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A Smart Security Watch For Women

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ABSTRACT

Women all over the world are facing and even subjected to unethical physical harassment. Security for women is still a major issue as the number of crimes and harassment over women and girls is increasing day-by-day. Self Defense module for women safety is like a Smart Watch for Women safety. It has the ability to help women with technologies that are embedded into a compact device. We can't change the society totally but we can increase the security of girls by using modern technology. Nowadays though there are many apps evolved for women safety via smart phone it is activated only by a touch or one click or shake. It is not possible to have mobiles on our hand in all circumstances. This concept is used to provide security to women when they are exposed to external challenges and harassments in the society When a women wearing this 'watch me' is exposed to sexual or vulnerable attack, the sensor present in it detects the heart beat rate of a person It has the potential to help women with technologies that are embedded. It is specially designed for women safety and protection.

Key words : Watch, Body temperature, Pi-camera, Heart-beat sensor, Raspberry-pi.

1. INTRODUCTION

The status of women in India has gone through many great changes over the past few millennia. Today in the current global scenario, the prime question in every girl's mind is only about her safety and security. Even in the 21st century where the technology is rapidly growing and new gadgets were developed but still women and girls are facing problems. The only thought haunting every girl is when they will be able to move freely on the streets even in odd hours without worrying about their security. Among other crimes, rape is the fastest growing crime in the country today. India is the "fourth most dangerous country" in the world for women, and the worst country for women among the G20 countries. "There is one universal truth applicable to all countries, cultures and communities: violence against women is never acceptable, never excusable, and never tolerable"

A violence act against female gender disturbed the public health life of society and also it violates the human rights of women."

This project focuses on a security system that is designed solely to serve the purpose of providing security and safety to women so that they never feel helpless while facing such social challenges It works automatically based on heart beat rate which is increased due to the secretion of epinephrine hormone from hpa axis which is defined for every situation like fear , anger, anxiety ,and other kind of reactions which will trigger the sensor .When system is activated, tracks the location of the victim using GPS (Global Positioning System) and sends emergency messages using GSM (Global System for Mobile communication) to stored contacts. Health is very important and it is necessary to take care of the health. As the population is increasing, along with it health issues are also increasing due to pollution.

The status of women in India has gone through many great changes over the past few millennia. From equal status with men in ancient times through the low points of the medieval period to the promotion of equal rights by many reformers, the history of women in India has been eventful. In modern India, women have adorned high offices in India including that of the President, Prime Minister, Leader of the Opposition and Speaker of the Lok Sabha. However, women in India continue to face social challenges and are often victims of abuse and violent crimes and, according to a global country for women among the G20 countries. Women and girls suffer disproportionately during violent conflict. Sexual violence is often used as an instrument of war, and although men and boys may also be abused in this way women and girls are the primary target. During Sierra Leone's 11 year civil war an estimated 250,000 women experienced sexual violence. The destabilising effect of conflict on families and communities can mean other forms of violence increase in intensity, including domestic violence. Sexual exploitation and trafficking also tend to rise during armed conflict. Refugee women and girls are especially vulnerable. After the conflict has ended survivors of sexual violence are often forced to live through the traumatic legacy of these experiences without access to support or counselling and without hope of seeing justice done. Although they are disproportionately affected by conflict women tend to be sidelined from formal conflict resolution and peace processes, meaning that post-conflict recovery and reconciliation programs often overlook women's specific needs.

2. RELATED WORK

Today girls were not allowed to move freely even in the streets without worrying about their security Parents were worrying about their security which has become the first barrier to send their daughters for job. Day by day the women harassment increases.

Under the lots of circumstance that has been, a lot of work has been done to relate to the security. It is necessary for us to learn about related/Existing system to see what aspects we can improve on.

Nowadays though there are many apps evolved for women safety via smart phone it is activated only by a touch or one click or shake. Alert messages are sent out to the listed contacts, who receive your message along with your physical location. This concept is used to provide security to women when they are exposed to external challenges and harassments in the society.

A app which is named as "VithU-app" works With only 2 clicks of the power button, anybody facing danger can send out an SOS message to their guardian.. The disadvantage of above concept is We have to click the power button for 2 times consecutively.It is not possible at all the situation.

