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Design and Implementation of Wearable Protective Device for Women Using raspberry PI

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Abstract : When women were subjected to harassment and molestation at that time the women compact device inbuilt raspberry pi and Universal Serial Bus (USB)camera will capture and sent the opponent faces to parent mail. This video is captured only when the women is succumbed to higher heart rate and subsequently if she presses a button, short message services carrying her Global Positioning System (GPS) location is sent to the user straight away. Using this system, it becomes handy to save women when they are in danger and risks. When women gets higher heart beat due to some panic situation and when acknowledged by subsequent pressing of button will make the camera thus connected to take a shorter video of duration around 3 seconds of the environment pertaining to the incident. Meanwhile, it also sends longitude and latitude data using GPS and Global System for Mobile communication module (GSM) to the preloaded contacts as an alert to the preloaded contacts in form of a Short Message Services (SMS). In this work, not only the location data is sent but also the video will be very much useful. Raspberry pi is the central unit, which contains and makes all important decisions, Pulse sensor continuously senses the heartbeat and feeds to the raspberry and subsequently gets displayed in the monitor. Subsequently using Simple Mail Transfer Protocol (SMTP) and ETHERNET the mail is sent to the loaded recipient, that mail contains the video content of 3 seconds. Secure Digital (SD) card contains the program and software required for the functioning of Raspberry pi.
Keyword: Global System for Mobile communication module (GSM), Global Positioning System (GPS), Simple Mail Transfer Protocol (SMTP),Raspberry pi.

Introduction

The need for this work is mainly because women now a day are subjected to too much of assault, molestation and other associated illegal activities take instances Nirbhaya in Delhi and Jisha in Kerala made us to develop a work that should not alone be a work but as a protective device for modern time woman. On deeply surveying these situations we came to know there available only fitness band and workout trackers, We took that us a model and we worked out that our protective device must be fitting straight away within the woman's hand, So that she can use it without making much effort in carrying and using it.

A Location Monitoring System is a system that will monitor the location of any object and will send the updates about the location to the user. The object can be anything or anyone- vehicle, old people, children, precious jewellery, and hikers and so on. Here the user may want to set a boundary region of the object. If that object goes beyond that specified boundary intentionally or unintentionally, our system will give updates to the user about the whereabouts of the object. If suppose the user is not connected to the internet, there is also a facility of receiving an update through text message or SMS.

One way of characterizing the Internet Of Things (IOT)[1] is by market segment where there are three main categories: monitoring and controlling the performance of homes and buildings, automotive and transportation applications, and health self-tracking and personal environment monitoring. A new approach is introduced to the signal processing algorithms applied for the data provided by passive infrared (PIR) motion sensors used in Ambient Assisted Living Applications (AAL). In AAL, PIR sensors are deployed differently than in the typical security applications and different results are expected by the users from the sensors[2]. A design using both a microprocessor and light sensors for automatic room light detection and control. The Home Light Control Module (HLCM) which will be installed in every light fixture of a family is made up of four blocks: the Pyro electric infrared (PIR) sensor circuit, the light sensor circuit, the microprocessor and the Radio Frequency (RF) module[3].Design and implementation of a Home Security system through mobile devices, that take advantage of mobile technology to provide essential security to our homes that does not require specific hardware or skilled technicians[4].A high-resolution video surveillance management system incurs huge amounts of storage and network bandwidth. The current infrastructure required to support a high-resolution video surveillance management system (VMS) is expensive and time consuming to plan, implement and maintain[5].

