

DESIGN AND IMPLEMENTATION OF IoT BASED CHILDREN LOCATION TRACKING SYSTEM

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Abstract— In India, 60,000 children go missing every year despite the fact that big states like Uttar Pradesh, Maharashtra and Bihar, along with Punjab and Jharkhand did not provide the data for missing children. In this paper we proposed a Children Location Tracking System (CLTS) based on IOT using Raspberry Pi. One can able to track the location of the missing children safely with the help of this system. Raspberry Pi is a series of small single board computers. In this system GSM (Global System for Mobile Communication) and GPS (Global Positioning System) is configured with Raspberry pi 3 model B+ for faster communication. By sending request message from parent's smart phone to the GSM modem placed in the missing children's bag, dress or watch, the GPS track the location by reading the longitudinal and latitudinal axis and it will be stored in the Raspberry pi. An IoT (Internet of Things) is a device which can copy the address location to the link and it will be delivered through GSM to the GPS receiver. The address is in SMS (Short Messaging Service) form or in the form of link (Google map link).

Keywords—Children Location Tracking System (CLTS), Raspberry pi 3 models B+, GSM (Global System for Mobile Communication), GPS (Global Positioning System), and IOT (Internet of Things)

I. INTRODUCTION

More than 300 children went missing every day in India. [1] Recently, an 8-year-old boy named Nayan was kidnapped when getting off from school bus in Kallian town on the outskirts of Mumbai on March 1. Even after the boy's family had paid a ransom of Rs 15lacs, the boy was murdered. [2] An five year old school going girl was kidnapped and raped in Delhi when she was going to school.[3] In Tamil Nadu at Coimbatore 10-year-old girl with her brother was kidnapped and murdered by an old car driver while leaving from school. This was one of the most sensational news in Tamil Nadu. We conducted interview to child psychologist and parent to support research data. In an interview with the child psychologist, concluded that parents need to monitor their children, because children nowadays are having many threats. It could come from the internet and neighborhood, sexual harassment and lack of social skills. If there is a system or tool that can assist parents in monitoring child remotely, it capable of providing security and comfort the parents. While doing interview with the parent it concluded that parents need to monitor the children but parents now need to come directly to the place where the child is to be able to do the monitoring. It becomes difficult for the parents themselves who have been busy with work and the workplace are often away with the child's location. So we are proposing a system based on Children Location Tracking system (CLTS). Raspberry pi interfaced with a GPS module, can be used for developing an advanced real time navigation system. Incorporating the pi's image processing, audio processing and web interface capabilities along with the GPS data we can develop advanced navigation schemes for real time implementation. The model B+ is the higher spec variant of raspberry pi. It is portable, powerful, and microcomputer. The board length is only 85mm and width is only 56mm. GPS is a space-based radio navigation satellite system that provides geo location and time information to the GPS receiver anywhere on or near the earth surface. The GPS system operates independently of any telephonic or internet reception, through these technologies can enhance the usefulness of the GPS positioning information. The GPS system provides critical positioning capabilities to military, civil, and commercial users around the world. GSM is a digital mobile telephony system uses a variation of Time Division Multiple Access (TDMA). The GSM module with registered Subscriber Identity Module (SIM) can quickly sent address of the children location to the GPS receiver in the parent side. The kit along with these modules has been able to fix with children's dress or bag or watch. Hence because of the advanced technology in raspberry pi 3 models B+ like on-board WIFI, Bluetooth and USB boot capabilities, we are interfacing it with our system.

II. LITERATURE SURVEY

Dhiraj sunehra, SMIEEE published "Children Location Monitoring on Google Maps using GSM and GPS technologies" in 2016 IEEE 6th international conference on advanced computing. In that IEEE paper a cost effective and reliable children location tracking system (CLTS) is implemented. The hardware modules used in the system design such as LPC2148, GSM, GPS. This system integrates GPS (Global Positioning System) and GSM (Global System for Mobile Communication) technologies with Google map application, so that the location can be obtained accurately and in real time. GPS is a satellite navigation system, whose signal can be used to compute three dimensional position of a user located anywhere on or above the surface of the earth. It can be used to track location of objects and individual equipped with a GPS receiver in a outdoor location. In this, the commercial GPS receiver is used to compute the position of the child continuously. GSM is a world standard used for cellular communication. It is often used for sending quick text messages. The child position information is periodically sent through GSM to the parent's smart phone (as a Google map link). Use of GSM with GPS in the system helps to inform the parent and school monitoring system about the location of the child through Short Messaging Service (SMS). This type of system helps in reducing crime against children and provides a means to the parent to find the child's location. The children location monitoring system can be used effectively by minimizing the size of the child module and integrating it.

