

Smart Band for Women Safety

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ABSTRACT

In the current society the security of women is a major issue. Today's media news at least contains one woman rape/attack cases. The main problem is, that the victim will be unable to call for help (if it is a rural place). In this paper, we made an attempt to develop a smart device that can assist women when they feel insecure. This device is a wearable smart band, which can be wore by women. The device could be used for children as a tracking device, thus parents can monitor their children's location remotely. It is interfaced with a push button, a GSM module for mobile communication, a Heartbeat sensor for monitoring the pulse and a microcontroller for controlling the whole process

Keywords :- GSM, URL, LillypadARDUINO, SIM800L

I. INTRODUCTION

Violence against women occurs throughout the life cycle from pre-birth, infancy, childhood, adolescence, adulthood to senescence. Most of the data are believed to be unreliable as many cases go unreported. Cases of violence against women are steadily increasing in the country. According to the National Crime Record Bureau, India there is one act of sexual harassment every 59 min, one rape every 34 min, one act of torture every 12 min and almost one in every three married women experienced domestic violence. Studies from India reported violence in 19–76% of women (75%–76% in lower caste women; 42–48% in Uttar Pradesh and 36–38% in Tamil Nadu; and 19% in an urban slum community of childless women).

Even in this modern era women are feeling insecure to step out of their house because of increasing crimes in our country like harassment, abuse, violence etc., The corporate and IT sector are currently in boom. Many women are working in corporate even in night shifts. There is a feeling of Insecurity among the working women.

The proposed device is more like a safety system in case of emergency. This device can be fitted in a watch. It is an easy to carry device with more features and functions. The emergency push button is held to one of the buttons of the watch. The main purpose of this device is to intimate the parents and police about the current location of the women. A GSM modem is used to send the message to the pre-defined numbers. The microcontroller acts as an embedded computing system and it controls the activities of all the subsystems. The microcontroller is interfaced with all the other modules of the device. The program for Lilly pad Arduino microcontroller is done in Embedded C language.

II. EXISTING SYSTEMS

As a part of literature survey, we investigated some applications and devices that offer the same or similar services for android and other platforms. The aim is to see how these work and to see how they can be improved. Today the cases of abuses against women are growing rapidly. In these types of cases, a smart device plays an important role for Safety of women. Some of the existing systems are as follows –

2.1 Siren

Disguised as an average ring, SIREN actually helps users stay safe by emitting a piercing, loud sound to confuse and distract attackers. The sound is over 110 decibels loud and can be heard from 50 feet away. Users simply twist the top of the ring to the left, approximately 60 degrees, to emit the loud sound. In a little over a second, the sound begins; this delay also allows the user to switch the ring back off in case the situation doesn't require it anymore. Its stylish design and easy access make it simple to use in variety of situations.

2.2 Stiletto Charms

In an effort to make the personal safety device more discreet, Stiletto Charms mimic the aesthetic of modern jewellery. They can complement virtually any outfit but secretly manage a variety of functionalities. Using the Stiletto mobile app, users can create an emergency profile, set up emergency contacts, plan a route and check the device's battery level. Besides contacting friends and family members, and they even have a voice-assisted alert system to communicate when the user might not be able to speak.

2.3 Roar

ROAR for Good created its first product, Athena, to create a simple way for women to get help. Roughly the size of a half dollar coin, Athena activates a loud alarm when users press a button. The device then sends an alert with the location of the user to contacts who can help. The device can be attached to a

purse or even worn as a necklace (a recessed button avoids any accidental alarms). Users can also set the device to silent mode so that Athena still sends information to contacts without making a sound.

2.4 Guardly

This app is developed basically for women safety intention, to put a phone call by your name, instantaneous location, and emergency hit to your selected friends. In this app you have to give your details in profile sheet e.g. birth date, tallness, weight, eye-colour, blood group, hair-colour, etc. This app is also used in I-Phone, I-Pad, BlackBerry, Windows Phone etc.

