

CHILD TRACKING SYSTEM USING RASPBERRY PI

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Abstract- It has become important for parents to locate their children at any point of the time, due to an increase in crimes against children. The project proves to be instrumental for parents to cater to their everyday need of tracking their child. The system includes Raspberry pi B+, Global system for mobile communication (GSM) and Global positioning system (GPS). The GPS and GSM module have been combined and used as a single module called as the SIM808. This device sends a request location to the child's device and in return the child's device will respond to the request by sending its GPS position. The parent can thus identify the approximate location of his/her child using the map available in a mobile application. This system is capable of locating multiple children and achieves efficient child security. Using this system, parents can directly check their child's location using the application. It aids the parents to navigate their children easily, providing better security against suspicious individuals.

1.INTRODUCTION

For parents, their greatest concerns are the safety of their child. This project is an android based solution to help parents to track their children in real time. The system consists of Raspberry pi B+, Global system for mobile communication (GSM) and Global Positioning system (GPS) combined module in SIM808. This device sends a location request to the child's device in order to get the location of the child in the map and in return the child's device responds to the request by sending its GPS position in return along with the parent's location so that the parent can easily track the child. The map also shows the time at which the map was last checked into so that the parent can always be aware of the live location of the child.

2. Need for Project

There is a lack of variety in the technologies for parents to choose from, which would enable them to locate multiple children. There is no available functionality in the systems that are currently available, that enables the parents to record the route that their child took during the chosen period. This application helps the parent to keep tracking their child's location. Differently abled and missing children can be located effortlessly by the parent or the guardian of the child. This can also reduce rate of the kidnappings and abductions which

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continue to be the most prevalent crimes against children, accounting for 42 percent of the total crimes reported. The device provides a live location of the child at all times possible.

3. Literature Survey

The paper titled "Implementation of Child tracking system on android mobile terminals" published by IEEE focuses on child tracking system for children attending school and also if child is crying it is sent to the parent. It consists of two parts-transmitter module and receiver module. Transmitter module includes Raspberry Pi B+, GPS and GSM. The receiver

module includes android mobile device and monitoring data

base in the control room of the school.[1] The paper "A self-

configurable new generation children tracking system based on mobile Ad Hoc Networks consisting of Android Mobile terminals" explains that it is a safety support network which can be used only for 4G mobile phones.[2] Angel Sense is a tracking kit available to locate the child. It consists of GPS wearable with sim card embedded in it, protective sleeve, three magnetic garment fasteners, and a magnetic key. Once the device is attached to the child's pocket or belt, it can be removed only using special magnetic key and an APP is available for the parents to easily track their child. [3] Tracking system has been used globally, either for the commercial or personal usage. Recently, to cope with the missing case that is happening with the kids, personal GPS trackers have come up in the marketplace. Here we are using sim 808 which has combined GPS and GSM modules in it. The recent survey made by the 1130 numbers of parents living in the UK has shown that 48 percent of the respondents had decided not to use the method of location tracking and for the others, 37 percent if the respondents never heard about location tracking, 12 percent of the respondents are in favor of location tracking and only about 1.5 percent of respondents are using the tracking system method. However people still lack the knowledge about the method. Furthermore, with the same price levels and technical capabilities for the same child location tracking system, there exist disparities in the features of the system depending on the social context. There are abundant studies of the tracking system in different areas. However, since the focus of this research is on the child tracking system, this will not be reviewed in detail and will only be referred to when appropriate. The report will be focusing on the technology and the features that will act as a guide in practicing the best approach in order to build the tracking system for children in India.

