Implementation of Novel Application for Woman and Child Protection Using IOT Enabled Techniques

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Abstract: Today in present global computing world most of the scenarios which are all based upon digital technology and moreover every person is connected with each other in many number of ways, where in which most popular communication is all the times as an Internet. In current global scenario, the harassment of women and children are increased day-by day and the world is becoming more unsafe and helpless. The most common incidents that are raised upon women and children are chain snatchings, kidnapping, sexual harassments, eve teasing, etc., and the worst among all mentioned in previous is rape which is rising in many countries. The only thought of haunting every girl is when they move in odd hours or alone without worrying about their security. In such perilous situations there must be a mechanism to be implemented that they easily affordable and comfortable to handle those situations instantly. In this paper we proposed a device which is integrated with multiple devices, comprising of wearable "smart band" which is connected to the smart phone through the BLE module. The smart phone that has the application which is programmed with all the required data which includes the behaviour of the human and reactions like anger, anxiety, nervousness and fear. When these situations are faced by the victim, the various sensors generates the emergency signals which are to be transmitted to the smart phone. Based on the transmission, the GPS tracks the location and GSM sends help request by sending messages to the nearest police station, relatives and the people in the near radius through Google map link to save the person. This type of system plays a crucial role to ensure safety of women and children in the fastest way.

Keywords: Smart band, GPS, GSM, Smart phone, BLE module.

I. INTRODUCTION

Internet of Things refers to the ability of network devices to sense and collect the data from the world around us, and then sharing of the data across the Internet where it can be processed and utilized for various purposes[2]. The Internet of Things(IOT) associate to the use of intelligently connected devices which is comprised of smart machines interacting and communicating with other machines, objects, environment and infrastructures and also systems to exploit data gathered by embedded sensors. The term Internet of Things was first coined by Kevin Ashton in 1999.

In today's world, over 80% of the world population habituated towards through the smart phones, including children at the age of eight or nine as the technology is to be increased rapidly the usage of mobiles are also increased. The proposed system in this paper is solely based on smart phones. Now-a-days attacks on women and children are extended in many number of ways and the victims are not in a case to take the mobile and dialup to the police station or to the family members, our proposed system will be very much useful in such cases which is not only informing about attacks but also in giving exact location of the injured party to nearby police station for necessary action. Women will be provided with equipment of smart band and the smart phone that has access to the GPS gets the location and these location values are displayed on the LCD. To the existing technology we have included the alert messages which are to be sent to the police station and family members.

The status of women in India has been subject to many great changes. In modern India, women are treated on equal grounds with men in every aspect. They have become independent and are keeping pace with the changing trends. However, in some situations still it continues to face discrimination and social challenges. Due to these reasons, it has become very important for females to stay alert and tackle all the situations when they are alone. All they need is a device which can be easily carried and to whorn when they feel unsafe. Here we introduce a wearable device which normally works as an ordinary watch[8].

In this paper we proposed a system for security of women and children. This paper focuses on a wireless method which will alert and communicate with a secure medium. This system will give speed monitoring for children security which can also be done by using the GPS tracking mechanism. Alert messaging will be done on the registered phone numbers. This paper focuses on a security system which is designed merely to serve the purpose of providing security to women so that they never feel helpless while facing such social challenges. An advanced system can be built which can detect the location and health condition of person which will enable us to take action accordingly based on electronic gadgets like GPS receiver, body temperature sensor, GSM, Pulse rate sensor. We can make use of number of sensors to precisely detect the real time situation of the women in critical abusive situations. The heartbeat of a person in such situations is normally higher which helps make decisions along with other sensors like motion sensors to detect the abnormal motion of the women while she is victimized[1].

The idea to develop a smart device for women is that it's completely comfortable and easy to use as compared with already existing women security solutions such as a separate garment, bulky belts and infamous mobile apps that are just

very abstract and obsolete[6]. The Smart band integrated with Smart phone has an added advantage so as to reduce the cost of the device and also in reduced size. The GPS and the GSM can be used of a smart phone. This also enables in reduced power use and that the watch can be installed with Bluetooth 4.0 BLE(Bluetooth Low Energy) which comes in handy for several days on a single shot of charge.