2.5 Secure me Beta

This app is developed by Think MP Consulting Private Limited. It helps us to raise alert and we can get help in case of life threatening emergencies. After installing the app, initially we have to give a pin number for security purpose and then after emergency contacts must be registered in the app. By pressing a tap on secure button, it notifies the contacts with location co-ordinates.

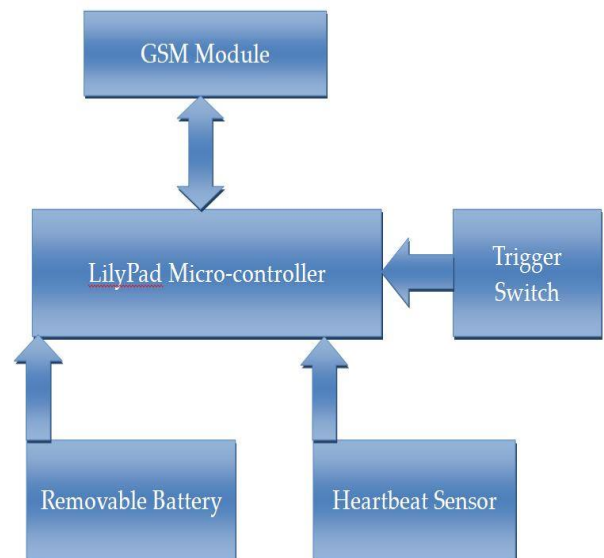
2.6 Vanitha Alert

This app is developed by ABC Mobile Learning Communication click on "HELP" button on our mobile's home screen in an emergency situation can deliver a distress text message to the registered mobile number, E-mail id, face book id seeking help and indicating the user's location.

III. PROPOSED SYSTEM

The proposed system is intended to alert the authorities to take immediate action, whenever a woman is get attacked. This design will deal with most of the critical issues faced by women and will help them to be secure. This system helps to decrease the crime rate against women.

The system can be divided into different modules, this device uses a heartbeat sensor for monitoring the heartbeat, a GSM modem for identifying the location of the person in trouble, a lily pad Arduino micro-controller for controlling the whole process, an OLED display for display, pushbutton and a rechargeable battery for power source. The block diagram of the proposed system is shown in below Figure.



3.1 Heart Beat Sensor

A heart rate monitor is a device that allows one to measure one's heart rate in real time. It can be used by users who want to easily use this live heart-rate data into their projects.

Pulse sensor consist of three pins:

- VCC pin
- GND pin
- OUT pin or Signal pin

Pulse Sensor is a plug-and-play heart-rate sensor for Arduino. It can be used by students, artists, athletes, makers, and game & mobile developers who want to easily incorporate live heart-rate data into their projects. Essence it is an integrated optical amplifying circuit and noise eliminating circuit sensor. There is also a LED in the centre of this sensor module which helps in detecting the heartbeat. Below the LED, there is a noise elimination circuitry which is supposed to keep away the noise from affecting the readings.

When a heartbeat occurs blood is pumped through the human body and gets squeezed into the capillary tissues. Consequently, the volume of these capillary tissues increases. But in between the two consecutive heartbeats this volume inside capillary tissues decreases. This change in volume between the heartbeats affects the amount of light that will transmit through these tissues. This can be measured with the help of microcontroller. The pulse sensor module has a light which helps in measuring the pulse rate.



FIG 2: Heart Beat Sensor

When we place the finger on the pulse sensor, the light reflected will change based on the volume of blood inside the capillary blood vessels. This variation in light transmission and reflection can be obtained as a pulse from the output of pulse sensor. This pulse can be then conditioned to measure heartbeat and then programmed accordingly to read as heartbeat count using Arduino.

3.2 SIM800L GSM module

SIM800L GSM/GPRS module is a miniature GSM modem, which can be integrated into a great number of IoT projects. You can use this module to accomplish almost anything a normal cell phone can; SMS text messages, Make or receive phone calls, connecting to internet through GPRS, TCP/IP, and more.

