A Raspberry Pi Based Smart Belt for Women Safety

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Abstract— **In recent case, women are facing so many problems with men at every stage of existence, but are being publicly abused, harassed, publicly violence, and even carried out at their homes. There are certain types of prohibitions that women are subject to that not only derail their experience of freedom, but also shatter their self-confidence and ambitions. Here, it aims to suggest a smart security wearable device for women based on the Internet of Things (IoT). It is integrated with a smartphone application. The device is highly portable and can be activated with the aid of the victim, attacked using just the click of a button to obtain its location, and the attacker's photo is also captured through the pi camera. The location details and link of the captured photo is sent to a predetermined emergency contact number or police. The buzzer belonging to the belt is automatically activated and it makes a high frequency scary sound to attract the attention of the people of that area and also acts as an alert to the intruder. Despite the fact that this device is originally designed to protect the girl, it can benefit various participants of society, as well as older people, a female child, or all those who have an unsafe condition. Let's face it. It also helps the aged persons of the society to use for help in case of a health issues where the situation does not favor the person being approached for medical assistance.**

Keyword— *Internet of Things, Women Safety, Computer Networking, Smart Belt, Raspberry Pi, Mobile Application.*

I. INTRODUCTION

In recent times, the safety of children and women has been a primary issue of our country. Women these days face a lot of harassment which is becoming frightening day by day. The situation is very serious in developing countries as well as underdeveloped people. Consequently, it is an important challenge for the empowerment of women as well as the budgetary development of the country. Most of the crime is due to lack of information. We need to find a solution to this problem. So, we design a portable device to solve the threat from the victim, which is the enterprise of our project idea. The raspberry pie can be attacked by the victim by just clicking the push button to capture the attacker's image through the camera. The location will be sent using predefined emergency contact numbers and the GSM module to the police.

This concept is awakened to crimes against women in India. The project proposes a flexible and IOT based security wearable device for women that used against the pandemic situations. It is implemented as a smart belt and includes Raspberry Pi 3 model B board, Raspberry Pi Camera, GPS and GSM modules to activate the services. The device is highly portable and can be triggered by automatically based on the heart beat level of the user and that will gain its current location and also capture the attacker's image via a Raspberry Pi camera. The location and link to the captured image will be transferred to the predefined emergency contact number or to the police via the GPS and GSM modules on the board that will increase the efficiency compared to using a smart phone on this purpose.

II. RELATED WORK

Keeping in mind the same concern, there is some existing approaches that based on innovative ideas. Some of such are:

A. Society Harnessing Equipment

It is an equipment which consist of circuits that can produce a high voltage and it helps to prevent actions against women. In pandemic situations, it will generate electric shocks[7].

B. Smart Security

It contains multiple alarms that can shock potential attackers and therefore protect the users from dangerous incidents[8].

C. Vithu application

It is an application, which is activated When the smartphone's power button is pressed multiple times in a row, it starts transferring emergency messages to contacts every two minutes with a link to the user's location[9].

D. Smartbelt

It is built with a device that look like a ordinary belt. But, It screams to the sisters of the Arduino Board, shouts alarms and sensors. When the sensor's normal level is exceeded, the device will be activated automatically. Then the alarm unit will be makes sounds and will send messages on emergency numbers[7].

E. Live2010

This is a feature of Mobile phones which contains particular icons or buttons for women. This feature is works in a pandemic time, the user needs to lengthen the icon on the phone and the phone starts calling multiple emergency numbers one after the other. In a condition where a number is unable to take a call, an SMS is sent to the number. Then after the call is automatically connected to the next number[10].

F. Women Security Tools &Applications-FEMME

Female safety equipment and applications. It consist of an ARM controller and Android app scheme where these components and the phone are connected with the help of Bluetooth, so the triggering of the components are do not depend each other. It can record audio for references and transferring calls and messages to determined contacts with an immediate location[11].

G. Eye SafeApp

It is an application mainly deals with women safety. Here , a mobile-based app having Android support has been developed to check whether the user is on unsecure situation or not. This puts the user's location in danger by giving fake phone calls, etc[12].

H. All in one Intelligent Security System for Women Safety

It offers a more advanced security . This approach proposes an efficient and portable women safety device with advanced sensors that are placed in a wearable dress. It has ATMEGA8 micro controllers with advanced sensors and Arduino tools, which keep the user under surveillance at all times. This system will detect the heart beat rate and temperature rates using appropriate sensors to find out the uncomfortable conditions[13].

