A Research on Child Safety Wearable devices

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ABSTRACT: **In today's world child and women are less secure and have many issues regarding their security purpose. They have to undergo among various difficult situations and have to prove themselves every time in all critical conditions. So, for their security and safety purpose government has provided security through rules and regulation to the society. Although there are many existing systems for security purpose need of advanced smart security system is increased. In order to overcome such problems smart security system for child and women is implemented. This paper describes about safe and secured electronic system for child which comprises of an Arduino controller and sensors such as temperature LM35, flex sensor, MEMS accelerometer, pulse rate sensor, sound sensor. A buzzer, LCD, GSM and GPS are used in this project. When the child is in threat, and the offender hand touches the touch sensor which is fixed in the bad touching places of a girl child, the device senses the body parameters like heartbeat rate, change in temperature, the movement of victim by flex sensor, MEMS accelerometer and the voice of the victim is sensed by sound sensor. When the sensor crosses the threshold limit the device gets activated and traces the location of the victim using the GPS module. By using the GSM module, the victim's location is sent to the registered contact number.**

Keywords: **Buzzer, Camera, Child, GPS, GSM, IOT, Sensors, Security, Smart phone application.**

1. INTRODUCTION

Internet of Things (IOT) is the latest technology that connects entire world. It establishes connectivity (through internet) among the various devices or services or systems in order to little by little make automation development in all areas.
Safety is the most wanted power for everyone in today's world. Rape is the one of the major crime in India practiced against Child and Women. The crime rate is growing steadily since last few decades. According to latest National Crime Records Bureau (NCRB) 2013 annual report, 33,707 rape cases are reported across only India. The number of reported rape cases has been steadily increasing over the past decade.

Technology is the best way to solve this problem. That's the reason to develop this project that can act as a rescue device and protect at the time of danger. The motivation behind this project is an attempt to focus on a security system that is designed merely to serve the purpose of providing security to women so that they never feel helpless while facing such social challenges. An advanced system can be built that can detect the location and health condition of person that will enable us to take action accordingly based on electronic gadgets like GPS receiver, GSM, pulse rate sensor, flex sensor, MEMS accelerometer, body temperature sensor. We can make use of number of sensors to precisely detect the real time situation of the women in critical abusive situations. The heartbeat of a person in such situations is normally higher which helps make decisions to detect the abnormal motion of the women while she is victimized.

2. LITERATURE SURVEY

A NOVEL APPROACH TO PROVIDE PROTECTION FOR WOMEN BY USING SMART SECURITY DEVICE

Seelam and Prasanti(2018)[1] says that in today's world women are less secure and have many issues regarding their security purpose. This paper describes about safe and secured electronic system for women which comprises of an Arduino controller and sensors such as temperature LM35, flex sensor, MEMS accelerometer, pulse rate sensor, sound sensor. A buzzer, LCD, GSM and GPS are used in this project. When the woman is in threat, the device senses the body parameters like heartbeat rate, change in temperature, the movement of victim by flex sensor, MEMS accelerometer and the voice of the victim is sensed by sound sensor. When the sensor crosses the threshold limit the device gets activated and traces the location of the victim using the GPS module. By using the GSM module, the victim's location is sent to the registered contact number.

Fig 1: Prototype of security system

AN INTELLIGENT SAFETY SYSTEM FOR INDIVIDUAL'S SECURITY

Prof. Kiran et al(2017)[2] says that, in today's world, security is the major issue for an individual. In this project the system consists of a monitoring device, which gets activated when the device is tapped upon then a text message along with voice alert message is received by the respective emergency contacts. Further the person who receives the notifications can find and track the location without the interaction of the victim's application at each and every function.

SMART SECURITY SOLUTION FOR WOMEN BASED ON INTERNET OF THINGS (IOT)

Harikiran et al(2016)[3] says that, today in the current global scenario, the prime question in every girl's mind, considering the ever rising increase of issues on women harassment in recent past is mostly about her safety and security. In this paper they propose to have a device which is the integration of multiple devices, hardware comprises of a wearable "Smart band" which continuously communicates with Smart phone that has access to the internet. The application is programmed and loaded with all the required data which includes Human behaviour and reactions to different situations like anger, fear and anxiety. This generates a signal which is transmitted to the smart phone. The software or application has access to GPS and Messaging services which is pre-programmed in such a way that whenever it receives emergency signal, it can send help request along with the location co-ordinates to the nearest Police station, relatives and the people in the near radius who have application. This action enables help instantaneously from the Police as well as Public in the near radius who can reach the victim with great accuracy.

