IoT Literature on Child Safety

**Smart IoT device for safety and tracking**

Nandini Priyanka developed a smart IoT device for child safety and tracking. The system is developed using Link-It-ONE board programmed in embedded C and interfaced with temperature, heartbeat, touch sensors and also GPS, GSM & digital camera modules. The novelty of the work is that the system automatically alerts the parent/caretaker by sending SMS, when immediate attention is required for the child during an emergency. The developed strategy consists in including the parameters such as touch, temperature & heartbeat of the child that was used for parametric analysis and results are plotted for the same. The demerit of this to implement the IoT device which ensures the complete solution for child safety problems. Boundary monitoring system is implemented on safety gadgets with the help of BEACON technology, and as soon as the safety gadget moves far away from the BLE listener gadget an alert is provided to itself.

**Safety wearable device**

Akash Moodbidri presented a child safety wearable device and it was published in 2017 IEEE. The purpose of this device is to help the parents to locate their children with ease. At the moment there are many wearables in the market which helps to track the daily activity of children and also helps to find the child using Wi-Fi and Bluetooth services present on the device. This wearable over other wearable is that it can be used in any phone and it is not necessary that an expensive smartphone is required and doesn’t want to be very tech savvy individual to operate. As, this device’s battery gives short life-time. High power efficient models will have to be used which can be capable of giving the battery life for a longer time. If any abnormal readings are detected by the sensor, then an SMS and phone call is triggered to the parents mobile. Also, updated to the parental app through the cloud. The system is equipped with GSM and GPS modules for sending and receiving calls, SMS between safety gadgets and parental phones.

**Safety & tracking management system using GPS**

Aditi Gupta and Vibha Harith demonstrated the child safety & tracking management system by using GPS .This was published in 2016 IEEE .This paper proposed a model for child safety through smartphones that provides the option to track the location of their children as well as in case of emergency children is able to send a quick message and its current location via Short Message services ,The system also consists of Wi-Fi module used to implement IoT and send all the monitored parameters to the cloud for android app monitoring on parental phone ,which offers rich features like Google maps, GPS, SMS etc. .This system is unable to sense human behavior of child.

**Children location monitoring using GPS and GSM**

Dheeraj Sunehera and Pottabhatini Laxmi Priya exemplified the

children location monitoring on Google Maps using GPS and GSM and it was published in 2016 IEEE.This paper provides an Android based solution for the parents to track their children in real time. Different devices are connected with a single device through channels of the internet. The concerned device is connected to the server via the internet. The device can be used by parents to track their children in real time or for women's safety. The proposed solution takes the location services provided by the GSM module. It allows the parents to get their child’s current-location via SMS.It has application in child tracking system using android terminal and hoc networks.This device cannot be used in rural areas due to poor network connectivity.

**Sensor-based method for glucose monitoring in children**

Dr Julie Edge evaluated performance and usability of the Freestyle Libre System in children and has demonstrated good agreement between sensor and BG results. The system is unique among ISF glucose monitoring sensors in that it can be worn for up to 14 days and does not require user calibration. Comparison of accuracy data from this study to that from other pediatric studies using ISF glucose sensors demonstrated that the factory calibrated system provided similar accuracy to systems requiring daily finger prick calibrations. The lack of user calibration eliminates potential variations in sensor systems that may be introduced through errors in BG results used for calibration, calibration at inappropriate times, missing calibrations or use of sensor rather than BG values for calibration.

**Activity Tracker Wristband**

KhasimShaik, SanthosiBogaraju proposed “Implementation of novel application for woman and child protection using IOT enabled techniques”. This system focused on a wireless method which will send alerts and communicate with a secure medium. The system here is based on smartphones which will be very much useful in helping victims. Women will be provided with a smart band and the smartphone that has access to the GPS tracking mechanism that gets the location and these location values are displayed on the LCD. The Smart band is integrated with the Smartphone and The GPS and the GSM can be used. The smart phone is connected to smart band watch through Bluetooth Low Energy (Bluetooth 4.0) module. The device communicates with the phone through an application designed specially that acts as an interface between the smart band and the phone.

**A smart watch for women security**

Helen. A, Fathima Fathila gave an idea of “A smart watch for women security based on the IOT concept known as watch me‟.The “Watch me‟ was designed in a way to secure women when they are exposed to external challenges and harassment in the society. Women safety by smart phone can be activated only by a touch or one click. It is impossible to have mobiles in our hands under all circumstances. In such situations this watch me concept can be used. It works automatically based on heart beat rate which increases due to the secretion of epinephrine hormone from hpa axis that is specifically defined for each and every situation like fear, anger, anxiety and other reactions triggering the sensors automatically.

**Security using wireless and GPS**

Ms. Deepali, M. Bhavale, proposed “IOT based unified approach for women and children security using wireless and GPS” .This system explains that the main goal of this project is to preserve the security of women and school children using a wireless portable safety device and school bus tracking system. This system consists of an emergency „PRESS‟ button and an electronic camera for capturing images. When the sensor kit button is pressed the camera will capture the image and will collect the information of the user. This system uses a wireless method which will alert and communicate with a secure medium.

**Smart GPS device**

The paper was based on IOT (Internet of Things). This paper proposes an Android based solution to aid parents to track their children in real time. The concerned device is connected to the server via the internet. The device can be used by parents to track their children in real time or for women's safety. The proposed solution takes the advantage of the location services provided by GSM. It allows the parents to get their child's location in real time by SMS. Here, a prototype model (device) is created which is simulation based. The work comprises ARM-7 LPC2148 as microcontroller, along with GPS and GSM module. Embedded C core compile using Keil and virtual simulation check using Proteus 8.1 is done. A server is created which will collect all the data generated by our prototype system and send the same to the server using GPRS. A Dummy server will be created by using Filezilla. This device will also have the facility of Emergency help key (SOS), if anyone presses the key, automatic help message will be sent to 3 registered mobile numbers on Server.

