International Journal of Computer Engineering in Research Trends
Multidisciplinary, Open Access, Peer-Reviewed and fully refereed
Survey Paper Volume-5, Issue-2 ,2018 Regular Edition E-ISSN: 2349-7084

SURVEY ON WOMEN SAFETY USING IOT

B.Sindhu Bala[1], M.Swetha[2],M.Tamilarasi[3] and D.Vinodha[4]

[1,2,3] U.G. Student Computer Science and Engineering, S.A.Engineering College, Chennai
[4] Professor Computer Science and Engineering, S.A.Engineering College, Chennai
e-mail: sindhubalabk@gmail.com , swethamuralims@gmail.com , tamilarasi2725@gmail.com and vinodha@saec.ac.in

Available online at: http://www.ijcert.org

Received: 05/02/2018, Revised: 06/02/2018, Accepted: 09/02/2018, Published: 13/02/2018

Abstract: - Nowadays women are facing many security problems in the society. In such cases, they feel handicap and need help to protect them. Even though many technologies have been introduced for women still kidnapping, eve teasing and sexual harassment are taking place in our country. When the women face into unsecured situations, to ensure the safety, automatic detection system needs to establish which send an alert message which includes the location of the police department. This can be done by sensing various factors such as abnormal sounds, body reaction like trembling, dreading and heartbeat which can be sensed using sensor and to provide the alert message.In this paper, we surveyed the existing mechanism for detecting locations, for sending communications and collecting physical parameters of the human body using sensors.

Keywords: Automatic detection, alert message, abnormal sound, heartbeat, trembling, sensor.

1. Introduction

Women safety is one of the major issues in today's world. The world is becoming so much unsafe for women. In today's world, most of the women are stepping out at any time from their house for working. Even though many technologies have been introduced for women still kidnapping, eve teasing and sexual harassment are taking place in our country.

In last few years crime against women has increased to a greater extent. Women are harassed not only in the evening or night but also during day hours at home, working place, shopping etc. There is number of women's who have been afraid of strangers for their safety. Around 80% of the women in our country have fear regarding their safety.

In past decades women's usually won't step out from their house for work, so there was more safety. But in the recent situation, women's want to be employed and want to work outside, but there is the lack of safety; various systems have been built to provide safety for women. Each system use a different kind of techniques to detect the unsafe situation of women. Some of them used panic sensors to detect the condition of the women by heartbeat and temperature change in women's body,

Sound detectors are also used to detect the variations in women voice while they are in danger situation. Most systems use mobile devices for detecting women's unsafe situations, such as phone mike to detect women scream, camera to take pictures and to record video. In this paper, we surveyed the different existing mechanism used for ensuring the safety of women when they are away from home.

When the women face into unsecured situations, to ensure the safety, automatic detection system needs to developed which send an alert message to the police department and people. This can be done by sensing various factors such as abnormal sounds, body reaction like shivering, sweating and heartbeat which can be detected using sensor and to provide alert message with the various factors to identify the safety of women are

- Mechanism for detecting Location(GPS)
- Mechanisms for detecting location using street images
- Schemes for Communication(GSM)
- Schemes of communication(Wi-Fi)
- Schemes on Sensor

 DOI: http://dx.doi.org/10.22362/ijcert/2018/v5/i1/V5I201

- Existing System

In this paper, we surveyed the existing mechanism for detecting locations, for sending communications and collecting physical parameters of the human body using sensors.

Mechanisms for detecting location

a) GPS

GPS is a Global Position System is a radio navigation system used to provide geolocation; this is mainly used in military forces, this technology can be used to track the location of a person and to determine the position of an object. GPS will broadcast a message which contains current position, time, latitude and longitude of the place where it is situated. It establishes a connection to the required number of satellites, and at minimum at least four satellites should be used for calculating current location of the system, then GPS initiate a process that solves a set of equations to find precise current location, this can take place within few minutes or seconds depending on the strength of the receiver. The GPS does not require the user to transmit the data; it operates independently through internet reception to enhance GPS positioning information. This GPS system is available as a module that can be embedded in any mobility devices, so this system can be helpful for women to track the location information when they feel unsafe or in danger situations.

b) Using street images

Mobile phone's camera is used to capture the street image of the current place when women are in danger situation. As soon as such situation is detected, the camera captures the image automatically and sends to the cloud, the street images are recognised by the police or neighbours, and the women are tracked quickly.