RESEARCH AND DEVELOPMENT OF A MOBILE-BASED WOMEN SAFETY APPLICATION WITH REAL-TIME DATABASE AND DATA-STREAM NETWORK

Sai Prashanth et al (2017)[4] developed an application that incorporates all the unique features such as real-time location tracking and integrate all the features offered by the existing system such as GPS tracking, SOS. The application requires an initial registration along with emergency contacts and the user is asked to update the emergency contacts from time to time. When the user is travelling from one place to another, the dynamic GPS tracking offered by PubNub's channel is turned on to view the user's location on a map. Users with the same app can monitor other users with this app through the dynamic GPS Tracking system through the PubNub channel. When the SOS button is pressed then an alert message which contains the name of the user, GPS Location and a help message is sent via SMS. The user has access to first-aid information and toll free helpline phone numbers. All the information and data is integrated with Firebase.

WOMEN'S SAFETY MEASURES THROUGH SENSOR DEVICE USING IOT

Sathyapriya and Mary(2018)[5] describes safety electronic device for women, a wearable smart bracelet, that sends alerts to friends, family, as well as the police when they fell they are in problem. The smart device based on IOT uses a low-energy Bluetooth connection to synchronize to an application on the wearer's Smartphone. The application lets the wearer inform her situation in case of a critical situation - to her friends, family members, the police, or a group. The software or application has access to GPS/GSM and Messaging services, which is pre-programmed in such a way that whenever it receives emergency signal, it can send help request along with the location coordinates to the nearest Police station, relatives using emergency keys (SOS). This action enables help instantaneously from the Police who is in the near geographical location, who can reach the victim with great accuracy. The app also uses the Smartphone's record the incident and subsequently transmits the wearer's location along with the audio recording to the police.

SMART SHIELD FOR WOMEN SAFETY

Pawar et al(2018)[6] made an attempt to solve the problems of women safety. The scope of their system is to develop a smart device which can help women in some emergency situations. The system is a smart wearable device which resembles a jacket. The device contains different modules such as GPS (Global Positioning System), GSM (Global System for Mobile communication), Camera, Buzzer, Shock Mechanism Circuit. The main objective of the system is to provide a reliable security system for a woman when they are alone or feel unsafe.

SMART BEARS DON'T TALK TO STRANGERS: ANALYSING PRIVACY CONCERNS AND TECHNICAL SOLUTIONS IN SMART TOYS FOR CHILDREN

Katerina Demetzou et al(2017)[7] designed a "Smart Bear" which is a hypothetical connected-smart toy for children. While the functionalities it presents are appealing to both children and their parents, the privacy concerns that are raised should be taken into serious consideration. A big amount of personal data of the child (and probably of other uninformed minors and adults in physical vicinity) are processed and analysed, an accurate profile of the child is created and direct marketing practices would most probably take place. The toy could suddenly turn into a surveillance device, while malicious third parties might hack the device and proceed to activities that would even threaten the child's physical and/or mental health. Data minimisation and privacy enhancing technologies are suggested, that would, if not completely alleviate, at least diminish the risks presented. Cybersecurity measures constitute a necessary condition for the alleviation of privacy concerns. This paper concludes that while a zero privacy risk "Smart Bear" is currently not possible, a privacy considerate "Smart Bear" is not that hard to achieve.

A SMART WATCH FOR WOMEN SECURITY BASED ON IOT CONCEPT 'WATCH ME'

Helen et al(2017)[8], designed a wearable smart watch. When a women or child wearing this 'watch me' is exposed to sexual or vulnerable attack, the sensor present in it detects the heart beat rate of a person which will be high at the moment by the secretion of epinephrine hormone from hpa axis and gets activated, this will not only provide alarm sound to the attention of nearby people, it will automatically make a call to our registered contact and also through GPS/GSM it will detect the nearby police station

and make a ring there so it will be helpful for police to arrive soon at the spot by tracking the GPS, such a system will lead to safer and better environment.

