Raakhee

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Abstract
Raakhee is a smart ring developed to secure or make aware the victim from any sudden situation like child trafficking, women security, or any sort of panic or medical attack. The smart ring is designed -with an emergency situational task keeping in mind such that there are many android applications developed for person's safety, though it not be possible to carry mobile phone at the situation. The device contains different modules such as GPS (Global positioning system), GSM, camera, buzzer, shock mechanism circuit. The designing of the ring has a combination of web technology, electronic, UI design. The project started by obtaining a raspberry pi and calibrating it with software. Then a suitable ring was searched withshock technology as well as some sensors to physically interact with device. Finally, the frame for the concept is designed to give it a final look. I used adobe XD for the UI design, web technology tools for software and electroniccollaboration.

I. Introduction

The concept kept in mind while making the ring to work on tasks such as making payment when near a payment terminal, unlocking an electronic look or control home appliance with IR laser sensor. Also, UI is designed to calibrate gestures by ring.

Overall description & purpose

It consists of major hardware like SMD LED module, buzzer controlled by micro-controller ATMEGA16A, Infrared laser sensor and other sensors. Sensors like thermostat and pulse rate sensors are important for the ring to analyze temperature and pulse during hyper situation and work accordingly. It gives location, aid information, and accelerometer can detect speed and sudden change in motion of user. The main aim of the project was to develop a smart ring device as well as an Operating system to run on similar device. Up to now there have been many smart rings developed but in this research the challenge was to add a defensive architectureto work with IoT.

Problem statement

At any emergency situation people get panicked and, in that situation, they may not be able to reach their mobile device or immediately defend the attacker. That's what is the concept kept in focus as it is a wearable safety device consists of sensors and an emergency button which when pressed or the emergency panel when analyze the situation activates the sensor and components sends the alert messages with location information to the victim's family and nearby police stations. All the components to be embedded with compatible size was really a fascinating project to deal with.

Implementation

Ring consists of an infrared emitter, capacitive touch LCD, IMU sensor and other components. The ring prototype is built with IoT components using a Raspberry pi B+ board with ethernet connectivity. IR emitter analyze for the IR receiver to connect and control devices by using infrared pointing technique. The framework used for bidirectional communication between the ring and target device present the interaction model for the ring and controlled devices. Finger gestures- up, down, OK, cancel, forward, circle. The first four gestures are control gestures to control devices whereas the other two gestures are pointing gestures for defining relationship among things. The interaction model comprises with target device selection and interaction scenario which are to be enacted using pointing technique. The selection of device is easy if there is only one target in the range. Ring collects the device IDs of selected targets using communication channel.

- Finger gesture framework:

We collected 3 axes (x, y and z-axis) accelerometer and 3 axes gyroscope sensor data at 50Hz sampling rate using GY-521 MPU6050 IMU sensor. Each gesture is repeated and dataset gets the samples recorded. We calculate 4 time-domain features from a 500 msec sliding window mean, standard deviation, max, min. We compared gesture recognition accuracy using Weka9 implemented SVM, Naive Bayes, and Bagging classifiers running on Samsung Galaxy S6 Android phone. In our dataset, Bagging outperforms other classifiers. When user performs a finger gesture, ring transfers its IMU sensor data to the phone and the phone sends the gesture recognition output to ring using IoTivity communication stack.

- Pulse rate sensor:

Sensor used to detect the pulse rate of user. It activates the emergency system when the pulse rate is increased beyond 100 beats per minute.

- Temperature sensor:

It plays an important role in human health condition. The normal temperature of human body is 25 to 45 degrees Celsius. If it goes above 45 degree Celsius, then the sensor activates thesecurity and aid system.

- GPS/GSM Module:

GPS is used to track live location of the user. The location is traced from the satellites moving around the earth. The location is retrieved in the form of latitude and longitude coordinates. GSM is used to send data to the emergency contacts according to the input signals from the sensor.

- Buzzer Module:

