from source to destination i.e. from home to school or anywhere.

Keywords— Global Positioning System (GPS), Global System for Mobile communication (GSM), Tracking System, Voice Recognition Module, RFID.

I. INTRODUCTION

The Child tracking system is necessarily required for the 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 anywhere outside their home. Also it will alert the parents if their child is crying. In this tracking system GPS offers outstanding capabilities in locating positions that helps in locating missing or lost children outside of define area. So parents do not have need to do continuous monitoring of child movement, system will alert the parents if child is moved outside of defined area. The system will not only provide Location of the child but also provide information whether child is crying or not and if child requires emergency help through the text message.

II. LITERATURE SURVEY

Rohit N. Bhoi, Dr. V. V. [1] Shete did develop Children tracking system using ARM7 (LPC2138), Global positioning system (GPS), Global system for mobile communication (GSM). Loganathan.M1, Aswathi Dileep2, Kamatchi.K3 did develop children tracking system including ATMEGA 162, GPS, GSM module, Voice playback circuit.

Mohammed Rafi, K. Niranjan Reddy[4] did develop Android based children tracking system using voice recognition. The system includes atmega controller, Global positioning system (GPS), (GSM), Voice recognition develop module, RFID, ATMEGA644 controller.

Children tracking system is also designed by Yuichiro MORI, [3] using autonomous Clustering technique. It consists of tags which collect the information of child group, android terminals are attached to each children and server which stores tracking information. Tag consist of wireless LAN which construct a mesh network and also receives and transmit the information from one tag to another about the position of child and it is given to computer server which is located at school control room. This system will alert the school that one of the children 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. There are no. of schools in a city, and so many areas around a single school. So it is difficult to place the tag in such large areas. There is possibility that child may missed the android device, so it become difficult to implement Yuichiro MORI's child tracking system.

III. OVERVIEW OF SYSTEM

There are three main systems with the help of which child tracking system can be implemented. Mobile phone, android, GPS, RFID.

A. Mobile Phone Tracking

Cell phones make life more convenient. So in cell phone tracking system, one small cell phone is given to each children 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 mood of child whether they are happy or not. But sometimes 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 they can be alert if their child is moving outside of defined area. This system can also track the browser activities and provides call block and message from specific number. Besides this facilities in cell phones children between ages of 4-8 may get problem with operating and handling of cellular phone. Children between this age group have huge tendency of playing, so they may lose 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 it is basically designed for smart phones and tablet computers. In this child tracking system one android app is developed by using this android based approach. This app helps to locate child whenever parent's want and also alerts the parents if child is moving outside of define area.

C. 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. GPS having various applications which are specifically used in civil, military, and in commercial purpose. In some of school of America, uses this GPS based system in which one small GPS module is kept in the school bag of each child. But there is a problem that on some occasions or for any other reason child may or may not carry the bag each and every time or bag is not necessarily with child every time.



Figure 1. Block Diagram of GPS

In the proposed child tracking system, GPS module act as one of the functional 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 Atmega328.

D. RFID Section

Radio frequency identification uses [electromagnetic fields](#) to automatically identify and track tags attached to objects. The tags contain electronically stored information. Passive tags are placed near to the reader as they collect energy from a nearby RFID reader's interrogating [radio waves](#). Active tags have a local power source such as a battery and may operate at hundreds of meters from the RFID reader. Unlike a [barcode](#), there is no need to place the tag within the line of sight of the reader, so it may be embedded in the tracked object. RFID is one method for [Automatic Identification and Data Capture](#) (AIDC). In this project the RFID is used in the bus tracking and attendance of the school class room.



Figure 2. Block Diagram of RFID

IV. DEVELOPMENT OF SYSTEM

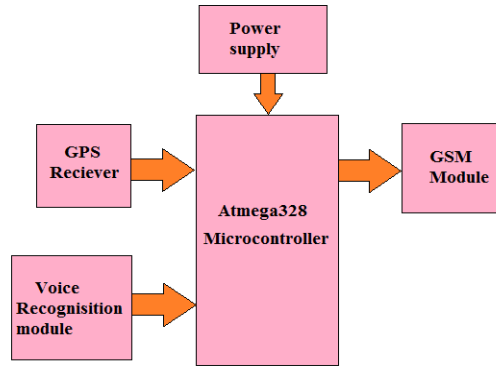


Figure 3. Block Diagram of Child Module

The proposed system includes a child module and receiver module for getting the information about the missed child. The child module includes atmega328, Global positioning system (GPS), Voice recognition module, Global system for mobile communication (GSM), 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 (Figure 3).