Schemes of Communication

a) GSM

GSM is a Global system for mobile communication, it is the most successful digital mobile telecommunication system, and it also termed as second-generation system. GSM provide various services based on voices and data delivery, some of the GSM services are Tele-services, bearer services and supplementary services. GSM mainly used for its tele-services for voice transmission and messaging services, when two users need to communicate via GSM system, a connection between the mobile node and nearby base station is established, the base station reaches the nearby base station of other user using BSC(base switching center), thus a connection is established between the two users within few seconds, GSM also provides emergency communication which has higher priority that preempts other connections, the advantage of GSM communications are wireless communication and worldwide connectivity, better frequency efficiency and many users can access at a time, hence this system can be used for emergency communication when a woman faces a difficult, unsafe situations.

b) Wi-Fi

Wi-Fi is wireless communication devices based on IEEE 802.11 standards, most commonly used Wi-Fi module are ESP8266, which is a low-cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability. This module can be integrated with any mobility devices. Wi-Fi can be used to connect to the internet and send data to cloud reliably.

Schemes on Sensor

Sensors are a device that can detect or measure any physical property; it will indicate or record or responds to it, mainly sensors are used to detect the changes in the environment that may be physical, visual or sound. Sensors are used in day to day life such as thermometer used to measure temperature and touch-sensitive lift buttons. The usage of sensors is increased exponentially in modern days, it's gone beyond measuring temperature, pressure and flow, every mobile device various sensors like proximity sensors, gravity sensors and accelerometer sensors, sensors provide output mostly in analog signals based on input quantity changes in environment, this analog output can be converted into human-readable format. Sensors can be able to communicate in the wireless medium; it can also communicate with each other, such communication network is known as wireless sensor networks. Many sensors are available as micro devices which are small and compatible, this can be embedded in any mobility devices to detect the changes, so sensors can be used to detect the condition of the women automatically when she is a danger.

For the safety of women, the required sensors:

Some of the required sensors are

a) Buzzer - It is a sensor, which gets input from the user and produces output in digital format. Usually a buzzer is a form of a switch, give output 0 when it is not pressed and give one as output when pressed.

b) Temperature sensor- It used to measure the amount of heat energy produced by an object or human body, it produces an output in analogue format, a formula is used to convert the analogue signal into the temperature of human body.

c) Heartbeat sensor - It is used to measure the speed of heartbeat; this sensor can be placed in any nerves of human body. Usually, the output is in analogue format. Hence it can record the change in the heartbeat.

d) Sound detector sensor - This sensor used to detect when a sound has exceeded a set point you selected, it produces output in digital format. The sound is recorded via a microphone and stored in an LM393 op-amp. The set point of sound level is adjusted via a potentiometer. When the sound level exceeds the set point, the output is sent low.

Existing System

In an Existing system when women face a threat, the systems records the image and audio of the current situations and upload to cloud, but precautionary measures were low, Various systems used technologies such as SOS message, GSM and Wi-Fi networks for communications.

To detect the difficulty situation of women many techniques were used, a button is used which a women should press when she is in such situation, this is manual, in many situations she may not be able to press the button manually, other auto detecting system used temperature sensors to detect the women condition based on her body temperature, heartbeat sensors are used to detect the conscious state of the women, even many systems used sound detectors to identify the variation in her voice in that situation.

Every system uses GPS and street images to identify the location of the women, those locations are fetched only when she faces such situations, there is no system to send locations periodically, these systems not only send the location to police and official safeguards, these systems can also store information about their friends and family. Hence the location is shared with friends and family also, this increase the possibility to save the women quickly.

Most of the systems are mobile applications that are dependent on the mobile network, mobile battery and other technical problems are also there in a mobile application. These mobile applications can't send the locations periodically because they require power and data bandwidth of mobile for other purposes like communication and other activities. Hence a separate device is developed specifically to ensure the women safety.