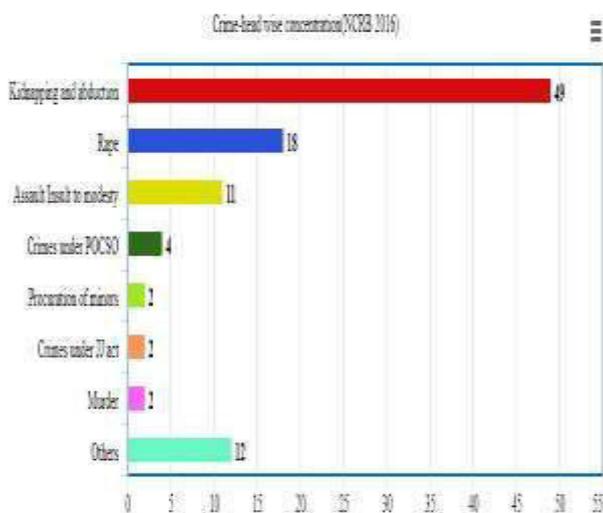


Figure 1. Crime records

Existing Technologies	Positioning Type	Features	Price
App/Sms, 2019	GPS	<ul style="list-style-type: none"> Smart Search Listen-in Capability Post Response Group Alarm School Dashboard Customize service Stuffed by parents 	Device price-548 Service cost-500 INR/month
GPS Swastika	GPS	<ul style="list-style-type: none"> Discrete monitoring Customized alert 	Device price-528 Service cost-528 INR/month
TrackPi	AGPS, GPS and GLONASS	<ul style="list-style-type: none"> Augmented Reality Scheduling Proximity Sense Speed alerts Multiple devices and sharing 	Device price-598 Service cost-254 INR/month for 2 years of service 254-498 INR/month for 2 year of service
Flag, 2019	GPS & Wi-Fi triangulation	<ul style="list-style-type: none"> Voice calling Smart location Intelligent emergency Messaging Time and date 	Device price-549 INR Service cost-520 INR/month
Finisar	GPS, radio frequency, Bluetooth, Wi-Fi	<ul style="list-style-type: none"> Multiple Features Module monitoring Capability Group monitoring Multiple type of Geo-fence Full detection Locate mode WiFi connection 	Device price-550 Service cost INR
Stello, 2019	GPS-LBS technology	<ul style="list-style-type: none"> Call function SOS Health tracking Alarm Report 	Device price-800 INR

Figure 2. Various tracking technologies

4. Objectives

The main objective of the project is to create a system to allow the parents to keep track of their kids when their child is out of their view. The objectives of the project are listed as follow: 1. Examine the existing feature used in the child tracking system that fits with the needs of the parents. 2. Develop the application that consists of the feature and design required by the parents with the implementation using suitable approach and methodology. 3. Verify and validate the developed system by performing unit testing and user interface testing and have it tested by the user to ensure the user satisfactory with the system.

5. Methodology

The main methodology consists of two parts: 1. Parent’s module 2. Child’s module. The parent’s module sends a location request to child’s device. The child’s information is transmitted and received using the GSM technology. The child module acts as a transmitter which includes Raspberry Pi B+, GSM module, GPS module. The receiver module includes Android mobile device with the mobile application. The child module is fixed to the child. This system initializes the GSM and GPS in the first stage, after which it waits for the SMS from the mobile terminal to send the GPS details. If formatted message is received in the GSM which is connected to Raspberry Pi, it reads the current GPS position and send it over the GSM network. Requested mobile will receive the Real time GPS value of the children. The position of the moving child is tracked by GPS and the information is send to the Raspberry Pi. After filtering, it forwards the GPS data (latitude and longitude) to GSM. The GSM will in turn send the position of the moving child to receiver

6. Hardware and Software Requirement

Raspberry Pi B: It is an SOC chip based on RASPBERRY PI with low power, high performance, very suitable for embedded product development. LINUX Raspbian OS: Raspberry Pi B+ model operates in Raspbian software. The recommended OS is called Raspbian. The Default username and Password is Pi, Raspberry pi. Syntax is the command for GUI of PI. SIM 808: It is a GSM and GPS two in one function module. It is based on GSM/GPS module SIM808 and supports quad band network and combines GPS technologies for satellite navigation. It is also known as hat.

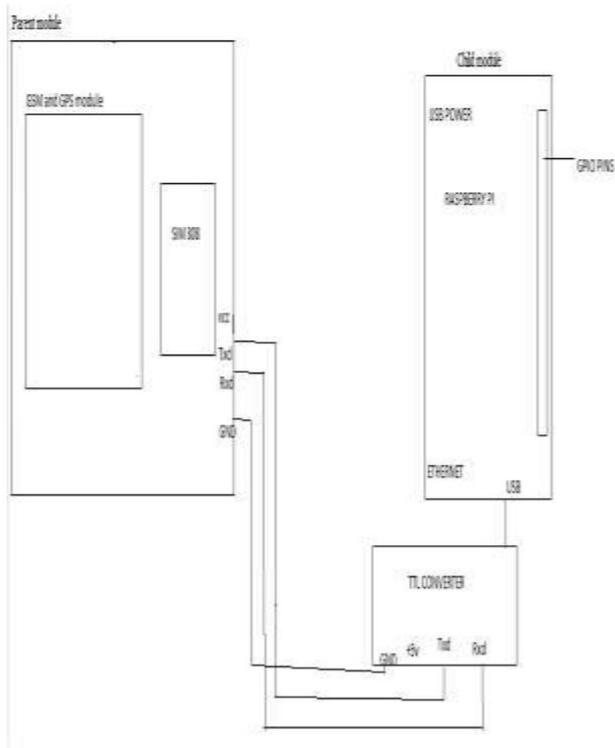
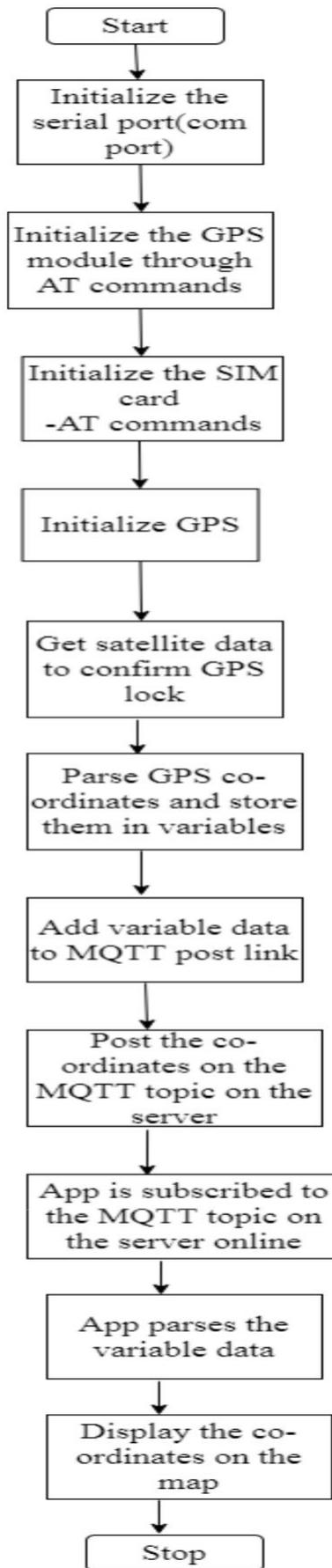