An Android Application for Women Safety Based on Voice Recognition". One in which, keywords of different languages

are set for activation of the system. System recognizes the voice and frequency of voice of the user. After system gets activate, it uses a GPS or WI-FI to track the location information of the user and send that location information as a message via SMS and post it on Social Application. Simultaneously, an emergency signal is sent to people who are selected by the mobile user. There is no need to handle mobile to activate the system and it will get activated even if mobile keypad is locked. In this age of technology, mobile phone is one of the gadgets that almost everyone like and uses to keep in touch with family and friends. All they need is a device that can be carried everywhere easily. This 'Design and Development of Women Self Defense Smart Watch Prototype' proposed paper deals with a quick responding, cost protection system for an individual and especially for women using which a woman in anguish can call for help just with the press of a button on this smart gadget. Self Defense module for women safety is like a Smart Watch for Women safety. It has the ability to help women with technologies that are embedded into a compact device. It has the potential to help women with technologies that are embedded. It is specially designed for women safety and protection. It has a control button that will be used by women to inform nearby police when they are in distress. This watch directly gets connected to the satellite through GPS when activated. Then the location is transferred through the GSM, it also contains a shock mechanism to produce non-lethal electric shock in emergency situations to deter the attacker.

'SMART INTELLIGENT SECURITY SYSTEM FOR WOMEN' by Geetha Pratyusha Miriyala, P.V.V.N.D.P Sunil This project describes about a smart intelligent security system for women. This acquires a fast pace due to lack of a suitable surveillance system. This project is a

venture to resolve this problem by using two objects wrist band and spectacles that are used in day to day life. The system resembles a band on the wrist incorporated with pressure switch as an input which when activates shows the result Screaming alarm and tear gas mechanism are imposed for self-defensing purpose and send location and messages to the emergency contacts and also Figureure out the attacker using live streaming video. Tear gas mechanism and live streaming video using webcam is incorporated in the spectacles that act as a weapon of the smart technology disadvantage is using 2 objects which is cost effective and physically dependent.

Ai Distress Beacon using Speech Recognition by Arman Shaikh, Mutasim Rehman , Rushikesh Mate , Ritesh Ghate , Prof. Mrs. A.S. Khandagale . This paper is about "An Android Application for Women Safety Based on Voice Recognition". One in which, keywords of different languages are set for activation of the system. System recognizes the voice and frequency of voice of the user. After system gets activate, it uses a GPS or WI-FI to track the location information of the user and send that location information as a message via SMS and post it on Social Application. Simultaneously, an emergency signal is sent to people who are selected by the mobile user. There is no need to handle mobile to activate the system.
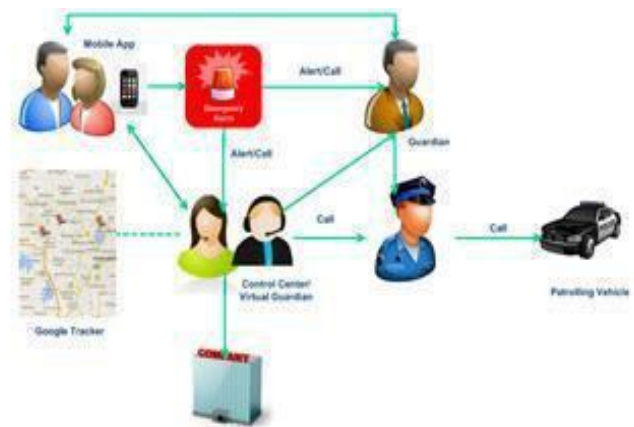

Figure 1: System architecture for vithu-app system

The main drawback of this system is physically dependent To overcome the drawbacks, this paper proposes as we can and find the location

3. ARCHITECTURE OF THE SYSTEM

The Main strength of our Proposed Architecture is relying on existing wireless communications is, which will provide a low power consumption with maximum functionality through sensor fusion and freedom of movement to users in their physical activity. Here, we have used small and the light-weight devices that are user friendly...

