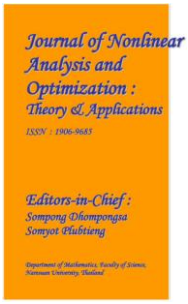
Journal of **N**onlinear **A**nalysis and **O**ptimization
Vol. 15, Issue. 1 : 2024
ISSN : **1906-9685**



IOT BASED CHILD SAFETY MONITORING SYSTEM USING ARDUINO AND RASBERRY PI

A Srinivas , Assistant Professor, Department of ECE, Narasimha Reddy Engineering College, Dhulapally, Secunderabad, Telangana, India
Basava Dhanne Assistant Professor, Department of ECE, St.Martins Engineering College, Dhulapally, Secunderabad, Telangana, India

ABSTRACT:
This paper discusses the concept of a smart wearable device for little children. The major advantage of this wearable over other wearable is that it can be used in any cell phone and doesn't necessarily require an expensive Smartphone and not a very tech savvy individual to operate. The purpose of this device is to help parents locate their children with ease. At the moment there are many wearable's in the market which help track the daily activity of children and also help find the child using Wi-Fi and Bluetooth services present on the device. But Wi-Fi and Bluetooth appear to be an unreliable medium of communication between the parent and child. Therefore, the focus of this paper is to have an SMS text enabled communication medium between the child's wearable and the parent as the environment for GSM mobile communication is almost present everywhere. When the child pressed the push button, the wearable device will send back with a text containing the real time accurate location of the child which upon tapping will provide directions to the child's location on google maps. Hence this paper aims at providing parents with a sense of security for their child in today's time.
Keywords: Children Safety; GPS; GPRS; Sensors; Serial camera

I. INTRODUCTION

Internet of Things (IoT) plays a major role in every day to day life. The major difference between IoT and embedded system is that a dedicated protocol/software is embedded in the chip in case of embedded system, whereas, IoT devices are smart devices, which are able to take decisions by sensing the environment around the device. The development of sensors technology, availability of internet connected devices; data analysis algorithms make IoT devices to act smart in emergency situations without human interventions. So, IoT devices are applied in different fields such as agriculture, medical, industrial, security and communication applications [1]. IoT systems are useful within a system to do deeper automation, analysis, and integration. IoT contributes to technology by advances in software, hardware and modern tools. It even uses existing and upcoming technology in the fields of sensing, networking and robotics. IoT brings global changes by its advanced elements in the social, economic, and political impact of the users. Child and women safety is a challenging problem nowadays due to antisocial elements in the society. The crime rate is day by day increasing. Schools and working places need high surveillance for ensuring the safety among children and women. Smart phones are playing major role for ensuring the safety, where some mobile based applications provide alert systems. During the emergency, mobile apps alert the control room of nearby police station or caretakers of children. The literature shows that location tracking devices are available in the market, but it does not provide the complete solution to the problem. The solution to this problem is to design an IoT device, which senses the child's location and environment and during emergency, it should send the alert to the parents automatically.

1.1 Problem Statement The increasing need for protection of the child at present times and also when child can be lost in crowded areas. Using Bluetooth and Wi-Fi not possible to track larger distance.

1.2 Solution Statement Wearable gadget which tracks GPS will use to track child using location sends notifications to parents about child's place through android mobile application.

2. Literature Review

In [1] author says that in this day and age ladies are less make sure about and have various issues with respect to their security reason. This paper depicts approximately sheltered and checked digital framework For women which intertwines an Arduino manager with sensors, while an example, hotness LM35, flex sensor, MEMS accelerometer, beat esteem antenna, noise antenna. A ringer, LCD, GSM along with GPS be worn as of now. Unequivocally at the identical time because the youngster is in chance, the contraption sees the frame parameters like heartbeat rate, trade temperature, the improvement of harm individual with the gain of flex sensor, MEMS accelerometer with say lamentable loss is superb with the useful resource of sound sensor. Right whilst the sensor crosses past what many might recollect feasible the device receives ordered and follows the region of the harmed individual the use of the GPS module. By the use of the GSM component, disastrous loss' position is send near enrolled phone number.

