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Virtual Friendly Device for Women Security

Dr.B.Sumathy1, P.Deepan Shiva2, P.Mugundhan2, R.Rakesh2, S.Sai Prasath2
1Assistant Professor, Department of Instrumentation and control engineering
2Final year Undergraduate Students, Department of Instrumentation and Control Engineering
Sri Sairam Engineering College, West Tambaram, Chennai-44
bsumathy.ice@sairam.edu.in

ABSTRACT- Crimes against women is becoming a daily routine in our country, nowadays. An increased demand persists in developing safety devices for ensuring safe and secure environment for women. The main aim is to develop a “Virtual Friendly” device, to safeguard themselves while in trouble. The proposed system developed consists of GPS, GSM modem, Microcontroller (LPC812), RF transceiver, Temperature Sensor, Voice Recognizer. GPS Receiver gets the location information from satellites in the form of latitude and longitude. The Microcontroller processes this information and this processed information is sent to the POLICE control room. The temperature sensor senses the body temperature continuously. SMS alert will be sent in case of low temperature which indicates emergency condition. The system can be activated by the user by themselves, when they are in need of self-defense. Features such as Alarm sound, voice recognition are added to the system to ensure optimum efficiency. The voice recognizer circuit is used to send command with voice by using the codes SAVE ME and HELP ME. The device is designed as a portable kit and easily operated, so that any women can easily carry with them anywhere and everywhere.

Keywords- GSM, GPS, RF Transceiver, Temperature sensor, Voice Recognizer

1. INTRODUCTION

No woman should be a victim of physical abuse. Women have to feel like they are not alone, but in the modern era women are feeling insecure. In corporate and IT sector, many women are working even in night shift. It has been recorded as the largest fall in the crime rate than other cities in India. It was just opposite in the capital of India, Delhi. Crime rate against women in Delhi was 17.6/100,000 females in 2000 (2,122 incidents) and 151.13/100,000 females in 2013 (11,449 incidents). The safety of women is very important in present days as crime actions against women are increasing drastically [1]. The fear has been caused by repeated case of violence toward women. Do not want to use the term ‘harassment’ instead it is sexual terrorism today. More than 800 women are harassed, raped, killed every day [7]. Schools and universities must compulsory teach the students to learn about physical education and art, schools do equip student with basic skills of life especially to safeguard of their own. All these issues forced to develop an security and safety system for women. The system is designed not only serve the purpose of providing security to women but also to face social challenges they never feel helpless[6]. The various problems arise can be overcome with the “all in one intelligent safety system for women security” [11]. The existing mobile application need lot of human interaction to operate and to send alert to police and family member by sending their location [3]. This application is not only used for cases like rapes and any perverts teasing girls but this also helps them from any bad condition or any health problem like fainting suddenly [10].
A. RECENTLY DEVELOPED MOBILE APPLICATIONS FOR WOMEN SAFETY IN INDIA

(a) FIGHTBACK: Fight back use GPS, SMS, location maps, GPRS, Email and your Facebook account to inform your loved ones in case you are in danger.

(b) GUARDLY: This application places phone calls to the predefined contacts along with the name, real-time location, type of emergencies and enables to identify different locations.

(c) ON WATCH: It allows the user to easily alert friends and emergency responders and police when needed with the GPS location.

(d) FAMILY LOCATOR: This application notifies about the near and dear ones about the trouble. It provides useful information about the criminals in the neighbourhood tracking the most visited locations and so on[4].

(e) SENTINEL: It is a smartphone application used to serve as a virtual security guard for women the users can press a button once they feel they are being stalked or harassed [4].

(f) STREET SAFE: This application has a feature called “WALK WITH ME” which gets the details of the situation and says online until they ensure the users get back home safe. In case the call is cut, the safety advisor connects the user to the local police for further help and guidance. In case of emergency situations, a feature called “SILENT ALARM” enable to get local help from the real-time location using the GPS and the physical description of the user.

The Internet of things (IOT) deals with the use of intelligently connecting devices and system to explore data gathered with sensors embedded machines actuators and other object in physical manner. IOT refers about the devices in network which sense, collection of data from around the world and then sharing the data over the internet where it can be utilized for various purposes and processed. The system propose is to provide safety and security for the women. As being in a developing nation and independent country, even today women’s are not safe, so there must be some constructive measure for the women’s security [8]. The proposed device is wearable one and easy to carry with more feature and functions, it also consist of audio recognizer which is more useful for physically challenged people[1], radio frequency identification as the name implies use of radio frequency to transfer data in wireless and non-contact style. The device is used when the individual wants to go to a remote place and when they are in need of protection. The main objective for this work is to create a wearable IOT device for the security and shielding of women, girl children and the details of the rape and violence happening in the society against women.