We can make use of number of sensors for detecting the heartbeat of a person via motion sensor and health

monitoring sensor and temperature sensor. The GPS and GSM integrated with smart watches is connected via Bluetooth to the smart phone and ring the alert notification to the emergency contact and within the limited radius the police station will be found in the GPS and make a signal. Cop will be able to track the alert signal and find the location. The basic concept on which the whole process is revolves is of triggering the heartbeat sensor when it attains the targeted heart beat rate and time period. As soon as the heart beat sensor gets activated it produces a high pitch alarm sound to alert the surrounding people to grab their attention. Then watch me immediately sends an alert signal to the nearby which is updated to them periodically. Then it also sends an alert message to the already saved emergency contacts so that they can get information that the person wearing watches me is under danger. The smart watch is chosen for its portability and cost effective components. As the technology grew people nowadays prefer smart watches to wear for many technical purpose and good stylish look. The battery can be changed by replacing with new one. The battery used in watch is Lithium batteries (Li-ion polymer battery). This type of battery is used because they are easily rechargeable and occupy less space and cost efficient.

Figure 2: System architecture

4. HARDWARE

Raspberry Pi

Here, the IoT system consists of Raspberry pi , which is an open hardware. With the exception of the primary chip on the Raspberry Pi, System on a Chip can run many of the main components of the board such as CPU, graphics, memory, the USB controller, and etc. Many of the projects made with the

Raspberry Pi are open and are well documented as well. The things we build here can be modify ourselves. Figureure 3, shows how the raspberry pi will look.

Figure 3: Raspberry pi

The Raspberry pi is used to operate the system. The Raspberry pi will be programmed to read the data values e c Subsequently it will send that information to the phone as a response to the user's request. It will also manage the Wi-Fi communication by coordinating with the Internet facility. With the help of this Wi-Fi communication the data will be sending to the cloud, so that we can collect the sensors data using smart phone.

The sensors that we connected to the raspberry pi are Heart beat sensor, Temperature sensor, voice recognizer, pi camera, mem sensor and the GPS.
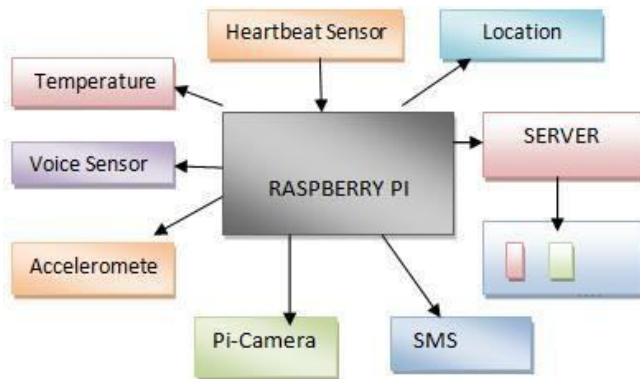
Heart beat sensor

The heartbeat sensor shown in Figure 4.will be consists of a light emitting diode and a detector like a light detecting resistor or a photodiode.

Figure 4. Heart beat sensor

Our heart beat pulses causes the variation in the flow of blood to the different parts of the body. When a tissue is light up with the light source, it either reflects or transmits the light. Some of the light is absorbed by the blood and the transmitted or reflected light is received by the light detector. The amount of light absorbed will be depends on the blood volume in that tissue. The output from the detector is in the form of electrical signal and is proportional to the heart beat rate. This is caused by pulsatile changes in arterial blood volume and is superimposed on the DC signal.

Heart beat sensor is designed to give digital output of heart beat when a finger is placed on it. When the heart beat detector is working, the beat LED flashes in unison with each heart beat. This digital output can be connected to microcontroller directly to measure the Beats Per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger at each pulse.

25

Temperature sensor

The temperature sensor that used to measure the temperature with an electrical o/p comparative to the temperature in Celsius.