ACTIVITY TRACKER WRIST BAND FOR CHILDREN MONITORING USING IOT

Bhanupriya and Sundarajan(2017)[9] proposed a device which is integrated with multiple devices, comprising of wearable "Activity Tracker Wrist Band" which is programmed with all the required data which includes the behaviour of the human reactions like anger, anxiety, nervousness and fear. When these situations are faced by the victim, the various sensors generate the emergency signals which are to be transmitted to the smart phone. The system effectively monitors the children presence within the expected zone. When the person crosses the monitoring zone, then based on IOT Monitoring system, GSM sends help request by sending messages to the nearest police station, parents and the people in the near radius.

IOT BASED UNIFIED APPROACH FOR WOMEN AND CHILDREN SECURITY USING WIRELESS AND GPS

Bhavale et al(2016)[10] proposing a system that works on the controversy of children and women security using IOT. The proposed system intends to a device wireless technique in the form of embedded device namely Arduino for women that will serve the purpose of alerts and way of communicating with secure channels and it captures the image using electronic camera. There are many android applications for women safety but they as not as much as efficient. So to solve this issue of women safety they develop a wireless sensor kit which is easy to use and which is efficient to provide help to that victim. so when the victim press kits button, our application will capture the photo, collect user's information to send notification to registered phone numbers with link of captured image. This saves the time and that victim get help without loss of time. Also in the case of Children security the system proposes a speed monitoring and location tracking facilities using GPS, GPRS, GSM. The system consists of bus unit. The bus unit which is used to detect the path of Bus by using GPS. Weather the bus is travelling on its day to day route and also it monitors the over speeding of bus. For the mechanism of vehicle tracking Haversine and Trilateration algorithm are used. According to that by using GSM, alert messages will be send to their parents and vehicle owner. The system has been developed on web based data driven application that provides the useful information**.**

SMART GIRLS SECURITY SYSTEM

Chougula et al(2014)[11] reviewed that, the status of women in India has gone through many great changes over the past few millennia. This paper focuses on a security system that is designed solely to serve the purpose of providing security to women so that they never feel helpless while facing such social challenges. The system consists of various modules such as GSM shield (SIM 900A), Arduino ATMega328 board, GPS (GYGPS6MV2), screaming alarm (APR 9600), a set of pressure sensors for activation and power supply unit. The Delhi Nirbhaya case that triggered the whole nation was the greatest motivation for this system. It was high time we women needed a change.

DESIGN AND DEVELOPMENT OF AN IOT BASED WEARABLE DEVICE FOR THE SAFETY AND SECURITY OF WOMEN AND GIRL CHILDREN

Anand Jatti et al (2016)[12] presents a work. The aim of this work is to develop a wearable device for the safety and protection of women and girls. This objective is achieved by the analysis of physiological signals in conjunction with body position. The physiological signals that are analysed are galvanic skin resistance and body temperature. Body position is determined by acquiring raw accelerometer data from a triple axis accelerometer. Acquisition of raw data is then followed by activity recognition which is a process of employing a specialized machine learning algorithm. Real-time monitoring of data is achieved by wirelessly sending sensor data to an open source Cloud Platform. Analysis of the data is done on MATLAB simultaneously. This device is programmed to continuously monitor the subject's parameters and take action when any dangerous situation presents itself. It does so by detecting the change in the monitored signals, following which appropriate action is taken by means of sending notifications/alerts to designated individuals. A prototype of the model is shown below.

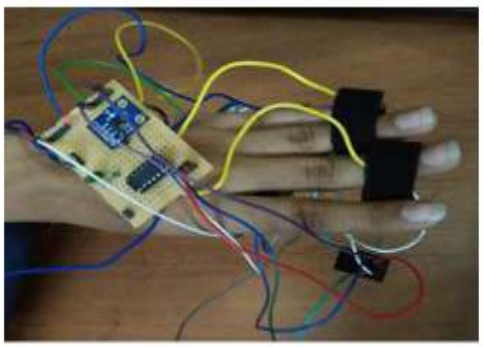

Fig 2: Developed prototype

CHILD SAFETY WEARABLE DEVICE

Moodbidri and Shahnasser(2017)[13] 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 wearables 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.

AN INNOVATIVE APPROACH FOR WOMEN AND CHILDREN'S SECURITY BASED LOCATION TRACKING SYSTEM

Velayutham et al (2016)[14] developed a system that helps the women and child to seek help in any critical situation. For that, the system contains GPS to detect location and GSM mechanisms to pass their current location to any one of the trusted contacts as a google map link and services are provided to track the locations from that moment onwards to save the person.