To top it off, the module supports quad-band GSM/GPRS network, meaning it works pretty much anywhere in the world. At the heart of the module is a SIM800L GSM cellular chip from SimCom. The operating voltage of the chip is from 3.4V to 4.4V, which makes it an ideal candidate for direct LiPo battery supply. This makes it a good choice for embedding into projects without a lot of space.

All the necessary data pins of SIM800L GSM chip are broken out to a 0.1" pitch headers. This includes pins required for communication with a microcontroller over UART. The module supports baud rate from 1200bps to 115200bps with Auto-Baud detection.

There's a SIM socket on the back! Any activated, 2G micro SIM card would work perfectly. Correct direction for inserting SIM card is normally engraved on the surface of the SIM socket. This module measures only 1 inch² but packs a surprising amount of features into its little frame. Some of them are listed below:

Supports Quad-band: GSM850, EGSM900, DCS1800 and PCS19000. Connect onto any global GSM network with any 2G SIM. Make and receive voice calls using an external 8Ω speaker & electret microphone

Send and receive SMS messages

Send and receive GPRS data (TCP/IP, HTTP, etc.)

Scan and receive FM radio broadcasts

Transmit Power:

Class 4 (2W) for GSM850

Class 1 (1W) for DCS1800

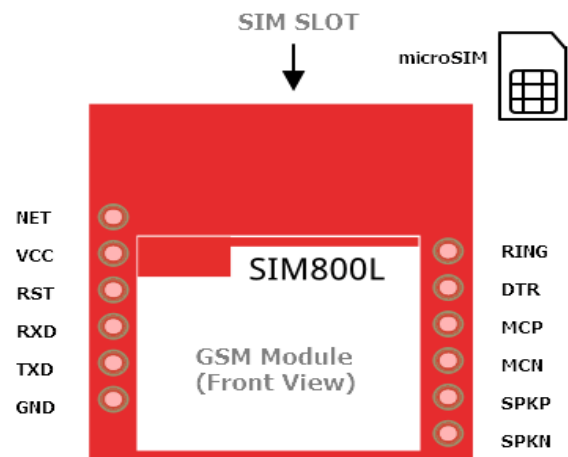


FIG 3: SIM800L GSM module

There is an LED on the top right side of the SIM800L Cellular Module which indicates the status of your cellular network. It'll blink at various rates to show what state it's in: Netlight LED Blinking Finding Network Connection

Blink every 1s-

The module is running but hasn't made connection to the cellular network yet.

Netlight LED Blinking Active GPRS Connection

Blink every 2s-

The GPRS data connection you requested is active.

Netlight LED Blinking Network Connection Established

Blink every 3s-

The module has made contact with the cellular network & can send/receive voice and SMS.

3.3 LilyPad Arduino

The LilyPad Arduino is a microcontroller board designed for wearables and e-textiles. It can be sewn to fabric and similarly mounted power supplies, sensors and actuators with conductive thread. The board is based on the ATmega168V (the low-power version of the ATmega168) or the ATmega328V.

Microcontroller - ATmega168V or ATmega328V

Operating Voltage- 2.7-5.5 V
Input Voltage -2.7-5.5 V
Digital I/O Pins-14 (of which 6 provide PWM output)
Analog Input Pins-6
DC Current per I/O Pin-40 mA
Flash Memory-16 KB (of which 2 KB used by bootloader)
SRAM-1 KB
EEPROM-512 bytes
Clock Speed-8 MHz

The LilyPad Arduino can be programmed with the Arduino software. The LilyPad Arduino should only be programmed with software versions 0010 or higher.

The ATmega168V or ATmega328V on the Arduino LilyPad comes preburned with a bootloader that allows you to upload new code to it with the Arduino software and can also bypass the bootloader and program the ATmega through the ICSP (In-Circuit Serial Programming).

The LilyPad Arduino can be powered via the USB connection or with an external power supply. If an external power supply is used, it should provide between 2.7 and 5.5 volts. This can come either from an AC-to-DC adapter (wall-wart) or battery. Again, don't power the LilyPad Arduino with more than 5.5 volts.