II.   EXISTING SYSTEM

Having the idea of above mentioned many developers have implemented creative applications. some of such applications are:

At first it is *91# is the code which is used to provide emergency services, which will alert police control.

The second application is 'Help me on mobile' is the free applications for mobile to ensure safety of women and children was launched to assist those who need emergency. When this application is installed it asks the name of the user who are using the smart phone and the guardian names for whom the automatic message and calls should be sent when they are facing trouble or attacked by someone by pressing the button .These applications requires a single click to do the task. But when a girl is in trouble, there can be a situation that the girl is not capable of taking the phone and to press the button.

A.   SHE(Society Harnessing Equipment)
It is a garment or equipment 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.

B.   ILA Security
The co-founders of this system have designed three personal alarms that can shock and disorient potential attackers and hence safeguard the victim from perilous situations.

C.   AESHS(Advanced Electronic System For Human Safety)
It is a device which helps to track the location of the victim using GPS facility when attacked by an offender.

D.   VithU app
This is an emergency app initiated by popular Indian crime television series "Gum rah" aired on channel. When the power button of the smart phone is pressed twice subsequently, it begins sending alert messages for every two minutes to the contacts with the location of the victim[5].

E.   Smart Belt
Smart Belt is the device which resembles like normal belt. This system is designed with a portable device. This belt consists of Arduino board, screaming alarm and pressure sensor. When the signal of the pressure sensor elevated, device will be activated automatically. The Screaming unit is also activated and sends siren sound to call out for help.

The main drawback of this system is that the initial action is to be triggered by the victim by pressing the button which doesn't happen in risky situations. So the emphasis is to build a solution which works automatically when situations are encountered.

III.   PROPOSED SYSTEM

Our Proposed system below starts by introducing a block diagram then after discussing some of the technical items which we used including their sample pictorial representations and also the sample algorithm of paper with some of the applications and advantages. Finally our paper concludes by providing some of the future directions of the paper.
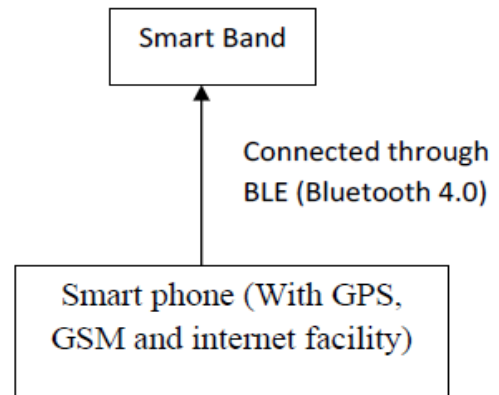

Fig. 1. Main block Diagram

As shown in above Fig.1 the block diagram consists of smart band, smart phone and BLE module. The smart phone is connected to smart band device through Bluetooth Low Energy (Bluetooth 4.0) module. The device communicates with smart phone through a specially designed application that acts an interface between the smart band 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 installed in the phone. In case of abuse, the app directs the smart phone to perform the following tasks[3][4]:
- Sends message to the family members along with the co-ordinates.
- Co-ordinates sent to nearest police station requesting immediate action.
- Also sends information to people in near vicinity requesting public attention.

The app is programmed in such a way that it uses the GPS of the smart phone to track the co-ordinates and monitor the movement for easy track ability! The help message is sent to the family members and the nearest police station through the GSM facility that is in built in the phone. The app also provides a social platform where the people who have this application installed get the messages instantaneously so that they too can contribute in justice being delivered just in time. This feature is executed by using internet facilities of the phone of the user.
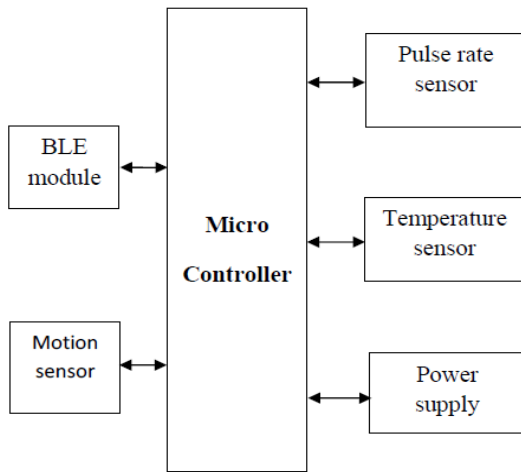
Fig. 2. Smart Band Module

As seen in Fig.2 smart band module consists of microcontroller, motion sensor, pulse rate sensor, temperature sensor and it should have the connection of power supply, BLE module. All these devices are associated to the microcontroller that controls all the functions of the electronic devices or system. These units precisely monitor the situations and takes actions accordingly[4].