It measures the temperature more accurately, maintains an exactness of +/-0.4°C at room temperature and +/-0.8°C at the range of 0°C to +100°.
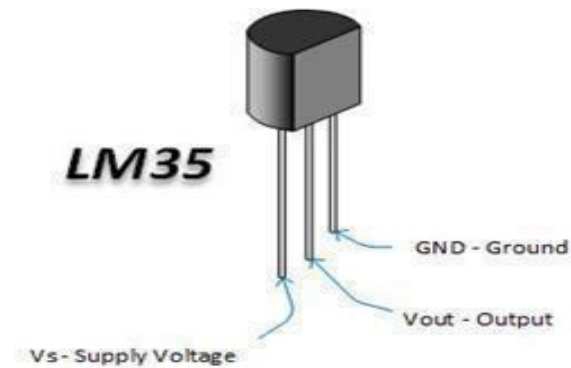

Figure 5: Temperature sensor

Accelerometer sensor

An accelerometer is a sensor that measures the physical acceleration experienced by an object due to inertial forces or due to mechanical excitation. Acceleration is defined as rate of change of velocity with respect to time. . It is a measure of how fast speed changes. It is a vector quantity having both magnitude and direction. As a speedometer is a meter to measures speed, an accelerometer is a meter to measure acceleration.

Figure 6.Accelerometer sensor

Voice Recognizer :

This Voice Recognition Module is a compact and easy control speaking recognition board. This product is a speaker dependent voice recognition module. It supports up to 80 voice commands in all .Easy VR is a multi purpose recognition module designed to add versatile, robust and cost effective speech and voice recognition capabilities to virtually any application. Easy VR is the second generation version of the successful VR bot module and builds on the features and functionality of its predecessor.

Figure 7: Voice recognizer

GPRS/GSM MODEM

The SIM900 GSM/GPRS Shield provides you a way to use the GSM cell phone network to receive data from a remote location. The shield allows you to achieve this via any of the three methods:

• Short Message Service
• Audio
• GPRS Service

The GPRS Shield is compatible with all boards which have the same form factor (and pinout) as a standard Arduino Board. The GPRS Shield is conFigureured and controlled via its UART using simple AT commands. Based on the SIM900 module from SIMCOM, the GPRS Shield is like a cell phone. Besides the communications features, the GPRS Shield has 12 GPIOs, 2 PWMs and an ADC.

Figure 8: GPRS/GSM MODEM

PI-Camera:

The Raspberry Pi camera module can be used to take high-definition video, as well as stills photographs. It's easy to use for beginners, but has plenty to offer advanced users if you're looking to expand your knowledge. There are lots of examples online of people using it for time-lapse slow-motion and other video cleverness. You can also use the libraries we bundle with the camera to create effects

Figure 9: Pi-camera

5. EVALUATION OF THE SYSTEM

The evaluation of the system is based on 3 modules
1. Face behavioural identification.
2. Collection of the body parameter.
3. GPS/GSM Module.

1 Face behavioural identification:

Face behavioural identification is done with the help of **Pi-Camera** and implementing **Haarcascade algorithm** Pi-camera attaches to Raspberry Pi by way of one of the two small sockets on the board upper surface. This interface uses the dedicated CSI(Camera Serial Interface), which was designed especially for interfacing to cameras. The sensor itself has a native resolution of 5 megapixel, integrated IR filter and has a fixed focus lens onboard. In terms of still images, the camera is capable of 2592 x 1944 pixel static images, and also supports 1080p30, 720p60 and 640x480p60/90 video.

2.Collection of the body parameter:

Voice recognizer:

▪It is a multi-purpose speech recognition module designed to add versatile, robust and cost effective speech and voice recognition capabilities to virtually any application ▪Easy-to-use and simple Graphical User Interface to program Voice Commands and Audio

Heartbeat sensor:

▪When the heart beat detector is working, the beat LED flashes in unison with each heartbeat
▪ Its output is a digital pulse which is synchronous with the heart beat. The output pulse can be fed to either an ADC channel of a microcontroller for further processing and retrieving the heart rate in beats per minute (BPM).

Mem/accelerometer sensor:

An accelerometer is a device that measures proper acceleration. Proper acceleration, being the acceleration of a body in its own instantaneous rest frame.

3. GPS/GSM Module:

▪GPS/GSM module is used to send the data from control unit to the base unit which will maintain the data according to input signals from sensor so that it make a alert position to the GPS tracker.
▪It is used to track the position of the user when the signal from the user is collected via GSM.
▪By this the police tracks the signal received and find the location to be arrive.