2. LITERATURE REVIEW

GPS and GSM based Self Defense [1] deal with most of the critical issues faced by women, the design is proposed. This mechanism provides viewing the location of the victim in terms of latitude and longitude which can further be tracked using Google maps. This system helps to decrease the crime rate against women. These crimes can be brought to an end with the help of real time implementation of our proposed system. The microcontroller used is PIC16877A. It is interfaced with a push button, a GPS module, a GSM modem and a speech circuit (ISD1820PY). Internet of things plays [2] a major role in the system explained below. The parameters monitored are body temperature, skin resistance with an interrelationship process. The hardware components used are skin resistance accelerometer and force sensors. The device is used when the individual wants to go to a remote place and when they are in need of protection. The main objective for this work is to create a wearable IOT device for the security and shielding of women, girl children and the details of the rape and violence happening in the society against women.
Women safety [3] is a very important issue due to rising crimes against women these days. These existing devices use to read the human temperature and heartbeat to generate alarm in case of emergency. Every human may have different body temperature and heartbeat pattern and thus keeping a fixed threshold for finding out emergency situation and then generating alarm is not correct way and this is where the existing devices are failing to correctly generate alarm in case of emergency. It deals to design a wearable women safety device that automatically reads and create patterns such as body temperature and pulse rate during running. If readings are higher than the normal readings then it will automatically call and message more than one person along with the location so that actions can be taken. The data is first collected by sensors in non-danger conditions to train the algorithm, after that data is used for testing the gauge accuracy. Thirdly, it deals to scenarios where there is no internet facility.

The implementation of wearable devices [4] is that women’s are facing more troubles physically in countries like India due to lack of safety. Government also provides some safety system but it is necessary for each women to protect themselves. In such case some additional equipment’s are needed to protect themselves. The safety device is a wearable jacket which consists of a control button, when the victim presses the button information sent to the parent and nearly police station as location by a GPS and GSM modem. The jacket can also produce a non-lethal electric shock in emergency situation to attack or get rid of the attacker. Women Security System [5] identifies the surveys about the security system for women which allow immediate response in case of any harassment. The security system uses RFID technology. An RFID is embedded with the watch and RFID reader is embedded in mobile phone, when the user is in danger or critical situation, button is pressed in the watch. The RFID tags send information as radio frequency and received in mobile. The Processor processes the information and sends alert “HELP” and location 4 or 5 pre-defined contacts through GPS.

Women Security System [6] is very much benefitable. A one touch system using GSM & GPS to make women feel safe and secure. The system consists of raspberry pi, GSM, GPS and force sensor. When a woman is in danger or critical surrounding, a button is to be pressed on the device, suddenly the GPS track the location and with help of GSM The system sends message to the pre-defined number and police control room. The system provides the complete security to women’s and kids. Smart Security Solution for Women based on Internet of things [7] is a device which automatically senses and rescues the victim. The hardware comprises of a wearable “Smart Band” which communicate with the smart phone via internet. An application is programmed with dates such as anger fear and anxiety, which is generated as a signal and transmitted to phone whenever an emergency signal is transmitted to the smart phone. The software generates a message (GPS) location to the pre-processed number or police station nearby. The Internet of Things [9] with the wearable devices is to analyze the factors that influence employees to use wearable devices at the workplace. The factors such as risk and trust are used to develop a conceptual model. Partial least square path and adaptive Neuro-Fuzzy inference modeling are used to validate and predicts these factors influencing employees to wear the device. Smart Solution for Women Safety [10] consists of flux sensor, vibration sensors, sensor for heart beat and tilt sensors are used for the purpose of safety. Location is detected using GPS and the same is send to the nearby police station and relatives which tend to monitor the health parameters of the woman.

3. PROPOSED METHODOLOGY

In the proposed methodology, women safety and security system is designed using the ARM processor. It has two inputs as two switches. By pressing the switch 1 it is enable to detect the victim location by using GPS and SMS is sent to the predefined mobile number by using GSM module. Another switch is recognized as panic switch, if the women get panic she can press the switch so that an alarming system is introduced. The security system is also featured with the temperature monitoring system, which would monitor the body temperature continuously and an SMS alert will be sent if it reaches below the
threshold of 20 degree Celsius. Another additional feature such as voice recognition module is used in critical situations if the particular person is unable to press the switch by own. For the above function to work a voice code is already recorded and voice is recognized and an SMS alert is sent to predefined mobile numbers and control room.

Fig. 1: Block diagram Transmission Part

The block diagram, circuit diagram [Fig 1, 2] explains about the transmission part of the wearable safety device. When Switch 1 is ON, the RF Transmitter transmits signal to the GPS and GSM Modem. When Switch 2 is ON the RF Transmitter transmits signal to alarm. The temperature sensor sense the temperature continuously, when it reaches below threshold, RF transmitter transmits signal to the GPS and GSM modem.