A. Pulse rate sensor

Fig. 3.1 is the Pulse rate sensor also called as Heart beat sensor that gives digital output of heart beat. When there is a functioning of pulse rate sensor the led flashes for every heart beat. The digital output that is generated will be connected to microcontroller directly to calculate the beats per minute (BPM) rate. It works on the principle of light modulation of networked satellites and is tracked to uplinks data for synchronization. The system uses four frequencies in the L-band which ranges from 1.2 to 1.6 GHz[9].
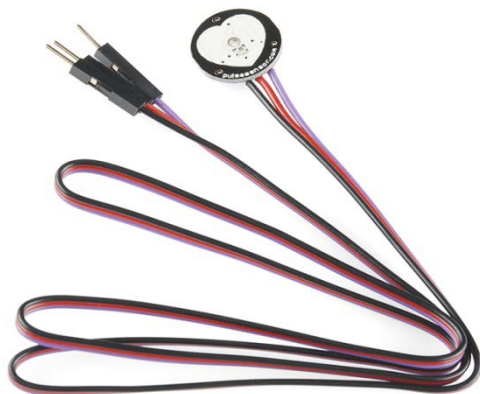
Fig. 3.1 Pulse rate sensor

B. Motion sensor

Fig. 4.1 is the motion sensor which is a device that detects the moving objects. A motion detector is often integrated as a component of a system which automatically performs a task or alerts a user of a motion in specified area. This sensor plays a vital role of protection for victim. Modern days motion sensors use combination of various technologies. While combining multiple sensing technologies into one detector reduces the false triggering.

Fig. 4.1 Motion sensor

C. Temperature sensor

As seen Fig. 5.1 it measures the temperature of the body by using various temperature sensors. Human body temperature is vital importance to maintain the health of the hunted person and therefore it is necessary to monitor it properly. For instance, LM35 series are precision integrated circuit sensor whose output voltage is nearly proportional to the Celsius temperature. It operates +10.0 mV/C scale factor with 0.5C accuracy. In emergency cases body temperature varies drastically which can trigger module for rescue.

Fig. 5.1 Temperature sensor

D. BLE(Bluetooth low energy)

Fig. 6.1 is the module which is designed to connect devices with low power consumption. The purpose of using this BLE module is to consume the low power when device is activated. A study by Beacon software, Aisle labs, reported that peripherals, such as proximity beacons, usually function for an year with a 1,000mAh coin cell battery. This is possible due to the power efficiency of Bluetooth Smart protocol which only transmits small packets as compared to Bluetooth Classic which was compatible for audio and high bandwidth data.

Fig. 6.1 BLE module

Fig. 7.3 Longitude

As seen in above Fig. 7.2 shows the latitude and Fig. 7.3 gives the longitude of the injured party that is determined by the GPS module.

E. *Power Supply*

Power supply unit is essential to provide regulated D.C supply to all the systems. As it is important to operate the instrument on batteries since it is used with the person while moving[5].

F. *GPS Module*

Fig. 7.1 is the Global positioning system (GPS) which is able to determine the latitude and longitude by calculating the time difference for signals from various satellites to reach the receiver. In six different orbits approximately 12,500 miles above the earth, 24 MEO (Medium-Earth Orbit) satellites revolve around the earth 24 hours and transmit location every second as well as present time from atomic clocks and by monitoring blood flow through skin when is in contact with the wrist band at each pulse[6][8].

G. *GSM Module*

Fig.8.1 is the GSM module that stands for Global System for Mobile Communication. It is a mobile telephony system[9]. This is used to send data from control unit to base unit. The importance of this system is sending messages to alert the family members. We can use GSM 300 which operates at frequency 900MHz. It has up link band of 890MHz to 915MHz and down link Band of 935MHz to 960 MHz GSM takes advantages of both FDMA & TDMA. Control Unit collects information from smart wrist unit and GPS receiver. GSM module will then send all these information from control unit to base station. Wrist unit collects the data from human using body temperature sensor, pulse rate senor and switches. RF module is used to send data from wrist unit to the control unit[7][10].