III. PROPOSED APPROACH

The smart belt includes the Raspberry Pi Zero, a single-board computer used to connect the Raspberry Pi camera and a buzzer module. The buzzer module uses a high-frequency warning sound to draw public attention to the sufferer. After pressing of the button, the pi camera seizes the image of the perpetrator when the victim is being attacked, a message-sending module is used to send current location of the victim and the link of the image captured to the family or police station using SMS, and an Android application that provides the user interface and helps to select emergency contact numbers.

A. Android Application

The user can activate the app in three ways. The first one via emergency switch in the app. Another one is the emergency button in the smart belt, which transmits signals with the application using Bluetooth support. The third one is by feedback from the sensor. When the emergency switch is pressed, the system will check whether the GPS is ON or OFF. If it is not in ON state, the app will run on the GPS location service. The application is connected to the Smart Belt Bluetooth Low Energy (BLE). The application has a login page. The users can register in the app by providing their information. The homepage has Safe Place, Tips to Avoid Threats, Law-related To women, and Video for self Defense features and an emergency button. All these features can be used to increase awareness for women. The "Safe Place" feature will help women to search for safe places. If women feel insecure, they can go and explore there. Through Google Geolocation Service the system will be informed about the current location of the victim. The app will then send a notification via any Notification Service system like Firebase to the nearest active user of the victim. As a result, volunteers will arrive to help him and the perpetrator will not get enough time to harm the victim. When they enter the app, they will see the location of the victim. The actual-time location of sufferer will be updated after every 5-10seconds.
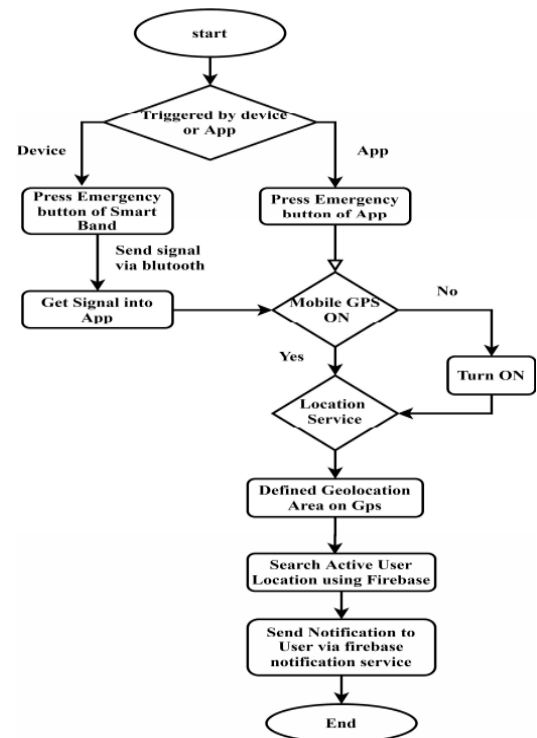

Figure 3.1: *Working Diagram*

B. Sensor

Sensors are used to precisely detect the real-time situation of the women under critical conditions. The temperature of women is higher than normal in such situations and they often fail in decision making. Sensors are used to detect heart rate and temperature. Heart beat sensor detects pulse rate. Heartbeat rate varies from one person to another. We take 60–80Bpm as the normal heartbeat rate. Beats below 50 Bpm and above 100 Bpm are considered an abnormal condition. Body temperature is of great importance in maintaining health and hence it is necessary to monitor it regularly. We can measure the body temperature using different type of temperature sensors. In emergency cases the body temperature changes abruptly, which can activate the smart belt for rescue. The normal temperature is 35 ° C. Excess of 40 ° C is considered hyperthermia. These user parameters acquired are stored in the server.

C. Message

The messaging module allows you to send all types of messages including SMS. It also helps you handle various helpful aspects of messaging, including managing address and browsing past conversations. Increasingly, it has an easy-to-use API to allow messaging modules to incorporate messages into their own projects.
GSM (SIM 800A): GSM modules allow any GSM network operator SIM cardand act to call its own unique phone Can accept like a mobile phone with number. MGM / GPRS is a class of mo-dem wireless modem devices designed for a computer's

communication with GSM and GPRS networks. As in the case of mobile phones, a SIM card is required to activate the communication with the network. In addition they possess an IMEI (Internal-Mobile Mobile Device Identification). Broadcast them on a mobile phone for identification.
The module can perform the below operations.
1. Receive, send or delete SMS messages in SIM.
2. Read, add, search phonebook entries. Make, receive, or reject voice calls.
The TX, RX, GND pin of this module is connected to the corresponding pin and is issued by the 12vtt, 2AMP Adaptor.
GPS: It consists a total of six wires from which three wires are used for connection. The TX pin of this module is connected to the D10 pin of the micro controller. Voltage supply is almost around 3.3V to 5V. When the switch is pressed, the GPS starts receiving the signal frame 4 satellite out of the 24 satellites in the orbit. The latitude and longitude values of the current location are obtained as soon as the connection is established. GPS works as a transmitter. A 5V supply is provided to the GPS from the controller.

