Internet of Things (IoT) In the Field of Women Security

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Abstract:
Women safety has become a very big concern globally. In the current scenario, the prime question in every girl's mind is, the increase of issues on women harassment and concern about her safety and security. 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. A day when media broadcasts more of women's achievements rather than harassment, it's a feat achieved! This paper suggests a new perspective to use technology for women safety. We propose an idea which changes the way everyone thinks about women safety. Since we (humans) can't respond aptly in critical situations, the need for a device which automatically senses and rescues the victim is the main idea of this paper. We propose to have a device which is the integration of multiple devices. The hardware comprises of a wearable "Smart band" which continuously communicates with Smart phone that has access through BLE module. The application is programmed and loaded with all the required data which includes human behavior and reactions to different situations like anger, fear and anxiety. This generates a signal which is transmitted to the smart phone. The application has access to GPS of mobile and messaging services through app which is pre programmed in such a way that whenever it receives emergency signal, it can send help request along with the location co-ordinates to the nearest Police station, relatives. This action enables help instantaneously from the Police as well as relatives who can reach the victim with great accuracy.

Keywords: Smart Band, BLE, Smart phone application.

I. INTRODUCTION

This paper focuses on the design and development of a security system for the main purpose of providing security to women, so that they never feel helpless at times of physical harassment. An advanced system is shown here that can detect the location and the physical condition of a person that will enable us to take action accordingly. The module includes BLE module, body temperature sensor, pulse rate sensor, motion sensor, PIC microcontroller. Different types of sensors are used to detect the current situation of the women. Here we are making use of a pulse rate sensor to detect the heartbeat of person, motion sensor to detect the abnormal motion and temperature sensor to detect the change in body temperature of the victim. In order to make women comfortable we have come up with an idea to develop a smart band which is integrated with smart app through BLE module. The Smart band integrated with Smart app has an advantage of reduced cost size. The GPS of the smart phone is used to find the current location.

II. EXISTING SYSTEM FOR WOMEN SECURITY

Having this concern in mind many developers have come up with creative applications. Some of such applications are: Codes like *91# is used to provide emergency services, which will alert police control. Free mobile application 'Help me on mobile' to ensure safety of women was launched to assist those who need emergency .These applications need a single click to do this task.

A. SHE (Society Harnessing Equipment): It is a garment embedded with an electronic device. This garment has an electric circuit that can generate 3800kV which can help the victim to escape. In case of multiple attacks it can send around 80 electric shocks [3].

B. ILA security: The co-founders of this system, have designed three personal alarms that can shock and disorient potential attackers and hence safe guard the victim from Perilous situations.

C. AESHS (Advanced Electronics System for Human Safety) It is a device that helps track the location of the victim when attacked using GPS facility.

D. VithU app: This is an emergency app initiated by a popular Indian crime television series "Gumrah" aired on Channel [V]. When the power button of the Smartphone is pressed twice consecutively, it begins sending alert messages with a link of the location of the user every two minutes to the contacts.

E. Smart Belt: This system is designed with a portable device which resembles a normal belt. It consists of Arduino Board, screaming alarm and pressure sensors. When the threshold of the pressure sensor crosses, the device will activate automatically. The screaming alarm unit will be activated and send sirens asking help [4]. The main drawback of these applications and services is that the initial action has to be triggered by the victim which often in situation like these doesn't happen. So the emphasis is to build a solution that works autonomously in situations encountered.

Disadvantage of Existing systems:

These applications need a single click to do the required work. But when a girl is in trouble, there can be times that the girl is not capable of taking the phone and pressing button. Hence a smart system has to be developed which can access the current condition of the person and automatically send the information to the concerned people and thus necessary actions can be taken.

III. PROPOSED MODEL

Fig. 1 consists of Smart phone (app) connected to a Smart Band through Bluetooth Low Energy (BLE) module. The device communicates with smart phone through a specially designed application that acts as an interface between the device and the phone. The data directed by the smart band such as the pulse rate, temperature of the body along with the motion of the body is continuously monitored by the application which is pre-installed in the phone.
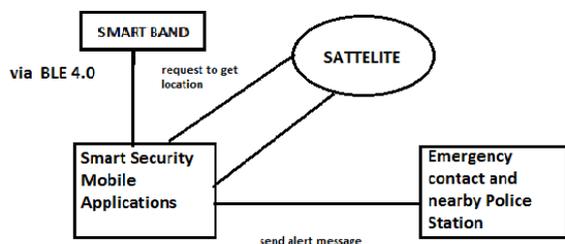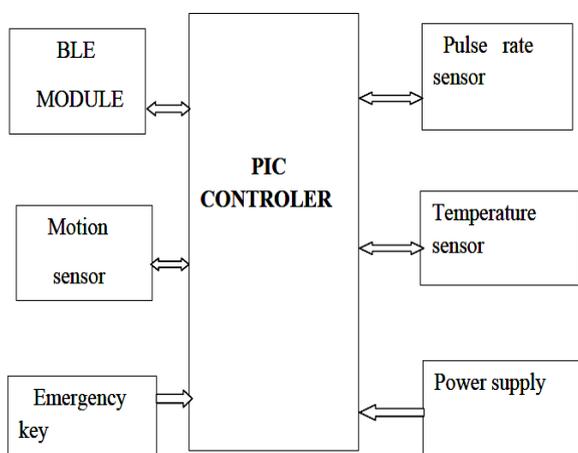