PIR sensors are widely used as a simple but powerful people presence triggers, e.g., automatic lighting systems. In particular, by alternating the effective polarization of the sensing elements in a PIR sensor, it is possible to determine the relative direction of the movement of an object moving on the motion plane of the PIR sensor[6]. Design and implement a home surveillance system based on an embedded system with multiple ultrasonic sensor modules to enhance the system's reliability. Each ultrasonic sensor module includes a transmitter and a receiver, and the modules are placed in a line direction[7].Design and implement a home embedded surveillance system with ultra-low alert power. Traditional surveillance systems suffer from an unnecessary waste of power and the shortcomings of memory conditions in the absence of invasion[8]. An indoor localization and monitoring system for robots and people is an important issue in robotics research. Although several monitoring systems are currently under development by previous investigators, these issues remain significant difficulties[9].Intelligent home service systems consist of ubiquitous sensors, a home network, and a context-aware computing system that together collect residential environment information and provide intelligent services such as controlling the environment or lighting[10].Human action recognition in videos is a challenging problem with wide applications. State-of-the-art approaches often adopt the popular bag-of-features representation based on isolated local patches or temporal patch trajectories, where motion patterns like object relationships are mostly discarded[11].

I. Methodology

The block diagram of wearable protective device for woman using raspberry pi is shown in the figure 1.

A. Raspberry PI

The Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote the teaching of basic computer science in schools and in developing countries. The original model became far more popular than anticipated, selling outside of its target market for uses such as robotics. Peripherals (including keyboards, mice and cases) are not included with the Raspberry Pi. Some accessories however have been included in several official and unofficial bundles.

B. Camera

In this module, Raspberry Pi Model B is used to connect the web camera to capture the footage and the RJ45 to connect to the Internet for sending and receiving data. Raspberry Pi executes the processing of all the data and after the data is analyzed then the set actions are triggered.

C. SD Card

Secure Digital (SD) is a non-volatile memory card format. Electrically passive adapters allow a smaller card to fit and function in a device built for a larger card. The SD card's small footprint is an ideal storage medium for smaller, thinner and more portable electronic devices.

D. GSM Modem

AGSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone. When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communicate over the mobile network. While these GSM modems are most frequently used to provide internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages.