In [2] author says that, right now age, security is the noteworthy issue for an individual. Right now structure involves a watching contraption, which gets ordered when the device is tapped upon then a text close by voice prepared message is gotten by the individual emergency contacts. Further the person who gets the admonitions can find and follow the zone without the joint effort of the terrible setback's application at each and every limit.

In [3] author says that, Nowadays in the modern standard situation, the high request in every teenager's thoughts, allowing for usually growing addition of troubles on women incitement in later beyond be normally concerning her prosperity along with protection. Right now suggest to have a device this is the compromise of diverse gadgets, equipment consists of a wearable "Keen band" which without give up talks with Smart phone that movements in the direction of the net. The software is altered and stacked with all the crucial statistics which fuses Human lead and reactions to one of a kind conditions like irateness, worry and disquiet. This makes a sign this is transmitted to the propelled cell phone. The object or software approaches GPS and Messaging groups that's pre-altered in order that at some thing point it receives emergency sign, it may send assist request close by the area headings towards nearby Police station, partner and youngsters and humans inside near variety who've application. This movement engages help abruptly from Police further while Public within by range who may display up on harmed person with high-quality accuracy.

In [3] author developed an application that merges all the exceptional features, for instance, persistent region Following and facilitate all of the capabilities supplied via the existing device, as an instance, GPS following, SOS. The software program calls for a hidden enlistment close Via crisis connections with purchaser be drawn nearer to animate crisis connections occasionally. Definitely whilst the customer is creation go to opening by one spot then onto resulting, lively GPS completing provided PubNub's channel be stored on staring at purchaser's area on a manual. Customers by proportionate programming framework can show display several customers with this object program thru the dynamic GPS Tracking contraption by way of techniques for the PubNub channel. Right while the SOS get is overwhelmed then an alert letter which consolidates choice of consumer, GPS position with a assist memo be despatched by using techniques for SMS. The client approaches scientific guide information and price loose helpline cell phone numbers. All the records and statistics are fused with Firebase.

In [4] author portrays wellbeing electronic gadget for ladies, a wearable keen wrist trinket, that sends alarms to companions, family, just as the police when they fell they are in issue. The brilliant gadget dependent on IOT utilizes a low-vitality Bluetooth association with synchronize to an application on the wearer's Smartphone. The application gives the wearer a chance to educate her circumstance in the event that regarding a basic circumstance - to her companions, relatives, the police, or a gathering. The product or application approaches GPS/GSM and Messaging administrations, which is pre-modified so that at whatever point it gets crisis signal, it can send help demand alongside area directions towards closest Police station, family members utilizing crisis keys (SOS). This activity empowers help quickly

from the Police who is in the close to geological area, who can arrive at the unfortunate casualty with extraordinary precision. The application likewise utilizes the Smartphone's record the occurrence and in this way transmits the wearer's area alongside the sound chronicle to the police.

3. Proposed System

Arduino Uno fetches various kinds of data from different modules which are interfaced to it. The GSM shield which is used as a interface to send the data is received by the arduino via SMS to the smartphone. Temperature sensor is connected to arduino which gives the ambient temperature. GPS Location sensor determines the real-time location of the child. Ultrasonic sensor and IR detects the obstacles that are near the child. Accelerometer sensor which is also known as mems sensor issued for tilt sensing applications which provides the dynamic acceleration resulting from motion of the child. If push button is pressed by the child, parent will get notified through the SMS through their smartphone. The protocol used here is UART (Universal Asynchronous Receiving and Transmission) protocol to communicate with one device to another.

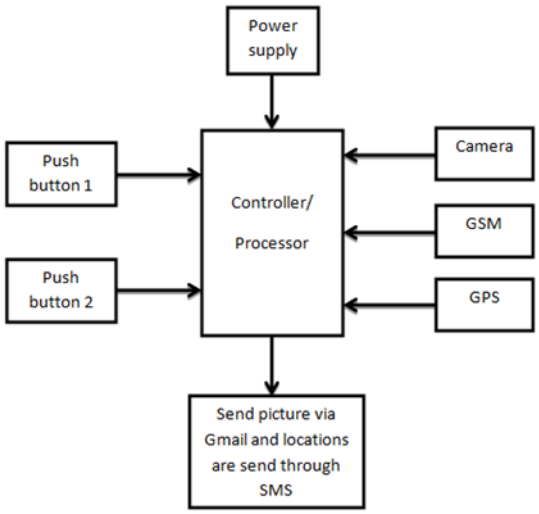


Figure 1: proposed architecture

We can use web application as well as mobile application or either one of it as the front end user interface, cloud, and database as the back end for storing and retrieving information, and a device for monitoring. GPS is used to track the live location of the child who is wearing that device. With the help of GPS, we can easily perform Geo-fencing concept, in which we will be able to feed a particular boundary to that device. If the child goes beyond that particular boundary specified, the respective guardians will receive an alert call using GSM.