Figure 3. Block diagram of the device.

The Raspberry Pi is powered using simple batteries and a UBEC which makes the device portable. The location of the child is displayed on the Google Map which has been designed on an application using Blynk platform. The child's location is displayed along with the time and date. The live location of the child is obtained on refreshing the app. The parent's location can be selected as an option so as to compare the distance between the child and the parent. The coordinates of the child obtained by the raspberry pi is displayed on the App by interfacing the application and the raspberry pi with a python code designed specifically to obtain the child's location on the application. The flowchart of the code is as follows:



7. Hardware Designing and Working

- 1) Power “on” the raspberry pi module which has Raspbian OS installed on it.
- 2) Connect the hat module to the raspberry Pi through USB as shown in the figure.
- 3) Insert a sim card to the HAT module to perform any GSM operations. The power led will be in an on state after connecting the USB.
- 4) Press the power key for 3 seconds and then remove. The STA LED (status) will also be in an on state. The NET led will blink continuously and the blinking rate will be reduced after obtaining the range for the sim-card.

The app will include the two-ways communication where the parent can communicate with their child. The app will include the Geo-fence feature with some enhancement where the parent is able to schedule the Geo-fence to be activated for monitoring according to the schedule. The app will also include the route history trace where the parent can track the route of their child traversed during a certain period of time, and a functionality of getting child’s real-time location. The app will include group monitoring feature where the parent can share the tracker with the predefined trusted group that helps track their child. • The keyboard and mouse are connected to the two ports of sim 808 and the monitor is connected to the Raspberry Pi and it is supplied with power, by doing so the Raspberry Pi boots up. • A window opens up on the desktop and the code for GPS location is given to the terminal. AT commands are given to the terminal and in return we obtain GPS co-ordinates which are fed into the mobile phones which provide the latitude and longitude values.

8. Gps Features

GPS receiver provides a solution that is high in position and speed accuracy performances, with high sensitivity and tracking capabilities in urban conditions. The general specification of the module is given below:

- Automatically senses the current position of the child
- Chipset: MTK
MT3318
- Frequency: 1575.42MHz
 - Signal Output: 8 data bits
 - Baud Rate: 9600bps (Default)
 - Protocols: NMEA 0183 v3.01, MTK NMEA Command

9. Result

Hence, we get the location on Google maps by interfacing of sim808 module with raspberry pi using a USB to TTL converter, since raspberry pi has operating voltage of 3 volt and sim808 module’s operating voltage is 5V. The program for the same has been executed successfully using python scripting language for GPS location. The child is tracked accordingly. An App is made so that parents can easily track their child on regular basis. Parents can keep refreshing the App to get continuous tracking of the child.

10. Limitations

The size of the device is large and it is not compact. The device needs to be powered at all time. The working of GPS might be affected due to atmospheric changes. The location on the Google Map is not 100% accurate; the exact location might be few meters apart from the location shown on the Google Map.

11. Discussion and Future Scope

It is an android based real time solution to track the exact location of the missing children. It provides the parents to navigate their children easily. This system can manage many children efficiently, providing better security solution against suspicious individuals.

Further, it can be extended to perform in many real time applications such as fixing it to ID card of the child. Future work can be extended by adding features like camera and sending the picture of the location to the parent’s module or parent’s mobile and adding various sensors to it.

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