International Journal of Application or Innovation in Engineering & Management (IJAIEM)
Web Site: www.ijaiem.org Email: editor@ijaiem.org
Volume 3, Issue 4, April 2014 ISSN 2319 - 4847

SMART GIRLS SECURITY SYSTEM

Prof. Basavaraj Chougula[1], Archana Naik[2], Monika Monu[3], Priya Patil[4] and Priyanka Das[5]

[1,2,3,4&5]KLE's College of Engineering and Technology, Belgaum,
Dept. of Electronics & Communication

Abstract

Today in the current global scenario, the prime question in every girl's mind, taking into account the ever rising increase of issues on women harassment in recent past, is only 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. This paper suggests a new perspective to use technology to protect women. The system resembles a normal belt which when activated, tracks the location of the victim using GPS (Global Positioning System) and sends emergency messages using GSM (Global System for Mobile communication), to three emergency contacts and the police control room. The system also incorporates a screaming alarm that uses real-time clock, to call out for help and also generates an electric shock to injure the attacker for self defense. The main advantage of this system is that the user does not require a Smartphone unlike other applications that have been developed earlier. The use of sophisticated components ensures accuracy and makes it reliable. The belt provides with all the features which will leave no stone unturned to help the victim in any kind of emergency situations.

Keywords: Arduino ATMega328 board, GSM, GPS, Security.

1. INTRODUCTION

The status of women in India has gone through many great changes over the past few millennia. From equal status with men in ancient times through the low points of the medieval period to the promotion of equal rights[6] by many reformers, the history of women in India has been eventful. In modern India, women have adorned high offices in India including that of the President, Prime Minister, Leader of the Opposition and Speaker of the Lok Sabha. However, women in India continue to face social challenges and are often victims of abuse and violent crimes[6] and, according to a global poll conducted by Thomson Reuters, India is the "fourth most dangerous country" in the world for women, and the worst country for women among the G20 countries.

This paper focuses on a security system that is designed solely to serve the purpose of providing security[7] to women so that they never feel helpless while facing such social challenges. The system consists of various modules such as GSM shield (SIM 900A), Arduino ATMega328 board, GPS (GY-GPS6MV2), screaming alarm (APR 9600), a set of pressure sensors for activation and power supply unit.

The Delhi Nirbhaya case that triggered the whole nation was the greatest motivation for this system. It was high time we women needed a change.

2. Existing System

Keeping the same concern in mind many developers have come up with innovative applications. Few of such applications are as follows-

1. VithU app: This is an emergency app initiated by a popular Indian crime television series "Gumrah" aired on Channel [V]. In this app when the power button of the Smartphone is pressed twice consecutively, it will begin sending out alert messages with a link to the location of the user every two minutes to the contacts fed into the app.

2. SHE (Society Harnessing Equipment) : It is a garment designed by three engineers from Chennai. This garment has an electric circuit that can generate 3800kv of current which can help the victim to escape.

In case of multiple attacks it can send upto 82 electric shocks. Since the fabric is bilayer, the user is not affected. It can also send emergency messages.

3. ILA security: The co-founders of this system, McGivern, James Phillips, and Neil Munn , have designed three personal alarms that can shock and disorient potential attackers and draw attention to dangerous situations.

3. Proposed Design

The proposed system is to design a portable device which resembles a normal belt. It consists of Arduino Board, GSM/GPS modules, screaming alarm and pressure sensors. When the threshold of the pressure sensor crosses, the device will get activated automatically. Immediately the location of the victim [3] will be tracked with the help of GPS and emergency messages will be sent to three contacts and one to police control room every two minutes with updated location. The screaming alarm unit will be activated and will send out sirens to call out for help. The system is also capable to generate an electric shock to harm the attacker which may help the victim [8] to escape.

4. Methodology

4.1 Hardware Implementation

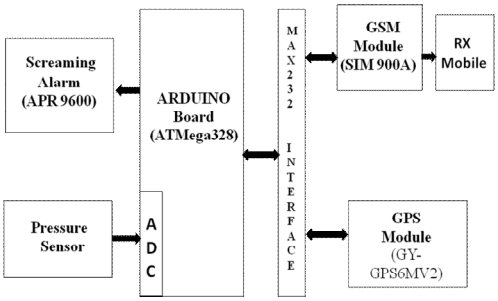

Figure 1 Block Diagram

1. Arduino ATMega328 board: The Arduino Duemilanove ("2009") is a ATmega328 microcontroller based board based which consists of 14 digital input/output pins (6 of which can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller. It can be simply connected to a computer with a USB cable or powered with an AC-to-DC adapter or battery to get it started.

Table 1 : Summary of Arduino ATMega328 Board

Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage (recommended)	7-12 V
Input Voltage (limits)	6-20 V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	16 KB (ATmega168) or 32 KB (ATmega328) of which 2 KB used by boot loader
SRAM	1 KB (ATmega168) or 2 KB (ATmega328)
EEPROM	512 bytes (ATmega168) or 1 KB (ATmega328)
Clock Speed	16 Hz

2. GSM Shield (SIM 900a): The SIM900 which is a complete Quad-band GSM/GPRS solution comes in a SMT module which can be embedded in customer applications. Featuring an industry-standard interface, the SIM900 delivers GSM/GPRS 850/900/1800/1900MHz performance for Data, voice, SMS and Fax in a small form factor and with low power consumption. SIM900 can fit almost all the space requirements in the M2M application with dimensions of 24mm x 24mm x 3 mm. SIM900 is designed with a very powerful single-chip processor integrating AMR926EJ-S core. Quad - band GSM/GPRS module with a size of 24mmx24mmx3mm, SMT type suit for customer application, An embedded Powerful TCP/IP protocol stack Based upon mature and field-proven platform, backed up by our support service, from definition to design and production.