Our goal in this paper is to gather as much published techniques as we could find their key ideas and found advantage and disadvantage and limitation used.

2. Related Work

B.Vijayalakshmi in [1] proposed a scheme to improve the women safety by using GPS and gsm model.A small device with a buzzer and microcontroller is designed, and it can be placed on band or watch. When any insecure situation, the woman can make use of this device to send alert SMS by pressing this buzzer to predefined numbers(5 members). But this scheme cannot generate automatic alert SMS. Instead, it requires the human interaction during a panic situation.

Rameshkumar.P in [2] described a scheme to identify the location of the individuals by using image metadata.A device GPS mapper is used to identify the location of a person using image and video by utilizing background metadata. With the help of GPS mapper, it can identify the altitude, longitude and position of a person who has uploaded their images to social media. But this scheme cannot generate the image of a person who has not uploaded the image in the social media.

Charranzhou in [3] proposed a mechanism to find the trip ends while travelling or not - travelling by using the smartphones based on GPS tracking system. The author modelled a device using PR (Promoted Recall)technology and data-driven machine language to find the speed, distance, heading direction. These features are used to characterize the smart phone holders and identify the travel point identification. The author has tested PR technology in the random forest and accurately tracked the distance of trip ends This scheme will take many days to find the location of trip ends.

Jakuryamaekawa in [4] proposed a scheme to determine user's current location preference using user's coordinate point, user's location information is disclosed to external providers even if this is not user's wish. A local Wi-Fi network is used to detect a user's location privacy preference.This enables to save energy and protect a user's private location.The disadvantage is Wi-Fi won't be available at everywhere and will be limited in space.

Humgnguyen in [5] developed the system called ambulatory based on the inertial sensor to observe and detect the person's behaviour in daily life with PD (Parkinson disease) and facilitate early treatment. It will identify the disease in short time. From the free environment, observe the disease and take treatment. The limitations of measuring the device will be fixed in objects. If the person away from the object can't be predicted.

Ignore in [6] proposed a scheme to determine Detection Of Global And Local Motion Changes In Human Crowds which may arise in sporting events, function etc. A Groups Are Detected Based on location, velocity and tracked the time using association algorithm. The behaviour changes of people can be detected by using holistic approaches and video surveillance by representing in the 2D histogram. But it can't be able to detect the motions changes in human crowds in 3D histogram representation.

Dawei fan in [7] proposed a scheme to monitor, record, analyse the person psychological, the behaviour characteristics of a person and environmental change in indoor and outdoor actions. A wireless sensor device is used to analyse the data.The information of body area network obtained from the wireless sensor is stored in Sdcard.It is mainly designed to check the behaviour changes of human

body diseases such as chronic disease and other health conditions.Hence it will improve the healthcare and quality of life.

JG Lourens in [8] has formulated a technique to Detect and logging advertisements using its sound. The technology uses Pattern matching approach and Time warping sensitivity for detecting the sound of each advertisement played in radio frequency. Once the correlation between the broadcasted advertisement and signature formulated has been determined, this correlation value has been compared to a threshold to find matching advertisements. The performance of the system is based on the false alarm and miss rate of each sound frequency.

HasmahMansor in [9] proposed a scheme for measuring Body Temperature using Remote Health Monitoring System.A device temperature sensor and the wireless sensor is used for measuring body temperature and heart rate. The temperature sensors will send the readings to a microcontroller using XBee wireless communication. To send the real-time data to health monitoring database, wireless local area network(WLAN) has been used. Arduino with Ethernet shield based on IEEE 802.11 standard has been used for this purpose. Test results from a group of voluntary shows the real-time temperature reading successfully monitored locally (at home) and remotely (at doctor's computer), and the readings are comparable to the commercial thermometer.

Mr.Amar Saraswat in [10] proposed a model to sense the heart beat and body temperature using Arduino .LM35 is used for the sensing the body temperature which is a basic parameter for monitoring and diagnosing human health. Heart beat sensor was used for sensing heart rate. This device will allow one to measure their mean arterial pressure (MAP) in about one minute and the accurate body temperature will be displayed on the Android. Though the system can be used to measure physiological parameters, such as Heart rate (Systolic and Diastolic), Pulse rate, It is not possible for a doctor to observe a patient's heart rate per minute and body temperature all the time.