Okky permatasari, department of informatics engineering published "A Prototype of Child Monitoring System Using Motion and Authentication with Raspberry Pi" in IEEE September 2016. In this research project, they focus on child monitoring system using motion and authentication with Raspberry Pi. They use Raspberry Pi microcomputer with evolutionary prototype method in order to monitor the children with video streaming media and motion detection. Moreover, this prototype can help parents to monitor children which can be accessed easily by online through the website with authentication feature. The results of this research project showed that the system using Raspberry Pi microcomputer can provide a sense of security and assist parents in monitoring a child. Parents can able to monitor their children with real-time video streaming media and motion detection. Once the motion is detected, this system will identify with red-box. To make it easier to use, the system can be accessed online through the web that have authentication feature.

III. EXTRACTING KNOWLEDGE FROM EXISTING METHODOLOGY

Speed is very slow in tracking system with GSM and GPS compared with Raspberry pi. It has fewer applications

compared with Raspberry pi 3 models B+. Parents from the farthest place cannot get quick response through GPS modem. The main disadvantage or problem with the children monitoring system is, any damage in USB camera, it will not possible to monitor the child. The address location cannot be viewed through this monitoring system. In this video streaming process colors in an image is not required and only black and white images taken alone. Once the authentication feature is lost, the system cannot be accessed

IV. PROPOSED METHODOLOGY

In this proposed system, the work is to build a children tracking system using Raspberry that can be accessed online through Google map. This system built upon to help the parent's to find their missing children. After receiving request message from the parent's smart phone, the GPS modem recognizes the correct activity and works on it. Here the Raspberry pi is interfaced with GPS to identify the location by reading the latitudinal and longitudinal axis. After identifying, the location is stored in the Raspberry pi module. Then the IoT (Internet of Things) copy the address into the link for better transmission at the farthest place. Compare with other forms the website including address link has more advantages like quick communication even at the distant location. Then the GSM module can send the link containing location in Short Messaging Service (SMS) format to the GPS modem. The link is confidentially delivered only to the parents by means of registration. So that the entire set up is coded in python language for interfacing of these modules with Raspberry pi. In this paper for implementation purpose we are using hardware requirements such as Power Supply, Raspberry Pi 3 Model, LAN Cable, Power Cable, GPS (Global Positioning System), GSM (Global System for Mobile Communication), Internet Connection and software requirements such as Putty, Remote Desktop Connection, Python Language.

A. General Block Diagram

In this paper we are using Raspberry pi 3 model B+, it serves as the heart of this paper. Because of affordable cost and size, Raspberry pi has been a popular name in the computing world.

One of the major perks of raspberry pi in the IoT space is its network connectivity. GPS and GSM are the two major devices used for faster transmission and information extraction.

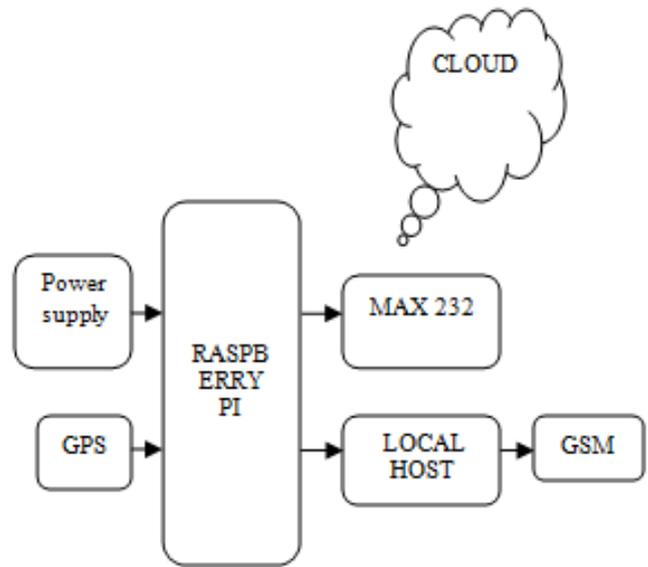


Fig.1. Raspberry Pi interconnection with GSM and GPS

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BASIC FUNCTIONS

- Sending request message to the GSM Modem
- GPS track the location by reading longitudinal and latitudinal axis
- Location stored in raspberry pi USB module.
- IOT copy the location into link.
- GSM modem sends the link to the GPS receiver
- Data acquisition using GPS receiver

V. WORKING DESCRIPTION

Once the connection are made and the modules are powered, make sure that the GPS module is kept in a place where the GPS has a clear view to the sky or at least near a window for reliable signal integrity. Provide separate power source to GSM Modem for proper functioning as it drives much current. Insert a 2g activated SIM card with working data connection and power up the modules. It will take a few seconds for the SIM to get registered to the network. Now we need to check the communication between the Raspberry pi and Modem. For which, we make use of a python code that transmits an AT command and verifies whether an OK is received as acknowledgement. First the GPS is to compute the

position of the child continuously and accurate location is identified by the latitude and longitude of the (GPS) Global Positioning System. Next, Raspberry pi is used with the Internet of Things to store the location into link. Then GSM (Global System for Mobile Communication) can send the child located position information to the parent mobile phone with the help of GSM modem. Finally the output is, child located position is tracked by the GPS receiver. The SMS delivered to the parent safely by using GPS receiver.

