

Design and Development of “Suraksha”-A Women Safety Device

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1. Abstract

India which sees itself as a promising super power and an economic hub, is still trapped in the clutches of various patriarchal evils like molestations, dowry, crime against women, worst among all is Rape. The atrocities against the women can be now brought to an end with the help of a device called suraksha. This paper explains the basic idea underlying suraksha which is to flash a warning giving an instant location of the distressed victim to the police so that the incident could be prevented and the culprit apprehended. This would help reduce crime against women. This paper also summarises other significant works in this field and hence forth discussed suraksha device in a greater detail.

2. Introduction

The device, named as “**Suraksha**” is a security system specially designed for women in distress. It is a simple and easy to carry device with magnanimous functionality. The basic approach is to intimidate instant location and a distress message to the cops and registered number, so that unfortunate incidents would be averted and to provide real time evidence for swift action against the perpetrators of crime against women. Currently the work is under process to miniaturize it so that it could be embedded in jewellerys, mobile phones etc in order to make it a versatile instrument for masses. It can play a major role in the upcoming projects such as **CCTNS (crime and criminal tracking network and system)** in which all the police records all over India are digitised and all the police station throughout the country will be integrated.

3. Related work

1. **Amrita Personal Safety System (APSS)**, a new technology to protect women from potential rapists and sexual offenders. APSS is an inconspicuous, wearable and easy-

to-operate electronic device that will help women in establishing communication with family and police at the first sign of trouble. The device will remain invisible to the criminals and yet can easily be triggered by the user with multiple options, to ensure steady and secure communication.

2. “**VithU**” is an **emergency App** that, at the click of the power button of your Smartphone 2 times consecutively begins sending out alert messages every 2 minutes to your contacts that you feed into the app as the designated receivers or guardians.
3. **Jivi 2010** is a feature of Jivi mobile with a fully dedicated SOS button aimed at women. In case of any emergency or unfortunate times, user needs to long-press the SOS button and the phone starts calling 5 pre-stored numbers one after the other. In case any of the numbers is busy or does not take the call, a SMS is sent to the number. After this, the phone automatically dials other numbers on the pre-defined list – thereby ensuring immediate help.

4. Design concept

The device can be actuated by three ways namely, **voice, switch and shock**. The device when not in use will be locked so that unnecessary signals are not sent. For unlocking it, a simple voice command is sufficient. When the device is thrown with force, using force sensor, it will start functioning i.e. it will send location to the police and distress message to the registered mobile number through a GSM module, and same will be achieved by a voice command in case the device is not in the vicinity of the user. A mere press of a switch will also send location as well as distress message, via the transmitter module to the police control room and to the other registered mobile numbers, via GSM module.

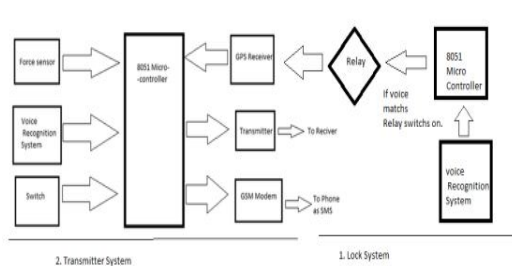


Figure 1. It shows the conceptual design (transmitter) of suraksha

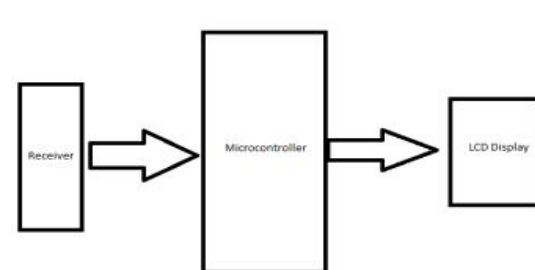


Figure 2. It shows the conceptual design (Receiver) of suraksha

5. Circuit and construction

Overview: In this we are using a 40 pin ATMEL’s AT89s52 Microcontroller which is used to interpret information from the sensor, switch and voice recognition system and accordingly send the GPS location to police control room and to one of the phone number(of a family member) stored, via transmitter and GSM Modem respectively.