Yanbozhao in [11] proposed a wireless home security system with low cost, low power consumption. The system contains a GSM/GPRS gateway and three kinds of wireless security sensor nodes - door security nodes, infrared security nodes and fire alarm nodes. The nodes are easy for installing. The system can respond rapidly to alarm incidents and has a friendly user interface including an LCD (Liquid Crystal Display) and a capacitive sensor keyboard. The wireless communication protocol between the gateway and the nodes is also suitable for other home appliances.

A.H.Ansari in [12] proposed new technology for a women safety with one touch system using GSM & GPS so that women never feel helpless while facing such social problems or challenges. A device using raspberry pi, GSM, GPS and force sensor ensures the protection of women. Anytime when women sense danger the only button is to be pressed on the device. In such case, GPS tracks the location of the women & sends an emergency message using GSM to saved contacts & police control room.

[13]Women's Security : It is a mobile application developed for women safety, the user has to save their email address, message to be sent and recipient numbers, this app is initialised in the home screen, when women touch the app, it automatically initiates a service that records audio of the environment for seconds and sends it along with the mobile location to the recipient numbers, if the network coverage is not available, it used SOS service to send text message

[14] Safetipin: It is a personal app for safety that helps user to take safer decisions, a safety score is provided for each area , based on the safety score of an area. The location is termed as safe or unsafe. When user enters an unsafe location, it alerts them to a warning message, as long as the application is in the background, a user can also invite their friend and family to track their location. This app also provides alternate route to the destination; the user can check the safety and choose the route based on it.

[15] Life360: It is a family locator mobile application enables the user to share location with their family members. The user can create a group with their friends and family members; it alert the user when the group members come near them, this app also helps in emergency situations for girls when they are in danger situation, it sends the location to the group members.

[16] Vithu: This mobile application is used to alert the women's guardians when she is in danger by pressing the buzzer button for twice, this process initiates a cycle that sends the location of the mobile to the designated contacts for every 2 minutes. The location is sent in SMS(short message service). This application also provides updates of crime scene happened in India with tips feed; those updates can also be done by the user of this application.

GPS:

The comparison table for location detecting mechanism will broadcast a message which contains current position, time, latitude and longitude of the place.

Serial Number	**Objective**	**Technologies**	**Advantage**	**Limitation and future enhancement**
[1] SDSFWS	To improve the women safety by using GPS and gsm	Microcontroller, GSM, GPS	1.Safety device carried by everyone 2.low cost 3.small	In panic mode, if she does not press the buzzer.The location

	model		size device	can't be identify
[2] LIOI	To identify the location of the individual by using image metadata	Geotagging, Photos, Metadata, tracking	By using photos of that person uploaded in social media. We can find the position where he /she is.	If unknown person find the location that causes problem to that person
[3] ADDM FTE	To find the trip ends while travelling or not travelling by using the smartphones based GPS tracking system	GPS tracking data processing, trip ends Identification, random forest, data-driven method.	Using data-driven machine language to find the 96% of points are identified in trip ends.	It takes so many days to find the result. The future enhancement is to improve the days to find the result.
[4] HWCA ULPPBD	To Identify the user location in privacy method	Local Wi-Fi location	It doesn't need GPS. Accurate than GPS	Wi-Fi won't be available at everywhere Wi-Fi will be limited.

Sensor:

The comparison table for Sensors can detect physical property, it will indicate, record, responds to it, mainly sensors are used to detect the changes in the environment that may be physical parameters, heartbeat and sound.