VI. RESULTS AND DISCUSSION

The output of the IOT based Children Location Tracking System (CLTS) is the website containing link which will get delivered to the GPS receiver. This will prevent the unauthorized persons to view the address location. It has more advantages that ordinary text message format. The link contains the IP address of the missing children location. By clicking the link after entering, the address can be viewed.



Fig.3.Raspberry Pi 3 model B+



Fig.1.Data acquisition using GPS receiver



Fig.4.Connection setup

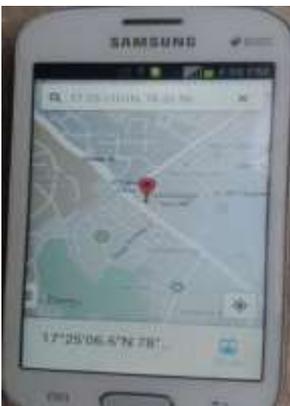


Fig.2.location tracking using GPS

After the connections are made, make sure that the GPS is placed in exact place. Then the Raspberry Pi is interfaced with GSM and GPS. IOT is a device used to get a data from the Raspberry and store it in the link for safer transmission.

VII. CONCLUSION

Thus we design child tracking system using Raspberry pi, GSM, GPS technology to assist parents in knowing children's location through text message. This work shows the efforts to preserving the safety of children and provides comfort and a sense of security to the parents. First, we utilize the Raspberry pi as a tool of the system which is processing all the necessary activities in child tracking quickly. The future work of our

paper is, we want to combine what we done in our previous works to develop a system that can be deployed in places with many children population to support the safety of children. And we can realize that, this is a useful application that can protect children and reduce worries from parent who works and away from children. The major advantages of this paper are it is portable and powerful. Its size is very small and has 1GB of RAM. It provides a high speed. Raspberry pi is reliable. It gives the high accurate information. It can operated with any generic USB computed keyboard and mouse. Benchmark showed that Raspberry pi 3 to be approximately 80% faster than the raspberry pi 2 in parallelized tasks.

- [13] Mori.K, Takeda.K, Mori.Y,"A Generalized children tracking system using Bluetooth MANET composed of android mobile terminals",9th international conference on ubiquitous intelligence and computing & autonomic and trusted computing.

VIII. ACKNOWLEDGEMENT

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IX. REFERENCES

- [1] Dhiraj sunehra, SMIEEE published "Children Location Monitoring on Google Maps using GSM and GPS technologies" in 2016 IEEE 6th international conference on advanced computing
- [2] Okky permatasari, department of informatics engineering published "A Prototype of Child Monitoring System Using Motion and Authentication with Raspberry Pi" in IEEE September 2016.
- [3] Al-suwaidi, G.B.Zemerly, M.J., "Locating friends and family using mobile phones with Global Positioning System (GPS)", IEEE/ACS International conference on computer science and application.
- [4] Almomani, I.M.Alkhali, N.Y.Ahmad, E.M.Jodeh.R.M, "Ubiquitous GPS Vehicle Tracking and Management System", IEEE Jordan Conference on Applied Electrical Engineering and Computing Technologies (AEECT).
- [5] M. Naveenkrishna, Dr. S. Jayanthi, has proposed "Beagle bone Black Webcam Server for Security" in IEEE Conference, 2015
- [6] Prof. Pramod Ganjewar, Shailesh Bandle, Prasad Wag mare, has proposed Wireless Automated Video Surveillance System Using Motion Detection Method in 2013.
- [7] Anthony C. Caputo, "Digital Video Surveillance and Security", 2nded., USA: Elsevier, Inc.,]
- [8] Linda H. Connell published a paper called "Monitoring the Childcare Situation" in 2005
- [9] Ryydo technologies private limited,"SIM900-RS232 GSM/GPRS modem user manual",cochin,kerala,india,2011
- [10] Chandra.A, Jain.S, Qadler.M.A,"GPS Locator: An Application for location tracking and Sharing Using GPS For Java enabled Handhelds" International conference on computational intelligence.
- [11] Al-Ali A.R,Aloul F.A, Aji N.R,"Mobile RFID Tracking system",3rd international conference on information and communication technologies.
- [12] Mori.Y,Kojima.H , "A Self configurable new generation children tracking system based on mobile Ad Hoc network consisting of android mobile terminology , 10th international symposium on autonomous decentralized system.