When voice recognizer [Fig 3, 4] recognize the code RF transmitter transmits the signal to the GPS and GSM modem. The transmitted signal from the Switch 1 is received in the receiver and the location is read and sent as alert message to police control room, When Signal from switch 2 is received the alarm rings for 10 seconds. Also when the temperature falls below the threshold, the location is sent as alert message to the control room GPS and GSM modem.
A. ADVANCED RISC MACHINE [ARM]

The Processor used is a low Cost ARM Processor. The LPC812 are an ARM Cortex-M0+ based, low-cost 32-bit MCU family operating at CPU frequencies of up to 30 MHz. The LPC81x support up to 16 KB of flash memory and 4 KB of SRAM. The peripheral complement of the LPC81x includes a CRC engine, one I2C-bus interface, up to three USARTs, up to two SPI interfaces, one multi-rate timer, self-wake-up timer, and state-configurable timer, one comparator, function-configurable I/O ports through a switch matrix, an input pattern match engine, and up to 18 general-purpose I/O pins. The system consists of ARM Cortex-M0+ processor, running at frequencies of up to 30 MHz with single-cycle multiplier and fast single-cycle I/O port. and ARM Cortex-M0+ built-in Nested Vectored Interrupt Controller (NVIC). The system tick timer, Serial Wire Debug (SWD) and JTAG boundary scan modes (BSDL) are supported. Micro Trace Buffer (MTB) are also supported. The ROM API support Boot loader, USART drivers, I2C drivers, Power profiles, Flash In-Application Programming (IAP) and In-System Programming (ISP).
B. Temperature Sensor [DHT11]

DHT11 temperature sensor features a temperature complex part with a calibrated digital signal output, it ensures high reliability and excellent long-term stability. This sensor includes a resistive-type temperature measurement component and an NTC temperature measurement component, and connects to a high performance 32-bit microcontroller, offering excellent quality, fast response, anti-interference ability and cost-effectiveness. It is used to monitor the temperature continuously. Four pins connected are mainly 1-vcc, 2- Data, 3- NC, 4-Gnd. It is used for the sensing the body temperature an alert is sent when it reaches below the particular threshold limit. One capacitor valued 100nF can be added between VDD and GND for power filtering.

C. GSM Module [SIM600]

SIM800 is a quad-band GSM module that works on frequencies GSM 850MHz, EGSM 900MHz, DCS 1800MHz and PCS 1900MHz. The above module is used to send messages from the GPS module. With a tiny configuration of 24*24*3mm, SIM800 can meet almost all the space requirements in users applications, such as M2M, smart phone, PDA and other mobile devices. SIM800 has 68 SMT pads, and provides all hardware interfaces between the module, One full function UART port, and can be configured to serial ports. SIM800 is used with power technique SIM800 integrates TCP/IP protocol and extended TCP/IP AT commands which are very useful for data transfer applications. 

Modem data:

Power Supply: 3.3v-4.4v
SIM Interface: SIM card [1.8v, 3.3v]
SIM application toolkit: GSM 11.49 release 99
Antenna Interface: Antenna pad
Command: SIM series: AT_command

D. Lumisense GPS Module [VP310]

The Global Positioning System (GPS) is a global navigation satellite system that provides location and time information in all weather conditions. The GPS operates independently of any telephonic or internet reception. The signal information is received by the GPS receiver in order to measure the user’s correct position. Many GPS data is received in the form of around 11 satellites, out of this GPRMC data is being taken for the messaging.

Modem Data:

Supply voltage: 12v DC
Interface: UART RS232
Optional T-TL Uart also available
Precision: 5 meters, Automatic antenna switching function
E. Voice Recognizer [V3.1]
Voice recognizer module is used to send the input by voice and output is detected as message. The voice is already prerecorded in the module by using the voice code. The device works at an input voltage range of 4.5 - 5 volts and will draw a current less than 40 MA. This module can work with 99% recognition accuracy if it is used under ideal conditions. The choice of microphone and the noise in the environment plays a vital role in affecting the performance of the module. Because of noise it is a microphone with good sensitivity and reduces the noise at the background. The prerecorded voice code such as “SAVE ME “HELP ME” is recorded and SMS alert is being sent.

F. RF TRANSCONVIER [TRANSMITTER & RECEIVER]
The radio frequency (RF) transmission system employs Amplitude Shift Keying (ASK) with transmitter/receiver (Tx/Rx) pair operating at 433 MHZ. The transmitter module takes serial input and transmits these signals through RF. The transmitted signals are received by the receiver module placed away from the source of transmission. The RF transmitter and receiver may be used for the approximate of 100 meters. RF module uses radio frequency to send signals. These signals are transmitted at a particular frequency and a baud rate. A receiver can receive these signals only if it is configured for that frequency.