**Transport safety system**

Ranga Rao developed a child transport safety system. With the rising measurements of traffic accidents and child abduction, there is a requirement for a robust framework that empowers steady tracking for a huge number of children in transit driving from and to schools. The framework depends on a minimal expense Nano RFID per user and a GPRS module both interfaced with Arduino microcontroller. The Nano RFID per user is utilized as an interface for giving the per user with an intent to get to the internet over 3G/4G organization. Assemble Mysql information base and convey it on Heroku's cloud stage, which makes building applications and sending them quick, secure, simple and adaptable.

**Child remote monitoring system using the radar devices**

Dipali Bad Gujar proposed a system mainly focusing on child remote monitoring systems also using the radar devices as well as obstacle sensors which will detect the alert when the child enters the danger zone then alert will be given to the caretaker through the mobile using an alarm or notification. For sensing purpose Waterproof Ultrasonic Obstacle Sensor which are placed in the simple locket that is given to the baby so that locket will give alert to the caretaker through the mobile and for battery backup we are using solar panel through which the energy will get stored in the care taker’s shoes and this energy will be dependent on the steps covered by the caretaker. In this proposed system a general method for rapid peak detection is used for depth/height measurement.

**RF based Student Tracking System**

Muthu Lakshmi demonstrated the ultimate goal of this project is to plan the blueprint and related work of RF based Student Tracking System. By using the in and out monitoring records that helps to create the suitable place or environment which helps in maintaining their safety. The proposed system notifies the parents when they enter and leave the school via mobile text messages with the help of GSM. The system uses fingerprint verification as a part for locking and unlocking the student band which is worn by each and every student. This system also makes use of affordable components such as RF, Arduino, GSM, LCD display and fingerprint sensor.

**Child Abduction Rescue Device**

M.Rabiathul Fathima developed IoT and GSM Based Child Abduction Rescue Device where an emergency reaction scenario recognition app named VithU was introduced to ensure children's safety in any situation. VithU is an emergency app that begins sending out alarm messages every 2 minutes to your contacts that you enter into the app as chosen recipients or guardians after you press the power button on your smartphone two times consecutively. This effort will assist us in rescuing countless youngsters from the nefarious elements of society. This child detection technology will help to ensure the safety of children, allowing parents to feel more comfortable letting their children out in public.

**Sensor embedded health monitoring device**

P.Poonkuzhla implemented a portable IOT-based safety and health monitoring system for children through a sensor embedded health monitoring device for safety and emergency services. For the purpose of the direct attendance of the children , the proposed system contains the MATLAB for face recognition and by using this we can also save the information of the child in the cloud. The system is built on Arduino and uses a commercial GPS receiver to compute the position of the child continuously. The Respiration Sensor is used to monitor abdominal or thoracic breathing, in biofeedback applications such as stress management and relaxation training.

**Contactless access for post covid school conveyance**

**RFID - based safety**

Ning described an RFID - based intelligent safety management

system for school children. Using RFID technology, they designed a

system for monitoring the school gate, schoolroom, and other places on the school campus. The proposed system includes a number of RFID readers and tags. Each student keeps the RFID tag either in his school uniform, school badge, or school bag. The reader captures the details and sends them to the security management system through a communication gateway.

**GSM and RFID technology for child safety**

Natraj proposed a system for monitoring the entry and exit of

school children from the school bus using GSM and RFID technology.

Parents are getting details on the status of their wards through messages sent using GSM.

**Based on Raspberry Pi**

Haider proposed an attendance system based on Raspberry Pi. The system comprises terminal units, and a central computer. The terminal device is composed of Raspberry pi, screen monitor, RFID, each user's transponder card, and GSM board. The central unit called the hub of the network is responsible for gathering all the information from the terminal units, displaying it, and special analysis to make a decision on those whose absence crosses the threshold line.

**RFID based system to update status of their wards**

Leela presented an RFID based system to update parents regarding

the status of their wards during their school time. The system includes a

GPS module that provides the kid’s location details. This system consists

of an ID card with an RFID/NFC system and a child safety device(CSD). The CSD is the arrangement of GSM / GPS and the wireless data transfer scheme of RFID. The device transfers information through GSM.

**IoT wearable device for the safety and security for girl child**

M. Pramod, Ch V. Uday Bhaskar and K. Shikha worked to create a

wearable IOT device for the security and shielding of women, girl

children. This is accomplished by the examination of physiological signs in concurrence with body gestures. The signs are analyzed and body

temperature is measured by galvanic skin resistance. This work deals with body temperature and stress and skin resistance and relationship

between them. By applying the records, activities persons position is

analyzed.

**Arduino based security for school children**

Prakash described an Arduino based security system for school

children. The described system consists of two components. The student ID with RFID tag constitutes the first component and RFID reader installed in the school campus belongs to the second component. When the student enters the school, the RFID reader scans her ID card and the name of the student along with the time of entry is displayed. An RTC module was interfaced to the microcontroller for time notifications. A GPS module attached to the system identifies the student location. Once the student enters the campus, details collected from the RFID reader, along

with the GPS data is sent to the parent using GSM.

**Contactless access control for post covid school conveyance**

A thorough survey of this topic reveals that several studies have

been carried out in this sector. Kasim demonstrated an RFID based

attendance monitoring system for replacing manual attendance

monitoring system in educational institutions. The proposed system tracked the student’s attendance using the RFID reader-tag system. Besides, this system facilitated the online record maintenance system to track the student’s attendance anytime anywhere.