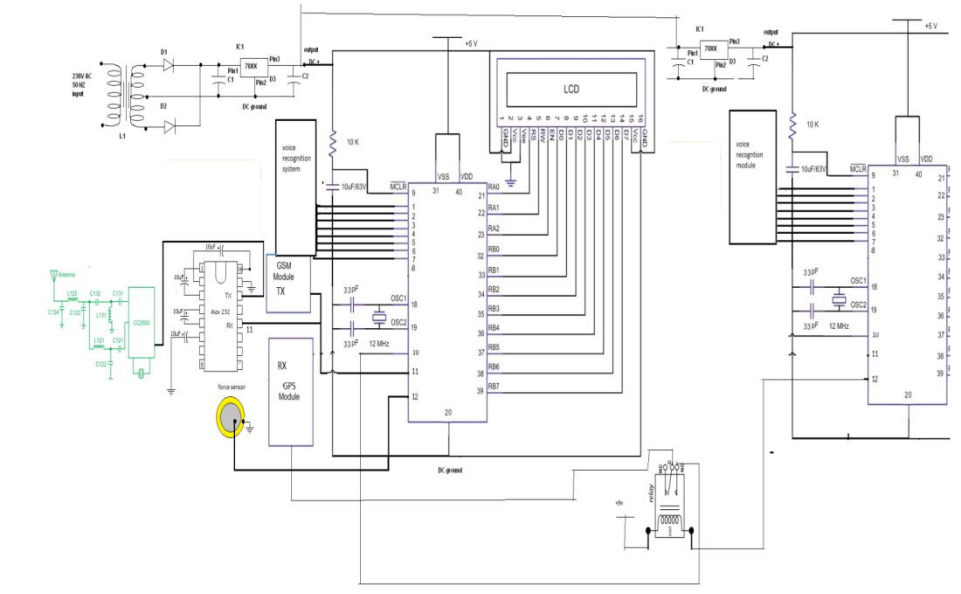


Figure 3. Shows the circuit diagram of transmitter section of suraksha device

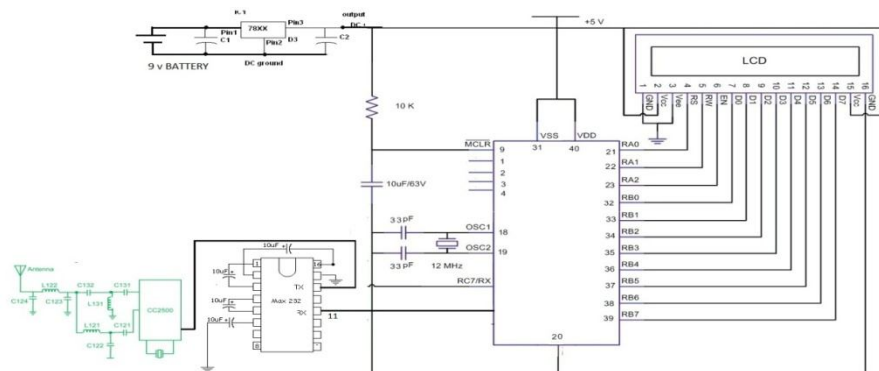


FIGURE 4. Shows circuit diagram of receiver of suraksha

Microcontroller: AT89S52 is a high-performance, low-power CMOS 8-bit microcontroller with 8K bytes of in- system programmable Flash memory. The device is built using Atmel’s high-density and non-volatile memory technology, and is compatible with the industry-standard 80C51 instruction set and pinout. The on chip Flash allows the program memory to be reprogrammed by a conventional non-volatile memory programmer.

PIN CONNECTIONS of various Modules with the Microcontroller are as follow:

- Pin 1 to 7 of Microcontroller is connected to Voice/Speech Recognition System.
- Pin 12 is connected to Force Sensor.

- Pin 13 is connected to Switch Sensor.
- Pin 10 is connected to the GPS Receiver.
- Pin 11 is connected to GSM Modem and Transmitter to send GPS Location.
- Pin 21,22,23,32 to 39 are connected to LCD Display (Section(C)).
- Pin 40 is V_{dd} and pin 31 is V_{ss} which are connected to Power supply.

Force sensor: This is a small force sensitive resistor. It has a 4 mm diameter active sensing area. This FSR will vary its resistance depending on how much pressure is being applied to the sensing area. The greater the force, the lower is the resistance. When no pressure is being applied, the resistance of force sensor will be larger than $1M\Omega$ with full pressure applied the resistance will be $2.5k\Omega$.