When the module activates, it continuously gives out siren which helps to distract the attacker from victim awhile seeking attention of public.
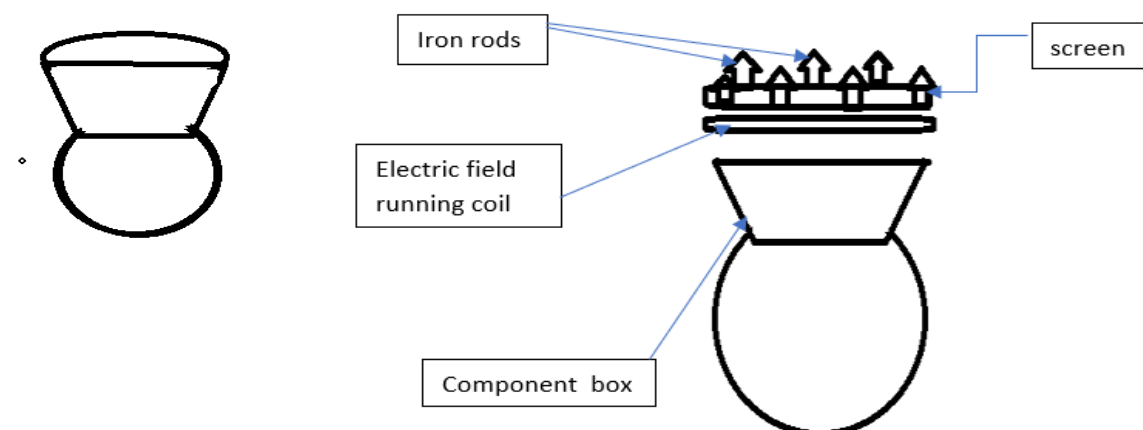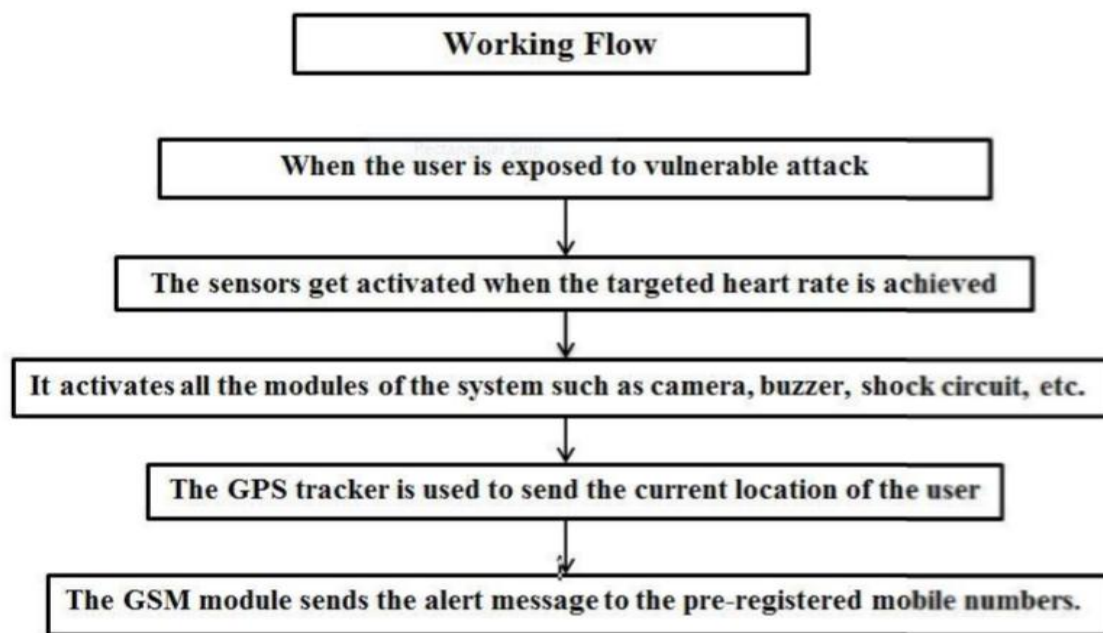
- Camera:

When the emergency module in the device is activated the camera module starts capturing the images continuously which could be useful for the police to find the culprit.

- Shock Circuit:

The shock circuit generates an electric jolt which can be used as a self-defense mechanism.

Proposed design & flow chart

Working Flow

When the user is exposed to vulnerable attack

The sensors get activated when the targeted heart rate is achieved

It activates all the modules of the system such as camera, buzzer, shock circuit, etc.

The GPS tracker is used to send the current location of the user

The GSM module sends the alert message to the pre-registered mobile numbers.

II. Result

A model with GPS NEO-6M, GSM SIM900, LCD Module, Buzzer controlled by Atmega8A microcontroller acts as the prototype ring. NMEA Latitude and Longitude data being received and is shown in LCD, when switch is pressed and the GSM message received by the emergency contacts, the location on Google maps when received longitude and latitude values are analyzed.

III. Conclusion

The proposed design will help the victim when they get into danger zone. They can make a rescue of themselves in dangerous situations. And this circuit will use to analyze and alert or decrease the tension of victim when he/she walks alone at peek hour and also that they will never feel helpless in any situation. The crimes like kidnapping, molestation or any such ruckus can be brought to an end with the help of real-time implementation of the proposed system. The system has been developed with such a motivation that it will leave no stone unturned to provide user a safe environment under all the circumstances. As the system is fabricated into a ring, it can be handy, activated and all time companion with the user in any environment.

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