Specifications
Receiver Operating Voltage: 3V to 12V
Receiver Operating current: 5.5mA

G. Switch [Push Button]
The push button is a simple type of switch that controls a action in that process. Normally Open (NO) Push Button is used its default state, makes no electrical contact with the circuit. When the button is pressed down, the switch makes electrical contact and the circuit is now closed. In this Project switch1 is used to detect the location and another switch2 is used to alert by alarm.

H. BUZZER [3.3V]
Buzzer is an audio signaling device. The buzzer has two pins Pin1-Identified by (+) symbol or longer terminal lead. Can be powered by 6V DC Pin2 -Identified by short terminal lead. Typically connected to the ground of the circuit

4. SOFTWARE USED
   A. EMBEDDED C
Embedded C is the most popular embedded software language in the world. Embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations. Additionally, using C increases portability, since C code can be compiled for different types of processors. One of the more popular ones is the Keil compiler. Because of this, Embedded C is also sometimes known as KEIL. It is small and reasonably simpler to learn, understand, program and debug. C Compilers are available for almost all embedded devices in use today, and there is a large pool of experienced C programmers. Unlike assembly, C has advantage of processor-independence and is not specific to any particular
microprocessor/ microcontroller or any system. This makes it convenient for a user to develop programs that can run on most of the systems.

**STEPS TO CREATE FILE**

New µvision project

Open a new tab in the keil software.

- **Folder creation**
  Create a separate folder for the new project and save the project.

- **Device selection**
  Click the device option and search for LPC812 Micro controller.

- **Core**
  Select the option and tick.

- **Start up**
  Select the device start up option.

- **Clock setup**
  MSEL -> 0x04
  PSEL -> P=2

Clock frequency required is 30 MHZ. Clock divider is used to reduce the frequency from 60MHZ to 30MHZ.

- **Language Selection**
  C file is selected and file name is added to the project file.

Program is written and stored in this C file, to get the output, HEX. File to be created. After creating the hex.File, the program will be executed.
Fig. 5: Flow Diagram KIT 1

The operation or flow of execution is shown in figure 5. When Switch 1 is pressed, device is ON and RF signal is sent from the transmitter to receiver in the KIT 2. The program stops when the switch 1 is pressed again. The voice is detected in the voice recognizer and signal is sent to the KIT 2. Again when the Switch 2 is pressed the RF signal is sent to the KIT 2 to initiate the alarm circuit. Meanwhile temperature is continuously monitored and compared with threshold. When temperature lowers below the threshold signal is sent to the KIT 2, if the temperature is low there will be no action.

Fig. 6: Flow Diagram KIT 2

The flow diagram for KIT2 is shown in figure 6. The Transmitted signal is received in the KIT 2. For switch 1, GPS reads the location and send this information as an alert message using GSM. For voice, the voice is recognized and the location is sent to the predefined number as message using GSM Modem. Additionally alarm system is on if the receiver receives signal from the transmitter.
5. RESULTS AND DISCUSSION

1. Short message Service [SMS] sent to the predefined Contact and predefined mobile Number

Fig. 7: Switch 1 Output

An SMS alert is sent to the predefined contact the input is by pressing the switch. The output is sent to the predefined contacts. The output is shown as “EMERGENCY SITUATION HELP ME and it is normally decoded as in the form of Latitude and Longitude parameters. [1333326.000, A, 1257.7700N, 080003.5286, E, 283.54, 130319, A*6A] and the detected location is identified by using GOOGLE MAPS. A buzzer output Alarming signal is used as a panic Switch A temperature sensor for sensing the body temperature and a limit if it mainly reaches below the threshold[20°C]. A Voice recognizer output signal is used to send the message with I’M Kidnapped Emergency Pls help me an output signal is shown in the predefined contact Number/Relatives

Voice Recognizer is used to send the input by Voice as “HELP ME” and output is mainly sent to the predefined contact number and relatives. The output is sent to the relatives by “I’M KIDNAPPED EMERGENCY PL S HELP ME” as location is normally sent in the form of latitude and Longitude and the detected location is normally identified by using GOOGLE MAPS. [1333326.000, A, 1257.7700N, 080003.5286, E, 283.54, 130319, A*6A]

Fig. 8: Voice Recognizer Output

6. CONCLUSION AND FUTURE WORKS

The objective of devising the women safety and security system is proposed and designed in this paper. This small and light weight device can be easily carried by woman and young ones while travelling on road, work place and wherever they want. By using this alert device with self-defense mechanism of
women will certainly reduce the harassment rate. The proposed mechanism locates the current location of victim in terms of Latitude and Longitude and can be tracked by Google map effectively. These crimes should be brought to an end with the help of our proposed system. As a future work, using face detection by biometrics, the attacker face could be detected and transmitted for further action. Also, the size of the device could be as small as Nano-portable device with better features. Finally, an auto call facility could also be incorporated, which makes the device as the best one in the domestic market.

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