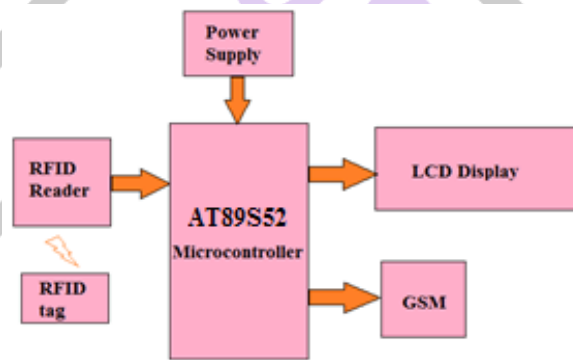


Figure 4. Block Diagram of School Module

The children information is transmitted and received using GSM technology. The Child module acts as a transmitter which includes atmega328, GSM module, Voice recognition module and GPS 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 atmega328 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 atmega328 microcontroller and intimation about corresponding child is given through text message to their parents and to the school module. Whenever push button or switch is pressed GPS data will be sent to the school database and parents by using GSM. An app is also included in the parent mobile to locate the GPS location values on the GMAP.

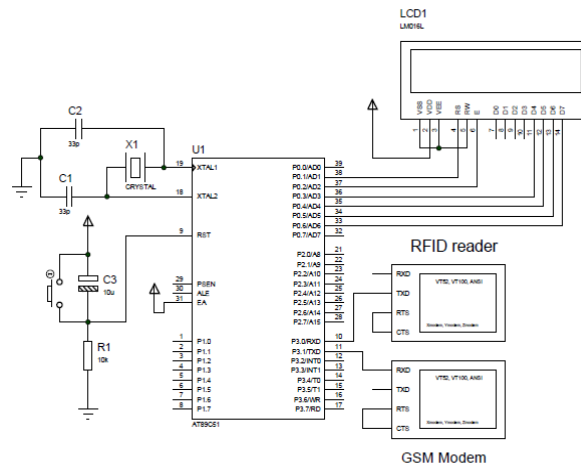


Figure 5. School module circuit diagram

School module (Figure 4) includes RFID reader module, AT89S52 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 has a unique identity number which is read by RFID reader and is sent to AT89S52 controller. If it is a valid card then a message will be sent to the parent android phone to inform that their child is reached 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. By using Lab view software same information will be shown in school module in excel sheet. Also whenever child cries or switch is pressed, GPS data also be displayed in school database. Child tracking system is extensively used across the world to insure parents that their wards are safe from dubious actions and their child is happy in school atmosphere without crying. The proposed system tracks the child's movement to and from school. The information about the missed child is sent to control room of the school as well as to their respective parents, if they move outside of the coverage area. The information about the child and also whether the child is crying is sent to parents through text message to their Android mobile device. "Autonomous Clustering technique" is used by System developed by Yuichiro MORI, et.al, 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 by using wireless LAN cluster head delivers the same to server at school through the tags. But it does not concentrate on individual children since the cluster head sends the information about the children group and not about each individual & also does not attention on child crying inside the school. It offers less security.