Figure.1. Main block Diagram

Figure.2. Smart Band Module

As shown in Fig. 1 In case of abuse, the app directs the smart phone to perform the following tasks:
• Sends message to the family members along with the co-ordinates.
• Co-ordinates are sent to nearest police station requesting immediate action.
The Smart Band unit as shown in Fig.2 consists of various units that precisely monitor the situation and takes necessary action accordingly.

The app is programmed in such a way that it uses the GPS of the smart phone to track the co-ordinates. The band communicates with smart app through BLE module which is previously paired with smart phone. When code responds to the sensors, BLE module will automatically communicate with smart app. The app sends previously stored message in the pic micro controller to the family members and the nearest police station .The contact list are previously stored in the app. The message is sent to the contact list along with the GPS coordinates.

A. PIC MICROCONTROLLER:

PIC16f877a finds its applications in a huge number of devices. It is used in remote sensors, security and safety devices, home automation and in many industrial instruments. An **EEPROM** is also featured in it which makes it possible to store some of the information permanently like transmitter codes and receiver frequencies and some other related data.

The cost of this controller is low and its handling is also easy. Its flexible and can be used in areas where microcontrollers have never been used before as in coprocessor applications and timer functions etc.

B. PULSE RATE SENSOR:

Heart beat sensor gives digital output of heart beat. When heart beat detector is working the led flashes for every heart beat. This digital output will be connected to microcontroller directly to calculate the beats per minute (BPM) rate.

C. DUAL TECHNOLOGY MOTION SENSOR:

A Motion Sensor is a device that detects moving objects. A motion detector is often integrated as a component of a system that automatically performs a task or alerts a user of motion in a specified area. Motion sensors form a vital component of security. Many modern day motion sensors use combinations of various technologies. While combining multiple sensing technologies into one detector reduces false triggering, it does at the expense of reduced detection probabilities and increased vulnerability factor.

D. BLE (Bluetooth Low energy):

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Blue core 04-External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature). It has the footprint as small as 12.7mmx27mm.

E. TEMPERATURE SENSOR:

This sensor includes a resistive-type humidity measurement component and an NTC temperature measurement component, and connects to a high-performance 8-bit microcontroller, offering excellent quality, fast response, anti-interference ability and cost-effectiveness. Each DHT11 element is strictly calibrated in the laboratory that is extremely accurate on humidity calibration. The calibration coefficients are stored as programmers in the OTP memory, which are used by the sensor's internal signal detecting process. The single-wire serial interface makes system integration quick and easy. Its small size, low power consumption and up-to-20 meter signal transmission making it the best choice for various applications, including those most demanding ones. The component is 4-pin single row pin package.

IV. SOFTWARE ALGORITHM

The following steps are performed when the unusual behavior of the user is detected. The decision is made by the inputs given by the various sensors like pulse rate sensor, temperature sensor and unusual motion detected by the motion sensor. The situations are pre-programmed into the system based upon which the device makes the decision and is handled by the smart phone app.
1. Micro controller continuously note down the values generated by the sensors.
2. When the sensors meets the particular condition which is different from the normal condition, then communicates with BLE module.
3. BLE module gets connected to app.
4.Now set a loop which will then trigger the following actions:
a) Save the numbers in the app.

b) Get location from GPS of the smart phone.

c) Sends the longitude and latitude obtained from GPS.

d) Attach this coordinates with an alert message.

e) Send this message to pre-selected ICE (In Case of Emergency) numbers which are previously stored in app.

v.CONCLUSION

This type of an idea being the first of its kind plays a crucial role towards ensuring Women Safety in the fastest way possible automatically. The proposed design will deal with critical issues faced by women in the recent past and will help solve them through technologically sound gadgets. With further research and innovation, this project can be implemented in different areas of security and surveillance. The system can perform the real time monitoring of desired area and detect the violence with a good accuracy.

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