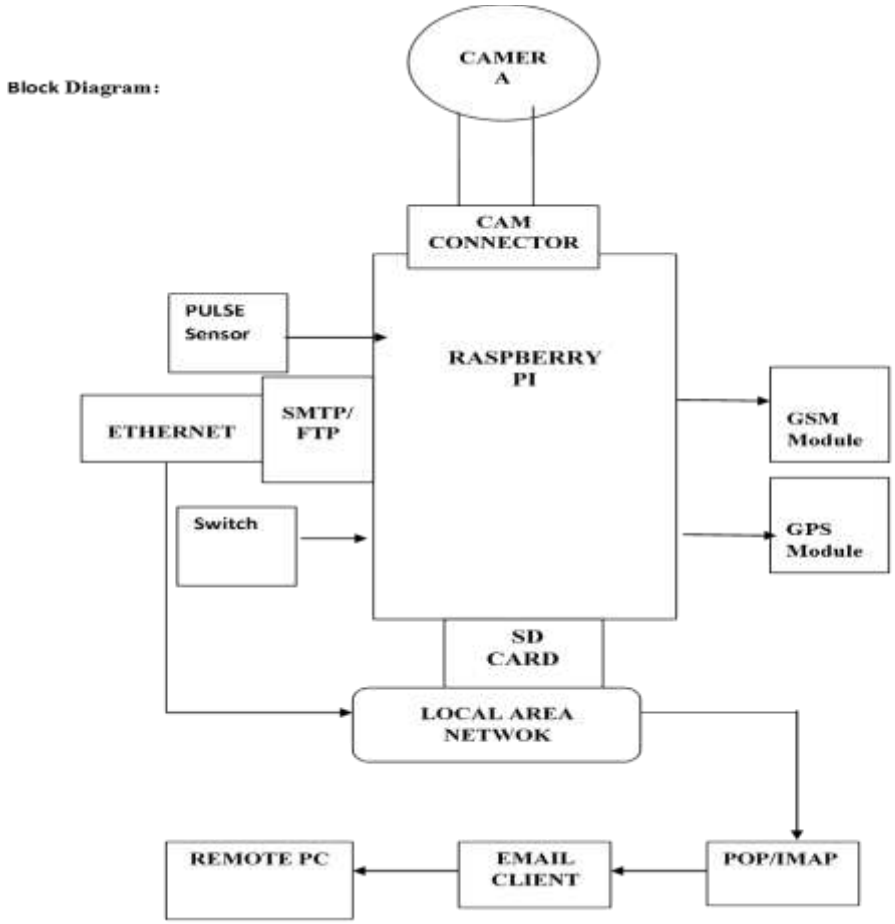

Figure1.Block Diagram of wearable protective device for women using Raspberry pi

E. GPS Board

The Global Positioning System (GPS) is a space-based radio navigation system owned by the United States Government (USG) and operated by the United States Air Force (USAF)." It is a global navigation satellite system (GNSS) that provides geolocation and time information to a GPS receiver in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. The GPS system operates independently of any telephonic or internet reception, though these technologies can enhance the usefulness of the GPS positioning information.

F. Pulse Sensor

Pulse oximetry is a noninvasive method for monitoring a person's oxygen saturation (SO2). Its reading of SpO2 (peripheral oxygen saturation) is not always identical to the reading of SaO2 (arterial oxygen saturation) from arterial blood gas analysis, but the two are correlated well enough that the safe, convenient, noninvasive, inexpensive pulse oximetry method is valuable for measuring oxygen saturation in clinical use. In its most common (transmissive) application mode, a sensor device is placed on a thin part of the patient's body, usually a fingertip or earlobe, or in the case of an infant, across a foot. The device passes two wavelengths of light

through the body part to a photo detector. It measures the changing absorbance at each of the wavelengths, allowing it to determine the absorbance due to the pulsing arterial blood alone, excluding venous blood, skin, bone, muscle, fat, and (in most cases) nail polish

G. Ethernet

Ethernet is a family of computer networking technologies commonly used in local area networks (LAN), metropolitan area networks (MAN) and wide area networks (WAN). It was commercially introduced in 1980 and first standardized in 1983 as IEEE 802.3 and has since been refined to support higher bit rates and longer link distances. Over time, Ethernet has largely replaced competing wired LAN technologies such as token ring, FDDI and ARCNET.

H. Local Area Network

A local area network (LAN) is a computer network that interconnects computers within a limited area such as a residence, school, laboratory, university campus or office building and has its network equipment and interconnects locally managed. By contrast, a wide area network (WAN), not only covers a larger geographic distance, but also generally involves leased telecommunication circuits or Internet links. An even greater contrast is the Internet, which is a system of globally connected business and personal computers. Ethernet and Wi-Fi are the two most common transmission technologies in use for local area networks.

I. SMTP

Simple Mail Transfer Protocol (SMTP) is an Internet standard for electronic mail (email) transmission. First defined by RFC 821 in 1982, it was last updated in 2008 with Extended SMTP additions by RFC 5321, which is the protocol in widespread use today.

J. FTP

The File Transfer Protocol (FTP) is a standard network protocol used for the transfer of computer files from a server to a client using the Client–server model on a computer network**.**

K. IMAP

In computing, the Internet Message Access Protocol (IMAP) is an Internet standard protocol used by e-mail clients to retrieve e-mail messages from a mail server over a TCP/IP connection. IMAP is defined by RFC 3501.

L. POP

In computing, the Post Office Protocol (POP) is an application-layer Internet standard protocol used by local e-mail clients to retrieve e-mail from a remote server over a TCP/IP connection. POP has been developed through several versions, with version 3 (POP3) being the last standard in common use before largely being made obsolete by the more advanced IMAP as well as webmail.

POP supports download-and-delete requirements for access to remote mailboxes (termed mail drop in the POP RFC's). Although most POP clients have an option to leave mail on server after download, e-mail clients using POP generally connect, retrieve all messages, store them on the user's PC as new messages, delete them from the server, and then disconnect.

III. Implementation

Pulse sensor senses the heartbeat of the person when pressed on it, The heartbeat thus sensed will be constantly getting displayed in the monitor as shown in the figure, The sensed heart beat is sent to the raspberry pi, Heartbeat when found above the threshold limit say 15 beats, GPS gets ready with its location details and GSM fetches the location details and sends the data to the preloaded contact. Simultaneously, the USB Camera gets ON and starts shooting the video up to the period of 3 seconds and sends to the mail recipient with the help of the Wi-Fi connection of the raspberry pi.