Transmitter-Receiver: This High Speed CC2500 Based Wireless module is a plug and play replacement for the wired Serial Port (UART) supporting baud rates up to 38400. It works on 2.4 GHz Carrier Frequency. It contains 255 possible Channels frequencies. It has 30+ meters range Line of Sight / 10 meters range indoors.

Voice/Speech Recognition System: It is HM2007 IC based device. The speech recognition system is a completely assembled and easy to use programmable speech recognition circuit. Programmable, in the sense that you train the words (or vocal utterances) you want the circuit to recognize.

Training Words for Recognition: Press “1” (display will show “01” and the LED will turn off) on the keypad, then press the TRAIN key (the LED will turn on) to place circuit in training mode, for word one. Speak the target word into the onboard microphone (near LED) clearly and loudly. The circuit signals acceptance of the voice input by blinking the LED off then on. The utterance is now identified as the “01” word. If the LED did not flash, start again by pressing “1” and then “TRAIN” key.

Changing & Erasing Words: Trained words can easily be changed by overwriting the original word. For instances suppose the word was “Capital” and you want to change the word to “State”, simply retrain the word space by pressing “6” then the TRAIN key and saying the word “State” into the microphone.

GSM Module: This GSM Modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. The plus point of using this modem will be that you can use its RS232 port to communicate and develop embedded applications. It can be used to send and receive SMS or make/receive voice calls. It can also be used in GPRS mode to connect to the internet and use all the applications for data logging. In GPRS mode you can also connect to a remote FTP server and upload files for data analysis. Supports features like Voice, SMS, Data / Fax, GPRS and integrated TCP/IP stack.

Lock System: Lock/unlock system in suraksha works on voice recognition system i.e. when the user needs to unlock the system so as to make use of device just a voice

command is enough. As the voice command is given, it is then matched in 8051 microcontroller which if matched, switches the relay so that GPS module is ready to get the location and sends it to the transmitter side, otherwise nothing can be done. In lock system pin 1 to 8 are connected to 8051 microcontroller which is connected to GPS Module via Relay switch.

6. Testing



Figure 2. Shows the latitude of the location of crime.

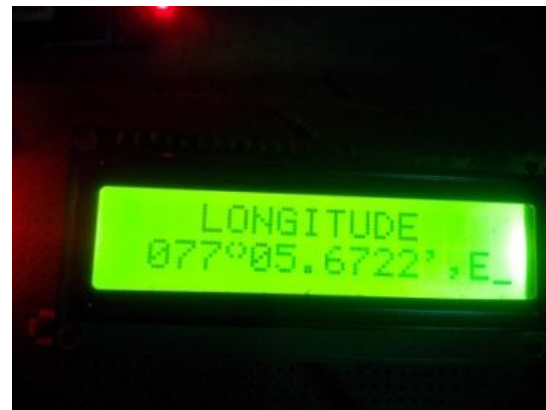


Figure 3. Shows the longitude or the location of crime.

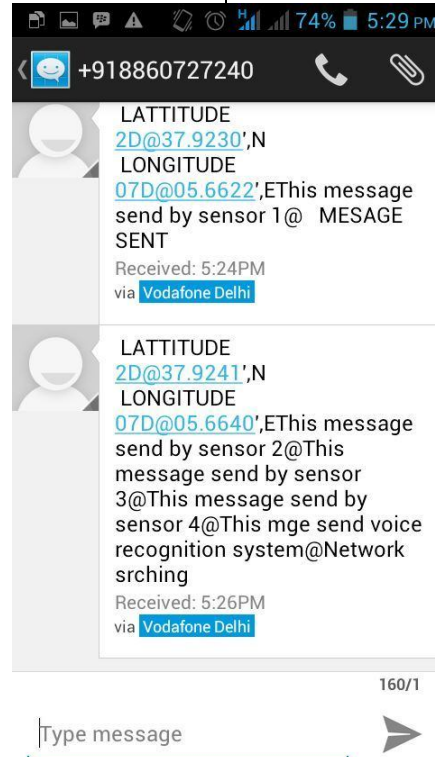


Figure. 4 Shows the message containing location of the coordinates which is received from suraksha.

7. References

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