The users are required to register using their credentials to use the application. The device will be given to the children for monitoring them regularly. We will feed the boundary value while writing code for the system and we control it using GPS for that device which is also known as Geo Fencing. These data are stored in the server.

1. If the child pressed the push buttons, then values are used to alert the specified guardians through SMS using GSM. When the user receives these alert messages from that device, they can turn on the web camera placed in that device, with which they can visually monitor the status of that child through the live video stream.
2. If the device moves, out of that boundary the server transfers an alert call by activating the GSM, to the user. The live location of the device will be updated in the server and pinged in the website for every few seconds.
3. The user will receive an alert call, they can check the live location through GPS, which was updated in the application. When giving boundary for the school unit, we can also maintain attendance by updating the entry and exit of the child, in and out, of school in the application.
4. After receiving the alert messages, if the user wants to visually check the status of the child, they are required to enter specific IP address of that camera for the first time before syncing and can

be able to watch the live streaming videos which are updated to the server, for further uses they can directly view.

5. The microprocessor is used to control all these actions and the alert was done by checking for specific user of that device in the database.

4. Experimental Results

All the interface hardware working is verified using Arduino software, which shows the outputs of the sensor before uploading to the web page. The web page is created and it can be accessed from any remote place using mobile, laptop or a desktop.

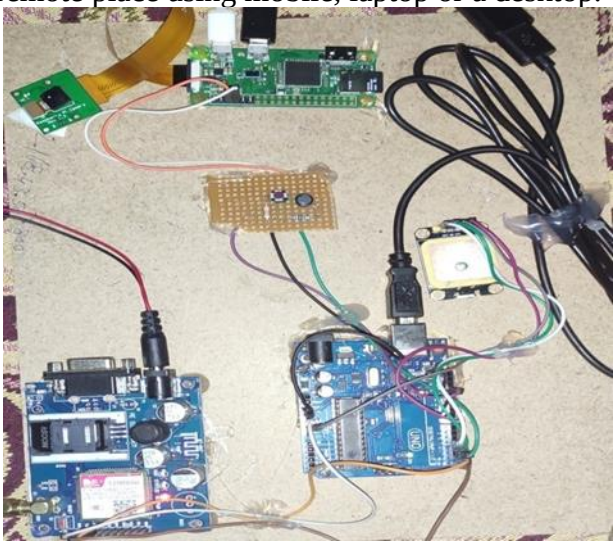


Figure 2: hardware interconnections

We also have a web camera through which we can monitor the child lively through live video streaming whenever we get notified in abnormal cases. We have an IP address for the camera fitted with the kit and we are supposed to enter that IP address in our mobile application or web application through which we can see the live video streaming of what's happening around the child as shown in the picture. we can monitor the child 24/7 in real time through the help of this live streaming which makes parents feel that they are beside their children ensuring children's safety