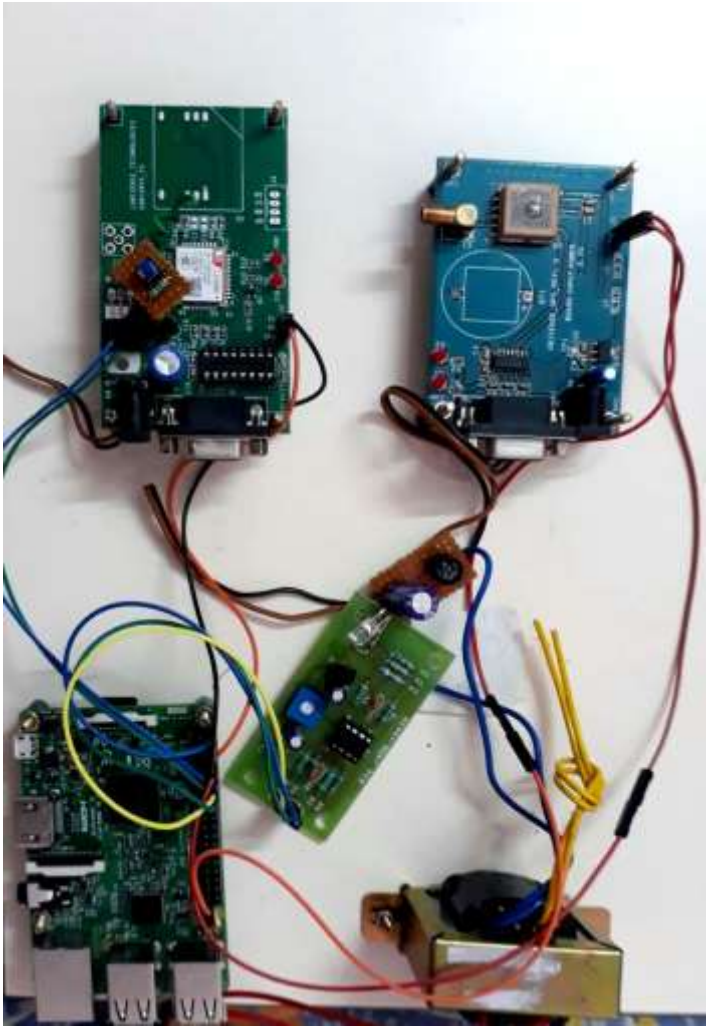

Figure 2. Hardware implementation

Table 1. Various Heartbeat levels of Human being

Age	18-25	26-35	36-45	46-55	56-65	65+
Athlete	49-55	49-54	50-56	50-57	51-56	50-55
Excellent	56-61	55-61	57-62	58-63	57-61	56-61
Good	62-65	62-65	63-66	64-67	62-67	62-65
Above Average	66-69	66-70	67-70	68-71	68-71	66-69
Average	70-73	71-74	71-75	72-76	72-75	70-73
Below Average	74-81	75-81	76-82	77-83	76-81	74-79
Poor	82+	82+	83+	84+	82+	80+

A. Scenario 1: Normal Condition

When the Heartbeat is within the threshold value, Only the Heartbeat is sensed and displayed, Raspberry pi remains intact.

