



Geo-fence and Raspberry Pi based Child tracking System Using Smart Phones

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Abstract

Recently many cases of missing children between 14 and 17 years are reported and a higher possibility of the kidnappers. Our aim is to focus on these cases where the children are kidnapped. This tracking system includes a geo fencing campus, a child module and a parent module. The geo fencing campus is to find the location and to track the child movements. Once the child is out of the campus a message will be sent from the child module to the parent module which alerts the receiver. We have also introduced a sensor to detect the child emotions. And mostly concentrated on when the child cries. A microcontroller ATMEGA 162 is used with a Global system for mobile communication and Global positioning system module. This helps one to track and find the child movements.

KEYWORDS: *Raspberry Pi, GPS, GSM module, child module, parent module.*



I-Introduction

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 their parent's mobile number, if they move beyond the school boundary. 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 services. 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 using wireless LAN. It results in lack of individual & also does not concentrate on child crying. It offers less security. Children tracking system is also developed based on mobile Adhoc networks. System development says that in GPS system and tag based system, each parent cannot obtain group information on the locus 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 school, the system could provide location and group information of children to their parents.

A. Raspberry Pi

The Raspberry Pi is a low cost single-board computer which has recently become very popular. In this paper we showcase our attempt at building a low cost stand-alone device which transmits data using the Raspberry Pi with Bluetooth and has a resistive touch screen display providing a user interface. The Raspberry Pi is controlled by a modified version of Debian Linux optimized for the ARM architecture. The display contains a graphical user interface which provides various fields for data entry via an onscreen keyboard. Also, various fields were provided to display data obtained from a remote host.



The long-term goal of our research is to carry out fundamental research on multi-agent/multi-robot cooperation and learning towards real-world applications such as tele-manufacturing, teletraining, tele repairing, remote surveillance, and distributed service robots for office, hospital and elderly care. Cooperative Internet robots will be a useful test-bed for us to do this Also this unique equipment can be shared with other researchers and Internet users who are interested in working in the same area.

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. GPS module design is flexible to accommodate various RF interference and it includes the following features.

D. GSM

The advantage of GSM is, its international roaming capability in over 100 countries, improved battery life, efficient network design for less expensive system expansion, efficient use of spectrum, advanced features such as short messaging and caller ID, a wide variety of handsets and accessories, high stability mobile fax and data up to 9600baud, Easy to use over air activation, and all account information is held in a smart card, which can be moved from handset to handset. The GSM Module used in this paper is SIM300 which offers all features mentioned above and serves as a medium between transmitter and receiver.



II- Geofences

A geo-fence could be dynamically generated—as in a radius around a store or point location. Or a geo-fence can be a predefined set of boundaries, like school attendance zones or neighborhood boundaries. Custom-digitized geofences are also in use. When the location-aware device of a location-based service (LBS) user enters or exits a geo-fence, the device receives a generated notification. This notification might contain information about the location of the device. The geofence notice might be sent to a mobile telephone or an email account.

Geofences are virtual regions considered around actual geo point with some radius. This geopoint can be considered as any real place like store, restaurant, schools, home place etc. and circular area of that place becomes radius of geo fence. Location services based mobile apps always have been centre of mobile industry and also need. Geofences / geo regions have added spice to it to make more accurate location based and useful mobile applications.

C. Pre requisite for geo fences:

In order to implement geo fences android device need updated Google Play services installed on it. Before creating or handling geo fences, app should check for Google Play Services installed on device. Without it, geo fences won't work.

B. Creating Geofences:

After requesting or checking Google Play Services, geo fences can be created. Geo fence object has following parameter, which values can be set while creating geo fence.

- Latitude of geo point around which geo fence has to be created



- Longitude of geo point around which geo fence has to be created

Radius of geofence to be created around chosen geo fence Geo fence expiration time – (App monitors geo fences created for the expiration time set. If it is not set, app will monitor geo fences throughout app life cycle) Event to be monitored for geo fence. It could be either entry or exit event of geo fence.

Initial triggers:

- The GEOFENCE_TRANSITION_ENTER transition triggers when a device enters a geofence.
- The GEOFENCE_TRANSITION_EXIT transition triggers when a device exits a geofence.
- Specifying INITIAL_TRIGGER_ENTER tells Location services. It should be triggered if the the device is already inside the geofence.

In many cases, it may be preferable to use instead INITIAL_TRIGGER_DWELL, which triggers events only when the user stops for a defined duration within a geofence. This approach can help reduce "alert spam" resulting from large numbers notifications when a device briefly enters and exits geofences. Another strategy for getting best results from your geofences is to set a minimum radius of 100 meters. This helps account for the location accuracy of typical WiFi networks, and also helps reduce device power consumption.