fig .3 camera visual

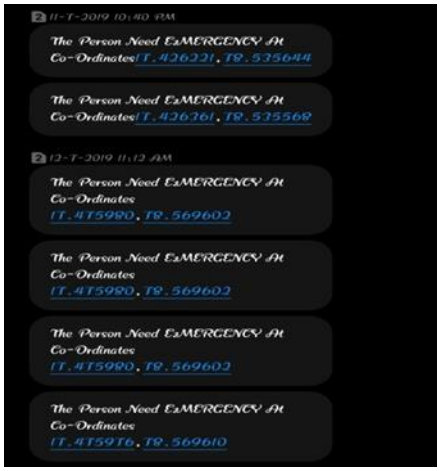


fig .4 communication established for disaster assist

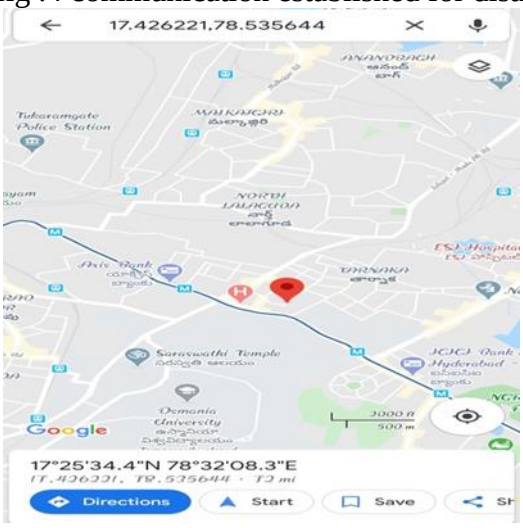


Fig 5 location

Upon testing the wearable device multiple times with repeated SMS texts. The GPS location sensor was able to respond back with precise latitude and longitude coordinates of the wearable device to the user's cellphone, which then the user would click on the received Google maps URL which would, in form, open the google maps app and display the pinpoint location. In all the scenarios the GPS module was tested, it would respond back to the user's cell phone within a minute.

Conclusion:

This research demonstrates Smart IoT device for child safety and tracking helping the parents to locate and monitor their children. If any abnormal values are read by the sensor then an SMS is sent to the parents mobile and an MMS indicating an image captured by the serial camera is also sent. The future scope of the work is to implement the IoT device which ensures the complete solution for child safety problems.

REFERENCES:

1. X. Wang, X. Pan, and H. Cong, ―Children road traffic safety education effect evaluation based on multiplerepresentations,‖ In Proceedings of the 2011 International Conference on Management Science and Industrial Engineering, pp. 89-92,2011.
2. N.A.A. Bakar, A.N. Zulkifli, and N.F.F. Mohamed, ―The use of multimedia, Augmented Reality (AR) and Virtual Environment (VE) in enhancing children's understanding of road safety,‖ In Proceedings of the 2011 IEEE Conference on Open Systems, pp. 149-154, 2011.
3. Akash, moodbidri, Hamid,Shahnasser, “Child safety wearable device” issue 2017 IEEE, Sanfrancisco state university, CA:94132.

4. Asmitapawar,pratikshasagare, tejalsasne,andkiranshinde “Smart security solution for women and children safety based on GPS using IOT” volume 2 issue 3 march,International Journal of recent innovation in engineering and research.
5. Robert D.morris, L.lloydmorgan,Devra Davis “children absors higher doses of radio frequency electromagnetic radiation from mobile phones than adults”.2015 IEEE, VOL,wy8305, USA environmental trust, Berkeley,,CA 94709.
6. Zhiganggao,Honguiguo,yunfengxie,andyanjunluo,Hangzhoudianziuniversity.”child guard a child –safety monitoring system”,Huijuanlu and keyan, china jiliang university,2017 IEEE
7. Kalpanaseelam, K. Prasanti,” A NOVEL APPROACH TO PROVIDE PROTECTION FOR WOMEN BY USING SMART SECURITY DEVICE”, IEEE International Conference on Inventive Systems and Control (ICISC 2018), ISBN:978-1-5386-0806-7, 2018.
8. Prof. Kiran. Mensinkai, Chaitra B.V, Chinmayi V Pandith, Goutam P Nayak and Jyothsna. C. S, “AN INTELLIGENT SAFETY SYSTEM FOR INDIVIDUAL’S SECURITY”, IEEE International Conference on Energy, Communication, Data Analytics and Soft Computing, 2017.
9. G C Harikiran, KarthikMenasinkai, SuhasShirol, “SMART SECURITY SOLUTION FOR WOMEN BASED ON INTERNET OF THINGS (IOT)”, IEEE International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT), volume: 3, 2016.
10. DantuSaiPrashanth, Gautam Patel, Dr. B. Bharathi, “RESEARCH AND DEVELOPMENT OF A MOBILE-BASED WOMEN SAFETY APPLICATION WITH REAL-TIME DATABASE AND DATA-STREAM NETWORK”, IEEE International Conference on circuits power and computing technologies, 2017.