Fig. 7.1 GPS module

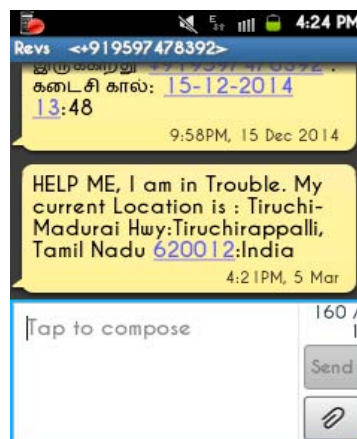**Fig. 8.1 GSM module**

Fig. 7.2 Latitude

Fig. 8.2 Alert Message

Fig. 8.2 is the messaging system with the location of the user determined by the GSM module which is sent to the predefined numbers of their family members or dear ones and also to the police station.

IV. SOFTWARE ALGORITHM

Whenever the unusual behavior of the user is detected the following steps are initiated. The decision is done based on the inputs given by various sensors like pulse rate sensor, temperature sensor, and motion sensor. The situations are programmed into the system that are made by the devices which make the decisions and is handled by the smart phone app:

1. Assign the transmitter and receiver pins to the GPS.
2. Set the serial buffer with baud rate 9600 and bit rate 4800.
3. Now set a loop which will trigger the following conditions:
    a) Scan the contact number from the SIM.
    b) Get the data from GPS module.
    c) Convert the longitude and latitude obtained from GPS into a Google URL.
    d) Attach this URL with the alert messages.
    e) Send this message to the pre-selected ICE (In case of emergency) numbers from SIM memory periodically until device is reset.

V. APPLICATIONS

- It is used for aged persons or senior citizens when they are missed or forgotten their home place.
- Can be used as legal evidence of crime with location information or prosecution.
- It is also useful for aged patients whenever they require any emergency.
- To decrease the chain snatching attempts.
- To prevent the children kidnapping attempts.
- To minimize the women kidnapping attempts.
- It helps the victim to escape when they are attacked by an attacker.

VI. ADVANTAGES

- Easy and fast to install.
- Wireless connectivity.
- Environmental friendly system.
- Safety device which can be carried by everyone.
- Ultra low power consumption.
- Compact in size.
- Low cost with high performance.
- Less weight.
- Easy coding and maintenance.
- Minute variations are captured by the sensors used.
- Works around the clock.

VII. FUTURE SCOPE

This paper is an endeavor to develop an effective self-defense gadget which would provide protection to women and children. The major merit of this product is its simplicity and is also economical and effective handy device for women who travel alone. This device gives more confidence to the women about their safety. It can also be used as a digital watch and a phone locator if phone is lost or misplaced. The model is developed with easily available and comparatively low cost components.

This work is of moderate cost, very effective, and productive. Some improvements can be made so that it accepts to enhance the performance without altering the existing design. Currently the application is compatible only to android smart phones. So by making it compatible with any operating system can improve the system as a whole. A small camera can be embedded into the system which would record the crime and serves as an identification of the attacker. The system can be further developed by adding few sensors to sense the fear and anxiety thus automatic response can be obtained. In addition to that a voice recognition system for the access will also help to improve the performance.

VIII. CONCLUSION

 The implementation of this system safeguards the women and children. This system mainly focuses on a wireless method which will alert and communicates with secure medium[9]. This type of an idea being the first of its kind plays a crucial role towards ensuring women and children safety and protection in the fastest way which is possible automatically. The proposed design deals with critical issues faced by women in the recent past and will help to solve them through technologically sound gadgets. This paper can be implemented in different areas of security and surveillance and can also be used in various security aspects which provides an effective strength to the victims to escape from the attacker when they are in trouble or facing perilous situations. This system can perform the real time monitoring of certain area and detect the severity with efficient accuracy. This system would be highly sensitive and easy to handle. Its quick action response will provide better and comfortable safety and security to every individual user.

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