Existing systems	**Objective**	**Technologies**	**Advantage**	**Limitation and future enhance**
[5] ADASA ODLP	To observe and detect the person In daily life with PD and give treatment based on that	Inertial sensor, ambulatory system, IMU	1.To identify the disease in short time. 2.From free environment, we can observe the illness and take treatment for that	The measuring device fixed in objects. If the person away from the object. It can't be predicted.
[6] DOGALM	To monitor the moving pattern of the crowd people in gathered area	Change detection, crowd simulation, human crowd analysis, video surveillance.	1. The multi camera is used to watch the people action. 2. The global digital scheme is used to monitor the local analysis of the individual &synthetic video sequences.	If the camera in one place is not working. It can be able to detect in that place. The future enhancement is to detect the behaviour of the person by using their footage.
[7] AEHM APP	To calculate and to predict the energy from the person to identify	Body sensor networks, data modelling, energy	1.It reduces the cost of the medicine. 2.It improves	To analysis, the data to the extent, so it takes time. A future

	the health of that person based on that treatment can be taken.	Harvesting, solar energy, thermoelectricity.	the healthcare. 3.It improves the quality of the person's life.	enhancement is to improve for finding the long and short-term prediction.
[8] DALA	Detection and logging advertisements using its sound	Pattern matching approach and Time warping sensitivity	Pattern matching approach and Time warping sensitivity	Change in the frequency the response of the channel Distortion and noise problem
[9] bTMFRHMS	To monitor the body temperature using the remote system	Health monitoring; temperature sensor; Arduino; body temperature; medical device	1.If the patient is not well that details will be transmitted to the doctor based on that doctor gives treatment to that patient. 2.It saves the hospital bill 3.It reduces the waiting time in the hospital.	If there is no internet connection, the details of the patient cannot receive by the doctor.
[10] SHBABT	To sense and monitor the heartbeat and body temperature using Arduino	Ardunio; Heart rate; body temperature	1.It is used to measure mean arterial pressure in one minute 2.It is used to measure physiological parameters	The result will be displayed on LCD screen if the screen is not there it can't be measured

GSM:

The comparison table for communication detecting mechanism is GSM and local Wi-Fi used to send the message to the people or police station when a woman faces difficult, unsafe situations.

Serial number	**Objective**	**Technologies**	**Advantage**	**Limitation and future enhancement**
[11] BCTS	To design the home security system at a low-cost GSM/GPRS system.	Security, GSM/GPRS, wireless	1.It is user-friendly interface 2. Response rapidly to any incident occur 3.Reduce power consumption	1.Cost is high 2.Security is less The future enhancement is to provide more secure than this method.
[12] ALCGBWHSS	To monitor the women security by using GPS and gsm system.	Security, Raspberry pi, GPS, GSM, push button, audio video recorder, buzzer, force sensor	1.The device is small, and it can carry to anywhere 2.Low cost 3.Performance high 4.Eco-friendly	If the buzzer is not pressed.It won't work the process.

Women's app:

The comparison table for various apps are determined such as senses the location, record audio automatically, and alert sound will be sent to their saved contacts.

Apps no	Description	Advantage	Disadvantage
[13] WSS	It is a mobile application developed for women safety, the user has to save their email address, message to be sent and recipient numbers, this app is initialised in the home screen, when women touch the app, it automatically initiates a service that records audio of the environment for seconds	It automatically records audio of the environment and shares that data with their contacts.	If their email address is not stored in the mobile app, it can track the location of a person.
[14] WS	It is a personal app for safety that helps user to take safer decisions; a safety score is provided for each area , based on the safety score of an area. The location is termed as safe or unsafe.	1. It gives the alert sound. If the person goes to the unsafe area. 2. It provides alternate solution for destination based on that choose the path.	There is no Automatic detector for detecting the location the only buzzer is pressed then only location can be identified.
[15] L360	It is a family locator mobile application enables user to share location with their family members	It senses the location and send the message periodically again and again to their contacts	There is no precaution for security.
[16] V	This mobile application is used to alert the	1.It saves women from facing a distressful	It needs internet connection.

	women's guardians when she is in danger by pressing the buzzer button for twice.	situation. 2.It acts as a security guard	

3. Conclusion

From the above survey, we analyzed that GPS, GSM and sensor can be used to track only users nearby locations and can only send alert SMS to limited people. In the existing system, there is a buzzer which alerts people when they are in danger, and mobile app ensures the safety of women by using a buzzer system to send alert SMS, the user will share location to their family members and SOS service to send the text message. So a new system needs to be developed which can send alert messages automatically without human intervention. The accuracy level of detecting violation of women can be improved by sensing more physical human body parameters.