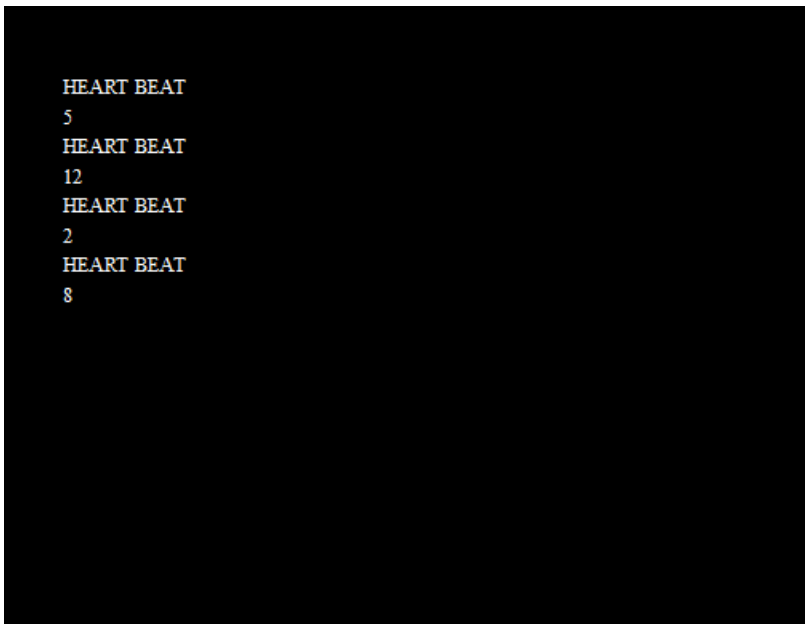

Figure3. Heartbeat reading

B. Scenario 2 : Panic Condition

When the Heartbeat is above the threshold value, Raspberry pi sends the SMS and videosimultaneously as shown in the Figure 4.

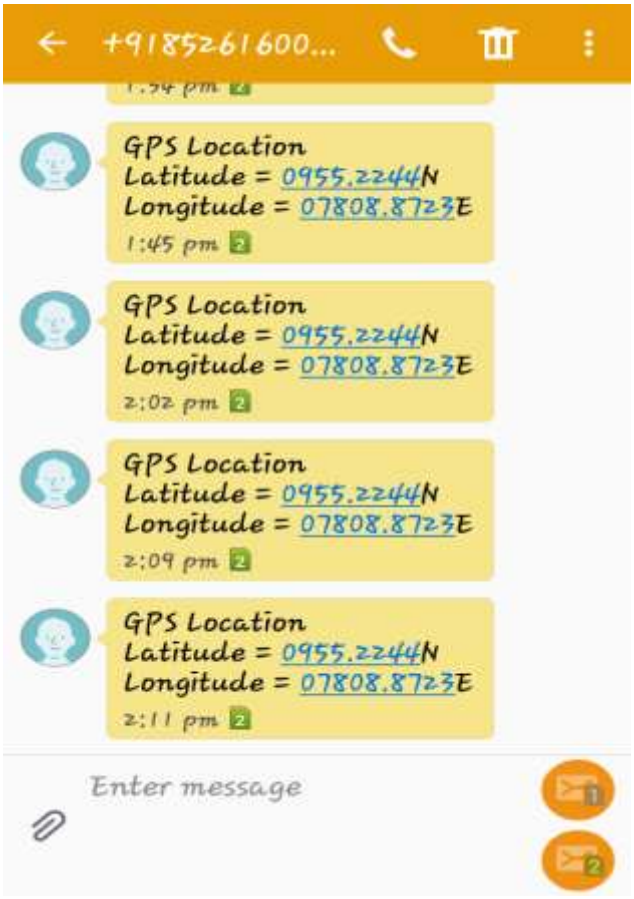

Figure 4. SMS value carrying GPS Data

IV. Conclusion

This work is definitely going to serve as a boon to women. They can straight away walk without any fear of getting engaged in troubles. In future every woman should wear this band and this is going to serve them as a personal body guard or so.

Wearing this band gives every woman, Confidence and braveness. On the other hand, every single people will know that women are not only talented, but can also protect themselves.

"**FEAR"** a national disease which is hindering the growth of woman since olden days will gradually eradicate from human minds and this is going to be the first milestone of this era, Where women empowerment and enrichment will further enlighten the future women of today's India.

"***Nation is considered as a nation only when a woman can walk in midnight without any fear***" - MahakaviBharathiyar.

This acts as a living example to make his dream come true.

Let's make way for the " **PUTHUMAI PEN"**

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