4. ALGORITHM

HAARCASCADE ALGORITHM

The human face poses even more problems than other objects since the human face is a dynamic object that comes in many forms and colors. However, facial detection and tracking provides many benefits. Facial recognition is not possible if the face is not isolated from the background. Human Computer Interaction (HCI) could greatly be improved by using emotion, pose, and gesture recognition, all of which require face and facial feature detection and tracking Although many different algorithms exist to perform face detection, each has its own weaknesses and strengths. Some use flesh tones, some use contours, and other are even more complex involving templates, neural networks, or filters. These algorithms suffer from the same problem; they are computationally expensive An image is only a collection of color and/or light intensity values. Analyzing these pixels for face detection is time consuming and difficult to accomplish because of the wide variations of shape .

HAAR CASCADE CLASSIFIERS

The core basis for Haar classifier object detection is the Haar-like features. These features, rather than using the intensity values of a pixel, use the change in contrast values between adjacent rectangular groups of pixels. The contrast variances between the pixel groups are used to determine relative light and dark areas. Two or three adjacent groups with a relative contrast variance form a Haar-like feature.Haar features can easily be scaled by increasing or decreasing the size of the pixel group being examined. This allows features to be used to detect objects of various sizes. Algorithm includes 4 steps:

1. RGB-Gray
2. Binarization
3. Erosion/dilation
4. Edge detection

1. **RGB-Gray:** RGB-Gray converts true color RGB to grayscale intensity image I .The RGB-Gray function converts to RGB images to gray scale by eliminating hue and saturation information by while retaining the luminance

2.**Binarization:** Binarization method converts the gray scale image(0 upto 256 graylevels) into black and white image(0,1).The high quality binarized image can be more accuracy in character recognition as compared original image because noise is present in original imageThis step indicates the bit position (0,1) Data required =1(color is in white)Data isn't required=0(color is in black)

3.**Erosion/Dialation:** Erosion-This step shrinks or thins objects in the binary images. Highlights the data part of image.The value of output pixel is minimum value of all the pixels in the input pixel neighbourhood.In a binary image,if any of the pixel is set to 0, the output pixel is set to 0.

Dialation-This step Grows or thickens the objects in the binary image .Highlights the background part of the image.The value of output pixel is the maximum value of all the pixel in the input pixel neighbourhood.In a binary image if any of the pixel is set to 1, the output pixel is set to 1
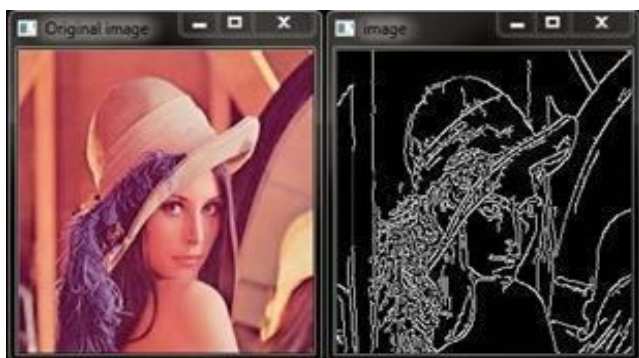
4.Edge detection: Edge detection is an image processing technique for finding the boundaries of object with in image.It works by detecting discontinuities in brightness.

Each feature is a single value obtained by subtracting sum of pixels under white rectangle from sum of pixels under black rectangle

Integral Image Calculation:

The simple rectangular features of an image are calculated using an intermediate representation of an image, called the integral image [9]. The integral image is an array containing the sums of the pixels' intensity values located directly to the left of a pixel and directly above the pixel at location (x,y) inclusive. So if A[x,y] is the original image and AI[x,y] is the integral image then the integral image is computed as shown in equation

$$AI[x,y]=\sum A(x',y') \text{ where } x'<=x,\ y<=y$$

The features rotated by forty-five degrees, like the line feature as introduced by Lienhart and Maydt, require another intermediate representation called the rotated integral image or rotated sum auxiliary image. The rotated integral image is calculated by finding the sum of the pixels' intensity values that are located at a forty five degree angle to the left and above for the x value and below for the y value. So if A[x,y] is the original image and AR[x,y] is the rotated integral image then the integral image is computed as shown in below equation

$$AR[x,y]=\sum A(x',y') \text{ where } x'\leq x,\ x'\leq x-|y-y'|$$

5.EXPERIMENTAL RESULTS

The proposed method works based on sensors.With the help of heartbeat sensor asif the heart beat detection using rasspberry that will detect the heart beat using the Pulse Sensor and will show the readings in BPM (Beats Per Minute). It will also send the readings to ThingSpeak server using the Wi-Fi Bee module ESP8266, so that Heart Beats can be monitored from anywhere in the world over the internet.Figure 1 shows the heartbeat variation Figure 2,3,4 shows the accelerometer sensor variation Figure 5 shows the images stored in database and Figure 6 shows the message received to the registered contact

