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The Personal Stun- A Smart Device For Women's Safety.

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Abstract: Women security is need of the hour now-a-days. In India, there are many cases of women harassment and molestation. Safety of women matters let be whether at home, outdoor or it be their work place. The literature surveyed shows that there are many mobile applications that are used for women safety purpose. One recent research study shows that there is a footwear chip which is sticked to the footwear that gets activated when the person taps one leg behind the other 4 times. We have developed a prototype that is a smart band which gets activated by tapping on the screen twice. Once the device is activated it starts sending the GPS location to the ICE contacts and police control rooms. A Piezo buzzer siren will get activated after 1-2 mins of the actual device getting turned on. The range of the buzzer is of 80-110 dB which can be heard from a distance of 50 feet long. An electric shock circuit is designed that emits electric current. On the top of the band screen there are two metal points that generates the shock when the two metal points come in contact with any surface or any body. The device supports a micro usb charging. A smart application has been developed on the android platform which is connected with the device via bluetooth interface that shows the sensed data of the subject to the ICE contacts. Until the device is turned off it will send the location on the interval of 5 mins and will keep on beeping continuously.
Keywords: GPS location, Piezo Buzzer Siren, Electric shock circuit, GSM module, Force sensor, Pulse rate sensor, Temperature sensor.

I. INTRODUCTION

The Internet of things [1] (IoT) is the network of physical devices, vehicles, and other items embedded with electronics, software, sensors, actuators, and network connectivity which enable these objects to collect and exchange data. Each thing is uniquely identifiable through its embedded computing system but is able to interoperate within the existing Internet infrastructure. Experts estimate that the IoT will consist of about 30 billion objects by 2020. As of 2016, the vision of the Internet of things has evolved due to a convergence of multiple technologies, including ubiquitous wireless communication, real-time analytics, machine learning, commodity sensors, and embedded systems. This means that the traditional fields of embedded systems, wireless sensor networks, control systems, automation (including home and building automation), and others all contribute to enabling the Internet of things.
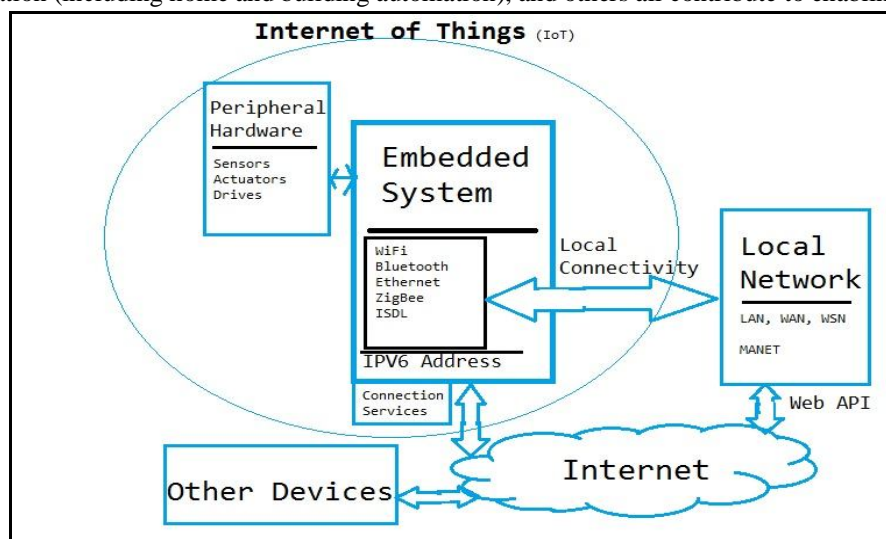

Fig. 1. IoT Architecture.

IoT is related with our research. We have made use of this new technology in our research in such a way that it helps the women or a girl while she is in trouble. It deals with hardware as well as the software. The prototype is a combination of both which makes it special.

II. EXISTING DEVICES

There are few already created devices and products in market that are related to our research. Following are the few examples of the existing systems/devices [10] [11] :-

1) ROAR (Athena)
2) Foot wear chip

Some of the applications are also there they are [11] :-

3) Raksha- women safety alert
4) VithU:V Gumrah Initiative
5) Shake2Safety

III. DRAWBACKS OF EXISTING DEVICES

There existed a chip that was sticked to the footwear and was used to send the alerts [2]. The other research showed up with the smart band that was used to generate the SOS signals along with the personal health information and based on that the alert was generated [3]. All the devices were used to sense the health parameters and positions of the body and accordingly, the alerts and SOS signals were sent to the contacts feeded [4].