DESIGN AND IMPLEMENTATION OF SAFETY ARMBAND FOR WOMEN AND CHILDREN USING ARM7

Toney et al(2015)[15] says that, with increasing atrocities on women and children, arises the need of an advanced system to serve the purpose of alerting someone for help. Most of the cases remain mystery because of lack of evidences or them being tweaked. The situation is noxious and they propose a system that would aid the victims not only to send a panic and alert message but also collect evidences in the form of images. They propose a system initiated by a human action. It is also given with an option of switch button and a fall detector to activate the system. The armband would have a controller with GSM/GPS kit interfaced. The band would also be interfaced with a wireless camera for collecting images. A human action would initiate the system. On initiation, the video collected is live video streamed to the Control room. An alert message along with the location is sent to a predefined Mobile Station until the system is reset. Since change in Longitude and Latitude is sent continuously; the person can be tracked. The system is designed also to be used as an alert system during medical emergency.

A REVIEW ON IOT BASED SMART GPS DEVICE FOR CHILD AND WOMEN SAFETY APPLICATIONS

Niti shree(2016)[16] proposes an Android based solution to aid parents to track their children in real time. Different devices are connected with a single device through channels of internet. The concerned device is connected to server via internet. The device can be used by parents to track their children in real time or for women safety. The proposed solution takes the advantage of the location services provided by GSM. It allows the parents to get their child's location on 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 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.

DESIGN AND IMPLEMENTATION OF CHILDREN TRACKING SYSTEM USING ARM7 ON ANDROID MOBILE TERMINALS

Raj and Anuradha(2014)[17] surveyed that, recently, all over the world, crime against children is increasing at higher rates and it is high time to offer safety support system for the children going to schools. This paper focuses on implementing children tracking system for every child attending school. However, the existing systems are not powerful enough to prevent the crime against children since these systems give information about the children group and not about each child resulting in low assurance about their child safety to parents and also does not concentrate on sensing the cry of the child and intimating the same to its parents. The proposed system includes a child module and two receiver modules for getting the information about the missed child on periodical basis. The child module includes ARM7 microcontroller (lpc 2378), Global positioning system (GPS), Global system for mobile communication (GSM), Voice playback circuit and the receiver module includes Android mobile device in parent's hand and the other as monitoring database in control room of the school. Finally, implementation results for the proposed system are provided in this paper.

DEVELOPMENT OF WEARABLE DEVICE FOR THE SAFETY AND SECURITY OF WOMEN AND CHILDREN

Jyothi et al (2018)[18] proposes an SMS and E-mail based solution to aid parents to track their children in real-time. Different devices are connected with a single device through channels of internet-concerned parents to track their children in real time or for women safety can use the device. It allows the parents to get their child's location on real time by an E-mail and SMS. Here prototype model (device) is created which is simulation based. The work comprises Raspberry Pi as a microprocessor along with GPS, E-mail and SMS gateway. Python 2.7 Idle compile is used for the purpose of compilation. A server is created which will collect all the data generated by our prototype system and send the same to server using GPRS. A Raspberry Pi camera is being used to capture the surrounding area's images when the child is in trouble.

GPS AND SMS-BASED CHILD TRACKING SYSTEM USING SMART PHONE

Al-Mazloum et al(2013)[19] surveyed that, recently many cases of missing children between ages 14 and 17 years are reported. This paper proposes an Android based solution to aid parents to track their children in real time. Nowadays, most mobile phones are equipped with location services capabilities allowing us to get the device's geographic position in real time. The proposed solution takes the advantage of the location services provided by mobile phone since most of kids carry mobile phones. The mobile application use the GPS and SMS services found in Android mobile phones. It allows the parent to get their child's location on a real time map. The system consists of two sides, child side and parent side. A parent's device main duty is to send a request location

SMS to the child's device to get the location of the child. On the other hand, the child's device main responsibility is to reply the GPS position to the parent's device upon request.

ANDROID BASED CHILDREN TRACKING SYSTEM

Pawade and Gaikwad(2015)[20] proposed, a children tracking system based on android terminals. Recently, all over the world crime against the children in the age of 14 to 17 years is more popular. Parent's always worry about their children whenever they are outside from the home. In this paper, the proposed system consists of two sides out of them one is parent module and another is the child module. The child module consists of ARM7microcontroller (LPC 2148), GPS (Global Positioning System), GSM (Global System for Mobile Communication) and voice chip where the parent module consists of android mobile phone. This paper gives the information about missing child from school campus. There are two android mobile phones for the safety of the both module. The system tracking the child from source to destination i.e. from home to school or anywhere.