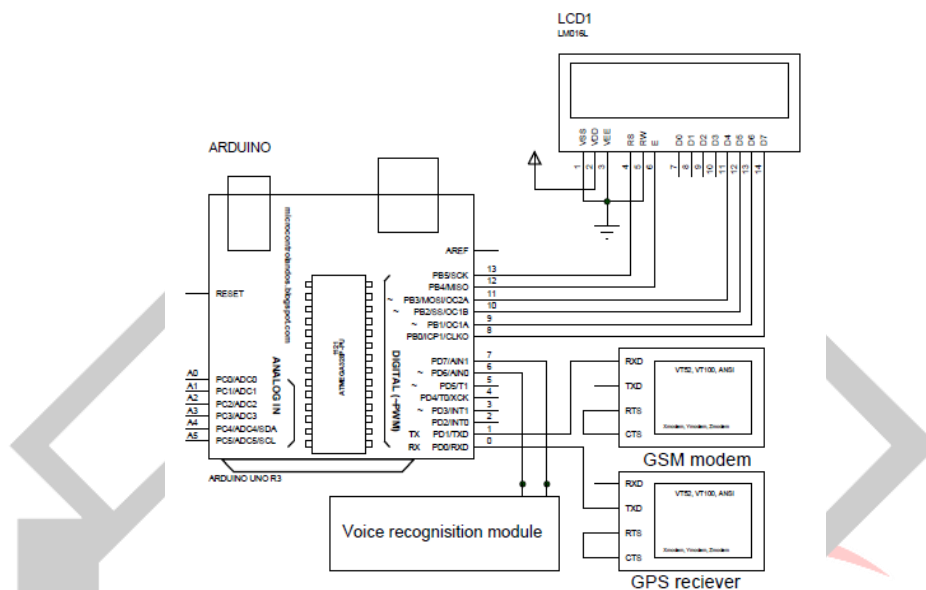


Figure 6. Child module circuit diagram

Children tracking system is also developed by using a mobile ad-hoc networks. System developed in [2] says that in GPS system and tag based system, each parent does not get group information on the proximity 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 from school, the system could send exact position and group information of children to their parents. From experimental analysis, it is found that performing incorrect registrations in Bluetooth tags and power shortage in phone are system independent factors which dominate in lowering average tag recognition rates for school routes. Tracking system using integrated Ultra wideband and GPS technologies is performed in hospital environment, for performing efficient indoor/outdoor tracking. Experiments show that system may provide extra security for patients but system using a WiFi network to sharing data and updating 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. Multihop Clustering scheme can be designed for adhoc network and it provide change in topology of adhoc networks, overhead for the settlement of the network is small and uniformly distributed. It includes the design other than generic function to evaluate adaptability of clustering schemes [5]. The above mentioned system [4] guides me to draw an attempt to reconfigure it by adding further features and thus making it more secure compared to the existing one.

V. SYSTEM TECHNOLOGY

A. GPS Principle

The GPS satellites act as reference points from which receivers on the ground detect their position. The fundamental navigation principle measures the distance 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 reference satellite, the distances between satellite and

receiver will yield accurate position, direction and speed. Though three – range measurements are sufficient, the fourth observation is necessary for checking clock synchronization error between satellite and receiver. Thus, the term —pseudo ranges is derived. Ionosphere is penetrating with the help of high frequency L1 and L2 carrier signal to reduce its effect. For eliminating most of the error parameter and large station separation dual frequency observations are important.

B. GSM Technology

The Global System for Mobile communication, i.e. GSM, is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe protocols for second generation (2G) digital cellular networks used by mobile phones. The GSM standard was developed as advances in first generation (1G) analog cellular networks, and originally designed for a digital, circuit switched network optimized for full duplex voice telephony. This was largely distributed over time to include data communications, first by using circuit switched transport and then packet data transport via GPRS (General Packet Radio Services) and EDGE (Enhanced Data rates for GSM Evolution or EGPRS). The digitized and compressed data by a GSM is sent to 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. In Europe the GSM is the wireless telephone standard. GSM has over 120 million users worldwide and is available in 120 countries, according to the GSM MOU Association.

C. RFID (Radio Frequency Identification)

Radio-frequency identification (RFID) is the wireless non-contact use of radio-frequency electro-magnetic fields to transfer data, for the purposes of automatically knowing and locating tags attached to objects. The tags contain electronically stored information. Basic RFID consists of an antenna, transceiver and transponder. Radio signals are emitted from antenna 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 consumed radio frequency and power output. While crossing through zone having electro- magnetic waves, RFID tag detects activation signals of reader powered by its internal battery or by the reader signals, the tag sends radio frequency return 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.

VI. 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.

A. Future scope

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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