4. References

[1] B.Vijaylashmi1, Renuka.S2, Pooja Chennur3, Sharangowda.Patil4, "Self defence system for women safety with location tracking and SMS alerting through Gsm network.IJRET: International Journal of Research in Engineering and Technology ISSN: 2319-1163 ISSN: 2321-7308.

[2] Ramesh Kumar P a,*, Srikanth b, KL Sailaja c," Location Identification of the Individual based on Image Metadata", Procedia Computer Science 8 (2016) 451 – 454.

[3] Chaoran Zhou, Hongwei Jia, Zhicai Juan, Xuemei Fu, and Guangnian Xiao, "A Data-Drive Method for Trip Ends IdentificationUsing Large-Scale Smartphone-based GPS Tracking Data", Ieee Transactions On Intelligent Transportation Systems, Vol. 18, No. 8, August 2017

[4] TAKUYA MAEKAWA1, NAOMI YAMASHITA2, AND YASUSHI SAKURAI3," How Well Can a User's Location Privacy Preferences be Determined Without Using GPS Location Data?", Received 2 December 2013; revised 25 March 2014; accepted 18 June 2014. Date of publication 8 July 2014; date of current version 6 December 2017.Digital Object Identifier 10.1109/TETC.2014.2335537

[5] Hung Nguyen, Karina Lebel, Sarah Bogard, Etienne Goubault, Patrick Boissy, and Christian Duval," Using Inertial Sensors to Automatically Detect and Segment Activities of Daily Living in People With Parkinson's Disease", TRANSACTIONS ON NEURAL SYSTEMS AND REHABILITATION ENGINEERING, VOL. 26, NO. 1, JANUARY 2018 197

[6] Igor R. de Almeida, Vinicius J. Castle, Norman I. Badler, SoraiaRauppMusse,

andCláudioRosito Jung, "Detection of Global and Local Motion Changes in Human Crowds", Ieee Transactions On Circuits And Systems For Video Technology, Vol. 27, No. 3, March 2017.

[7] Dawei Fan, Luis Lopez Ruiz, Jiaqi Gong, "An Energy Harvesting Modeling and Profiling Platform for Body Sensor Networks",IEEE JOURNAL OF BIOMEDICAL AND HEALTH INFORMATICS, VOL. 22, NO. 1, JANUARY 2018.

[8] JG Lourens,"Detection and Logging Advertisements using its Sound,"IEEE TRANSACTIONS ON BROADCASTING, VOL. 36, NO. 3, SEPTEMBER 1990

[9] HasmahMansor, Muhammad Helmy Abdul Shukor, Siti Sarah Meskam, NurQuraisyiaAqilahMohdRusli,N.SakinahZamery, "Body Temperature Measurement for Remote Health Monitoring System" ,26-27 November 2013, Kuala Lumpur.

[10] Mr. Amar Saraswat Assistant Professor Department of Computer Science andEngineering, "Sensing Heart beat and Body Temperature Digitally using Arduino",2016.

[11] Marc-Florian Uth*, Jochim Koch, Frank Sattler, "Body Core Temperature Sensing: Challenges and new SensorTechnologies",1877-7058 © 2016.

[12] Yanbo Zhao and ZhaohuiYe ,"A Low Cost GSM/GPRS Based Wireless Home SecuritySystem", 2008 IEEE

[13] A.H.Ansari1, BalsarafPratiksha P.2, MaghadeTejal R.3, YelmameSnehal M.4, "Women Security System using GSM & GPS",Vol. 6, Issue 3, March 2017.

[14] WOMEN'S SECURITY‖, Android App developed by AppSoftIndia, December 17, 2013. https://play.google.com/store/ apps/details?id=com.zayaninfotech.security&hl=en

[15] SAFETIPIN-COMPLETE SAFETY APP‖, an Android app developed in January 21, 2015.http://safetipin.com/

[16] LIFE 360‖,Android App developed by Chris Hulls and released in 2008 https://play.google.com/store/apps/details?id=com.life360.android.safetymapd&hl=en

[17] VITHU‖,Android App developed by Indian Crime Television series GUMRAH‖, https://play.google.com/store/apps/details?id=com.startv.gumrah&hl=en.