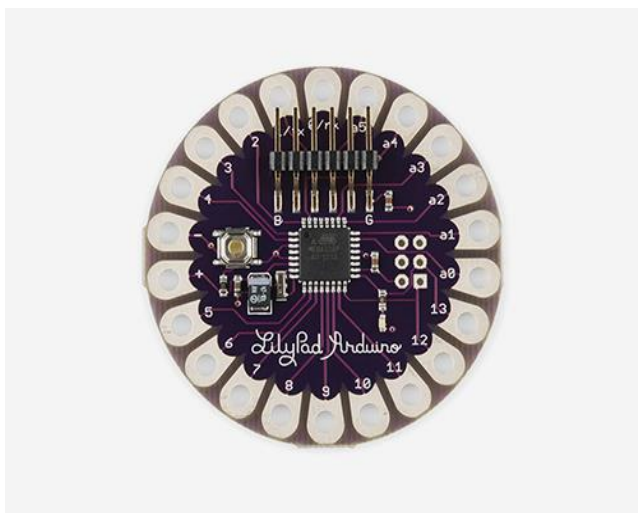


FIG 4: Lilypad Arduino Microcontroller

The LilyPad Arduino is a circle, approximately 50mm (2") in diameter. The board itself is .8mm (1/32") thick (approximately 3mm (1/8") where electronics are attached).

3.4 OLED display

An organic light-emitting diode (OLED) is a light-emitting diode (LED) in which the emissive electroluminescent layer is a film of organic compound that emits light in response to an electric current.

OLEDs are used to create digital displays in devices such as television screens, computer monitors, and portable systems such as smartphones, handheld game consoles and PDAs.



FIG 5: Organic Light-Emitting Diode

A major area of research is the development of white OLED devices for use in solid-state lighting applications. The OLED display doesn't require backlight, which results in a very nice contrast in dark environments. Additionally, its pixels consume energy only when they are on, so the OLED display consumes less power when compared with other displays.

IV. IMPLEMENTATION

The microcontroller acts as an embedded computing system and controls the activities of all the subsystems. The system tracks the location information from the GPS and prepares a text SMS containing the present location information and send SMS through GSM modem to the police control room and distress message to the pre-programmed mobile number. Thus the girl will be safe and she feels protected.

Arduino micro-controller board will be programmed to send sms to family or friends numbers during emergency situation. Watch will be equipped with GSM module for sending SMS. Admin contact will be saved to first memory location of SIM. Admin will have the authority to add or delete emergency contacts. Can add up to 3 number by sending SMS to equipment SIM in a defined pattern. Heartbeat sensor monitors heartbeat. Once variation is observed, it listens for long button press on equipment. When this button press is received, SMS with location and other information like signal strength will be send to defined contacts on regular intervals units it's stopped by a button press pattern. This device can be used by women for their security.

The device will function if there is no network and has more battery backup. It will not work unless there is an emergency situation because it is based on heartbeat rate. So mock traps can be excluded. Since it is a Smart Band, it is not quickly noticeable. Hence the attacker will not try to destroy it. If they have any emergency situation, they can depend upon the device completely. The objective of security alerts is to send emergency alerts to people who can really act in time. This

can save women from being a victim of attacks. It sends their location, to their relatives and nearby police station.

V. ADVANTAGES

- Can be used for the safety of children.
- Can be used for the safety of elderly aged people.
- Can be used for the safety of physically challenged people.
- Can be used as a legal evidence of crime with exact location information for prosecution.
- Wireless connectivity.
- Easy Maintenance
- Low cost with high performance.
- Fast response.
- Environmental friendly system.

VI. CONCLUSIONS

Being safe and secure is the demand of the day. Our effort behind this is to design and fabricate a device that provide advantage of personal security system. The merit of this application is even when the location of the root device is changing rapidly; we can identify the exact location. This design will deal with most of the critical issues faced by women and will help them to be secure. This system helps to decrease the crime rate against women. Women's security is a critical issue in current situation. These crimes can be brought to an end with the help of real time implementation of our proposed system.

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