D. Server

The server module is Raspberry Pi in a more malleable form factor, proposed for de-industrial application. The Compute module Raspberry Pi has the guts of a Raspberry Pi (BCM2835 processor and 512MB RAM) as well as a 4G EMCMC flash device (in which). Equivalent to SD card in pie.

E. Installation of Raspbian operating system

A Raspberry Pi -(either a Model B or Model B +).
SD card -We aptly recommend an 8 GB class 4 SD card.
• The cable and any HDMI / DVI monitor or TV must connect and function. As a display for pie. For better results, use one of the connections with HDMI input, but other connections for older devices without area.
• Keyboard and mouse The standard USB keyboard and mouse will work properly with your Raspberry Pi.
• Power supply Power your Ambridge P to a 5V Micro USB power supply. Whichever at least 5V output power supply can use; deficient power prevents your pie to behave unexpectedly.
• Download Internet connection updates or software, it is better to access your Raspberry Pi to the Internet via an Ethernet cable or WiFi adapter. Jack will work with your RaspberryPi.
Push Button Module: actually Push Button is a simple switch mechanism for a controllable action. The button is normally made of plastic or metal. The surface is usually flat or shaped to accommodate a human finger or hand. , So as to be simply pushed. The button is the most frequently biased switch, whereas many un-biased buttons require a spring to
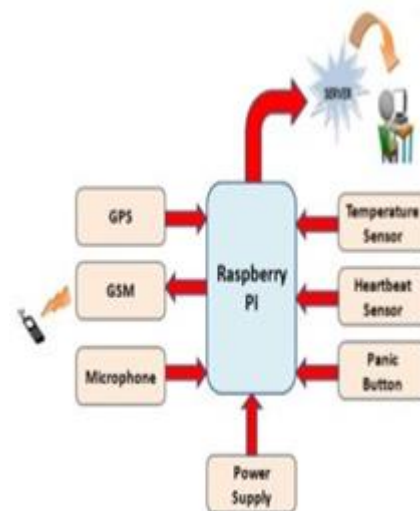

Figure 3.2: *Block Diagram*

take back to its fully pushed position. Different people use different words to push buttons, like press, depress, mash, and punch.

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F.The camera

The Pie Camera module is a device that can be used to take pictures and high definition videos. The Raspberry Pi board has a CSI (Camera Serial Interface) interface from which we can connect the PiCamera module precisely . This Pi camera module can connect to the CSI port of the Raspberry Pi using a 15-pin ribbon. Captured photos of one who attack are sent to emergency contacts. The camera module is installed as follows: Connect the camera module Make sure that your Raspberry Pi is turned off. 1. Track down the camera module port2. Gently pull up on the edges of the plastic clip 3 of the port. Insert the camera module ribbon cable; Make sure the cable is round 4 the correct way. Push the plastic clip back in place to start your Raspberry Pi. Go to the main menu and open the Raspberry Pi configuration tool. Select the Interfaces tab and make sure the camera is enabled: Reboot your Raspberry Pi. Now your camera module is connected and the software is enabled, try the command line tools Raspistil and Raspvid. Open the terminal window by clicking on the black monitor icon. Taskbar: To take a still picture, type in the following command and save it on the desktop: Press enter to run the command. When the command runs, you can open the camreview for five seconds, still before taking a picture. Look for the picture file icon on the desktop, and double-click the file icon for the open the picture.

I.V CONCLUSION AND FUTURE SCOPE

The current system is not so powerful to avert crimes against women. The major objective of the system is rapid process, low budget of development, bearable quality, ac-cure tracking. The project is an attempt to expand an effective self-defense gadget witch that will provide protection to women in case of any aggressor contact. Simplicity is the major merit of this product and is an economical and effective tool for women who travel alone. It gives women more confidence about their security. Since it is applied as a belt, the device is easily transported and can be extremely accessible in hazardous situations. The project placed as a technique when a woman is in danger, could immediately intimate conniving officers. The proposed technology uses GPS tracking of smart phones with co-ordination of the device. This technique sent image and warning URLs to inform family and police personnel.

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