Figure 1:Heartbeat variation

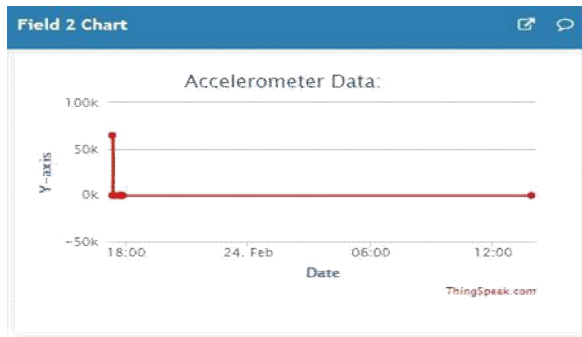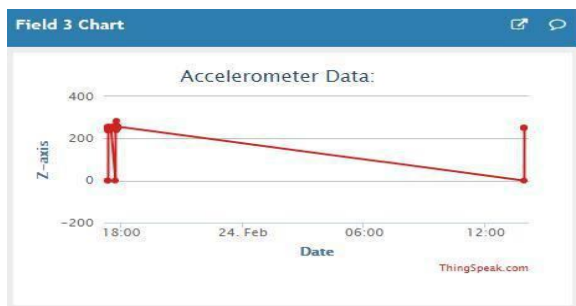Figure 2:X-axis of accelerometer

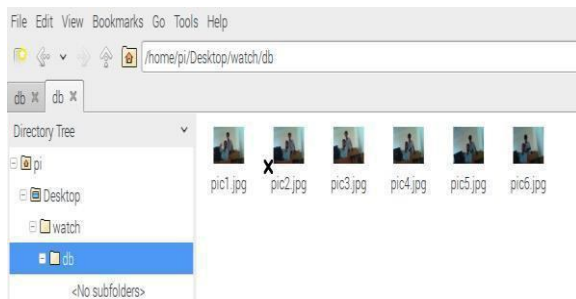Figure 3:Y-axis of accelerometer

Figure 4:Z-axis of accelerometer

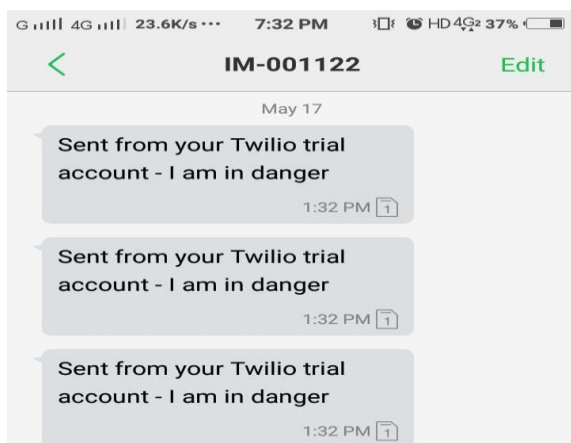Figure 5:Images stored in database.

Figure 6:Message received to registered contact.

6.CONCLUSION

Watch me really watches the girls and they don't want to click or shake this watch to help them to alert the police, their parents and surrounding.Watch me is a super fancy guard for girls at anytime and anywhere when they wear. So that girls can come out freely without any obstacles to reachtheir goals and future endeavors. The system helps to supports the gender equality by providing safe environment to women in the society, and allows them to work till late nights. Anyone before doing any crime against the women will be deterred and it help reducing the crime rate against the women. Women's security is a critical and social issue in today's world. The crime (molestations, robbery, sexual assault, rape, domestic violence) against the women can be now brought to an end with the help of real system implementation of propose model.

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