The GSM has the following advantages :
1. Spectrum efficiency is improved and Speech quality is high.
2. Provides International roaming and Support for new services.
3. Supports low-cost handsets and base stations (BSs).
4. Compatible with Integrated Services Digital Network (ISDN) and other telephone services.

Table 2: General Summary of GSM SIM 900A

Input DC Supply	Single 5v, 60mA
Serial Interface	TTL (asynchronous)
Data Output baud rate	9600 bps (default)
Output Format	Standard NMEA0183
Strip Interface	Standard 4-pin Berg (2.54mm pitch)

Chip Architecture	MediaTek
Patch Antenna Size	25mm * 25mm * 4mm
Power Consumption	Low (50mA at acquisition, 40mA at tracking)
Sensitivity	High (up to -158dBm tracking)
Position Accuracy	< 3m CEP (50%) without SA (horizontal)
Cold Start	Under 36 seconds (typical)
Warm Start	Under 34 seconds (typical)
Hot Start	Under 1 second (typical)
Max. Update Rate	5Hz (default : 1Hz)

3. GPS Module: This is a GPS Receiver (5V Serial) with high gain having 4 Pin 2.54mm pitch strip. The third generation POT (Patch Antenna on Top) is used by the reciever for the GPS module. It can be interfaced with normal 5V Microcontrollers with the help of the in built 3V-5V converter. The interfacing is made easier with the help of low pin count (4 pin) strip. The 4 Pins are 5V, TX, RX, and GND. This standalone 5V GPS Module does not require external components .It consists of internal RTC Back up battery and can be directly connected to USART of the microcontroller.

The current date, time, longitude, latitude, altitude, speed, and travel direction / heading among other data, are provided by the module and can be used in a many applications including navigation, fleet management, tracking systems, mapping and robotics. The module can support up to 51 channels. The GPS solution enables small form factor devices which deliver major advancements in GPS performances, accuracy, integration, computing power and flexibility. They are used to simplify the embedded system integration process.

4. Screaming Alarm (APR9600) : The device offers true on-volatile storage, single-chip voice recording and playback capability for 40 to 60 seconds. It supports both random and sequential access of multiple messages. Sample rates can be selected by user, allowing designers to customize their design for unique quality and storage time needs. Microphone amplifier, integrated output amplifier and AGC circuits greatly simplify system design. This device is ideal for use in portable voice recorders and many other consumer and industrial applications.

High levels of storage capability is achieved by APLUS integrated using its analog/multilevel storage technology which is implemented in an advanced Flash non-volatile memory process. 256 voltage levels can be stored in each memory cell. This technology enables the APR9600 device to reproduce voice signals in their natural form eliminating the need for encoding and compression, due to which often distortion is introduced.

5. Pressure Sensor: Pressure Sensors are used for control and monitoring in thousands of everyday applications .Pressure Sensors can be alternatively called pressure transmitters, pressure transducers, pressure indicators and piezometers, among other names. Pressure Sensors can vary drastically in technology, design, performance, applications suitability and cost. There is also a category of pressure sensors that are designed to measure in a dynamic mode for capturing changes in pressure.In a pressure switch, when pressure is applied to the sensor, the sensor either completes the electrical circuit or breaks it. Usually, a pressure sensor acts as a transducer.When the pressure is imposed on it, a signal is generated.

4.2 Software algorithm

1. Define the receiver and transmitter pin number of GPS module.
2. Setup the serial buffer with baud rate 9600 and bit rate 4800.
3. Now setup a loop which will do the following
   a. Read the contact number from SIM card memory
   b. Take data from GPS module.
   c. Convert the longitude and latitude from GPS into an Goggle URL.
   d. Attach this URL with the emergency message.
   e. Send this message to all the numbers from SIM memory periodically until device is reset.

5. Conclusion

The proposed design will deal with critical issues faced by women in the near past and will help to solve them with technologically sound equipments and ideas. This system can overcome the fear that scares every woman in the country about her safety and security.

References

[1] Moser, c. and c. mcilwaine (2006), “Latin American urban Violence as a development concern: towards a framework for Violence reduction”, World Development, Vol. 34, no. 1, pp.89-112.

[2] Hill, r., J. temin and L. Pacholek (2007), “Building Security where there is no Security”, Journal of Peacebuilding and Development, Vol. 3, no. 2, p. 38-51.

[3] Muggah, r. and k. krause (2009), "closing the gap Between Peace operations and Post-conflict insecurity: towards a Violence reduction agenda", International Peacekeeping, Vol. 16, no. 1, pp.136-150.
[4] Rathmell, a. (2009), "Security and Justice development – what next?", Journal of Security Sector Management, Vol. 7, p no. 2.
[5] Charlotte Bunch and Roxanna Carillo, "Global Violence against Women: The Challenge to Human Rights and Development" in Michael Klare and Yogesh Chandrani (eds.), World Security: Challenges for a New Century, third edition (New York: St. Martin's Press, 1998), p. 230.
[6] Beth Woroniuk, "Women's Empowerment in the context of Human Security", Bangkok, Thailand, December 7-8 1999.
[7] Reardon, op. cit., "Feminist Concepts of Peace and Security," p. 139.
[8] Susan McKay, "Gender Justice and Reconciliation," Women's Studies International Forum, vol.23, no. 5, 2000.