C. Sending Geofence Notifications:

A geofence is a circular area defined by the latitude and longitude coordinates of a point and a radius. An Android app can register geofences with the Android Location



Services. The Android app can also specify an expiration duration for a geofence. Whenever a geofence transition happens, for example, when the Android device enters or exits a registered geofence, the Android Location Services will inform the Android app.

D. Benefits of using geofences:

Geo-fences implementation can be widely used for location services based apps where app is monitoring some regions like some places. Geo fences can be used to show Location based Ads. As Google Play Services solely takes care of location tracking of regions defines, it does battery optimization at great extend. As Google Play Service is already running on device, every app which implements geo fences monitoring don't need to write own service for location tracking. So battery saving is great.

III- Hardware module and results

This section describes the conceptual design of a Children Tracking System. The children information is transmitted and received using GSM technology. The child module acts as a transmitter which includes raspberry Pi, GSM module, and GPS module and voice playback circuit. The receiver module includes Android phones. Child module is fixed to each and every child. The position of the moving child is tracked by GPS and is sent to raspberry Pi. This processor forwards the GPS data (latitude and longitude) to GSM board. When the child cries, voice playback circuit is triggered by raspberry Pi and intimation about corresponding child is given through text message to their parents.

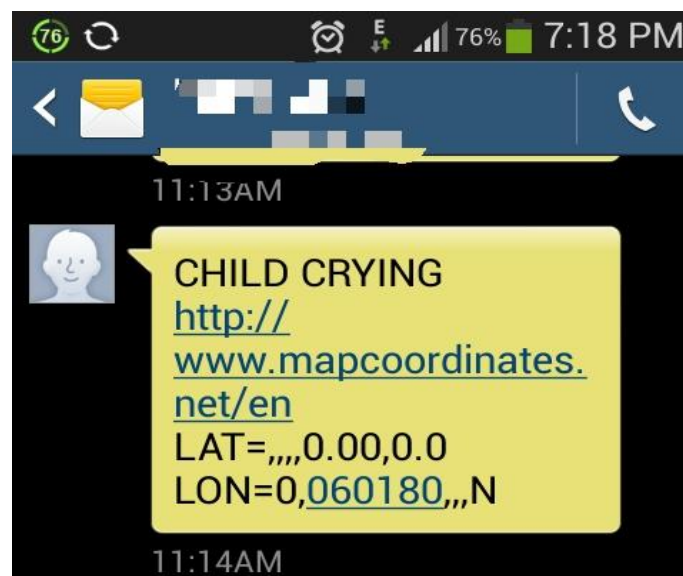


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Fig: 1 GSM Module

GSM module (fig.1.) receives the latitude and longitude value of the child's current position and sends it to two receivers.





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Fig: 2 Output from Voice playback circuit



Fig: 3 Output in the parent Module

When an update SMS List tab is pressed by the parent it results in retrieving the latest Lat, Long values sent by GSM Module and updating it in android mobile devices. When button tab is pressed it leads to GMAP indicating the place

IV-CONCLUSION

This Paper primarily focuses on tracking a child's position and its location is sent to its parent and control room. It can be extended to perform the same for all children in the school by reducing the size of the child module. This paper focuses on recording a child's cry and when it matches with crying of child in school the text message is sent to the its parents.



It can be extended by placing voice recognizing sensors which senses the cry of all the children inside the school and send the information to their parents appropriately by using the school database.

V- REFERENCES

- [1] Atsushi Ito, Yoshiki kakuda, tomoyuki ohta and shinji Inoue, "New safety support system for children on school routes using mobile ad hoc networks ", IEICE transactions on communications, vol.E94-B, no.1, 2011.
- [2] A.D.amis, R.Prakash, T.H.P.voung and D.T.Huynh, "Max-min decluster formation in ad hoc networks", IEICE trans. Inf \$syst. Vol.J84-D-1, no.2, pp.127-135, Feb. 2001G. Eason, B. Noble, and I.N. Sneddon, "On certain integrals of Lipschitz-Hankel type involving products of Bessel functions," Phil. Trans. Roy. Soc. London, vol. A247, pp. 529-551, April 1955. (*references*)
- [3] Tomoyuki ohta, shinji inoue, yoshiaki kakuda and kenji ishida, "An adaptive Multihop clustering scheme for adhoc networks with high mobility", IEICE transactions on communications, vol.E86-A, no.7, pp.189-1697, 2003
- [4] H. Tanguchi, M. Inoue, T.Masuzawa, and H. Fujiwara "Clustering algorithm in adhoc networks", IEICE transactions on communications," IEICE transactions on communication.
- [5] M.Hazaratn, Venkat Durgaprasad, "Raspberry Pi based child tracking system using android mobile", hydrabad, Vol. 1. International journal on embedded and VLSI systems.