IOT WEARABLE DEVICE FOR THE SAFETY AND SECURITY OF WOMEN AND GIRL CHILD

Pramod et al(2018)[21] designed a security device. The main objective of this work is 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 analysed 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 and persons position is analysed. The device makes an analysis of skin resistance and body temperature to analyse the situation of the person.

DESIGN AND IMPLEMENTATION OF A RESCUE SYSTEM FOR THE SAFETY OF WOMEN BY USING ARDUINO CONTROLLER

Pavithra, and Sangeetha(2018)[22] says that the main contribution of the paper is to develop a wearable arm band for safety and protection of women and girls. This objective is achieved by the analysis of physiological signal in conjunction with body position. The physiological signals that are analysed are pulse rate sensor, vibration sensor and if there is any fault it additionally uses a fault detection sensor. Acquisition of raw data makes the Arduino controller function by activating the GPS to send alert messages via GSM and the wireless camera captures images and videos and sends images to the pre-decided contacts and also shares video calling to the family contact. The alarm is employed to alert the surroundings by its sound and meanwhile, she can also use a TAZER as a self-defence mechanism.

HIGH ACCURACY SENSOR BASED WOMEN AND CHILD SAFETY BY USING GSM

Gopperundevi et al(2018)[23] says that the women and child safety is a very important issue due to rising crimes against women these days. This paper proposes to track the women or child from dangerous Situation. The flex sensor band wears by the child or a woman. If they are in dangerous situation they can bend the flex sensor literally, then it will send the accurate location to the android phone by the use of GPS and GSM. The GPS and GSM module which is already connected to the ARDUINO UNO. It converts the analog signal from the flex sensor to the message as a format of google link to our contacts.

3. WORKING OF PROPOSED SYSTEM

This project describes about safe and secured electronic system for women which comprises of an Arduino controller and sensors such as temperature LM35, flex sensor, pulse rate sensor. A buzzer, LCD, GSM and GPS are used in this project. The device is mainly built to save a child from harassments. We are placing the touch sensor in the bad touching places of the girl child. If any touches on the touch sensor is detected, the device senses the body parameters like heartbeat rate, change in temperature, the movement of victim by flex sensor. When the sensor crosses the threshold limit the device gets activated and traces the location of the victim using the GPS module. By using the GSM module, the victim's location is sent to the registered contact number. A hidden camera is also fixed along with the child dress, when the device gets activated, the camera starts working and it transmits the live scenario to the registered contacts, so that they can be able to see what's happening there.

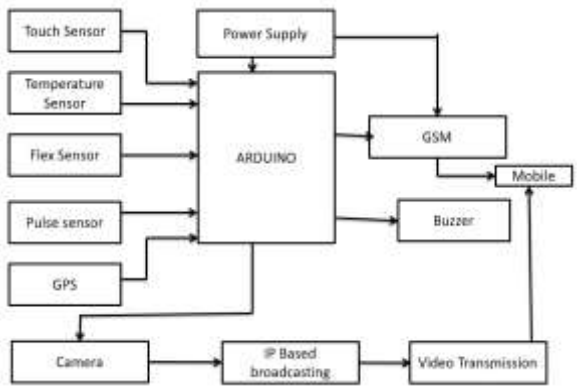

Fig 3: Architecture of the Proposed System

4. CONCLUSION

This paper is all about the existing applications for women security and comes out with an innovative idea for security and protection for women and more research is possible with introducing smart technology where people and objects form a network. This will help to solve them technologically with compact equipment and ideas. Using screaming alarms and also alerting the emergency contacts by sending the messages with the location is helpful for women's security. This system can overcome the fear that scares every woman in the country about her safety and security.

5. FUTURE ENHANCEMENT

Following are a few different paths that can be followed to improve the system developed in this project.

- As the mechanical changes or new prerequisite from client to improve the usefulness of item may require new form to present. In spite of the fact that the Framework is finished and working effectively, new modules which improve the framework usefulness can be added with no real changes to the whole framework.
- Device can be made further compact in size.
- Developing the ability to work in any environmental situation.

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