IV. ACTUAL SYSTEM

We have developed a prototype that is a smart device that can be worn by any individual on their wrists. The band is always active, the victim needs to tap on the screen twice when she feels the need of it or she feels someone is abusing her. After tapping on the screen, the device will start sending the current latitudinal and longitudinal co-ordinates to the ICE contacts and the police control room. The device consists of a piezo buzzer that emits beep sound after 1 minute of actual activation of the device. The range of the buzzer covers up to 50 meters of radius. The buzzer will start ringing after the actual activation of the device and the location at that particular time will be sent. On the top of the band there are two nodes which will emit electric current as soon as it comes in contact with any surface after the device is activated. The current is generated with the help of leakage current. The device and the smart phone are connected using Bluetooth, which is responsible for the overall data sharing

and connectivity. The heart of the device is Arduino which controls the entire device prototype. A LCD screen is used as the UI for the device. A capatative touch is used for carrying out the touch functionality of the screen. It is attached on the LCD screen. An android application is used for supporting the project to achieve its functionality. The application connects the hardware to the software via Bluetooth and the application is used to send the panic message/alert message to the pre-stored contacts in it.

1) *Arduino:* Arduino is a tool for making computers that *can sense and control more of the physical world thanyour desktop computer. It's an open-source physical computing platform based on a simple micro-controller board, and a development environment for writing software for the board. In our project we are going to use Arduino Uno. The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the micro-controller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.*
2) *Relay:* A relay is an electrical switch that uses an electromagnet to move the switch from the off to on position instead of a person moving the switch. It takes a relatively small amount of power to turn on a relay but the relay can control something that draws much more power. Relays are used in our project for generating shock for the device.
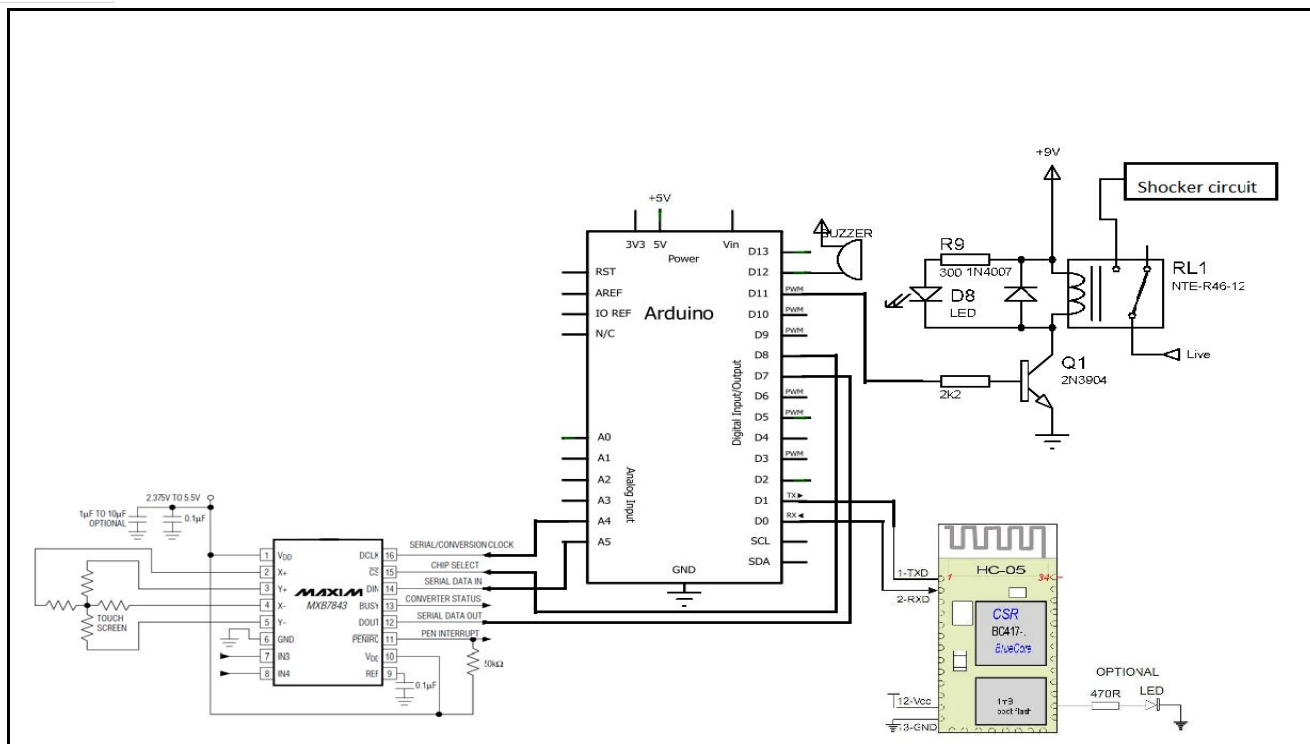
Fig. 2. Pin Diagram.

3) *Bluetooth Module:* Bluetooth is a specification for a small form-factor, low-cost radio solution providing links between mobile computers, mobile phones and other portable handheld devices, and connectivity to the Internet. It will enable users to connect a wide range of computing and telecommunications devices easily and simply, without the need to buy, carry, or connect cables. We are using Bluetooth Module for connecting our device with mobile.

4) *Buzzer:* The buzzer produces sound based on reverse of the piezoelectric effect. The generation of pressure variation or strain by the application of electric potential across a piezoelectric material is the underlying principle. These buzzers can be used alert a user of an event corresponding to a switching action, counter signal or sensor input. They are also used in alarm circuits. The purpose of using buzzer is for alerting the suspect sand gathering people for help.
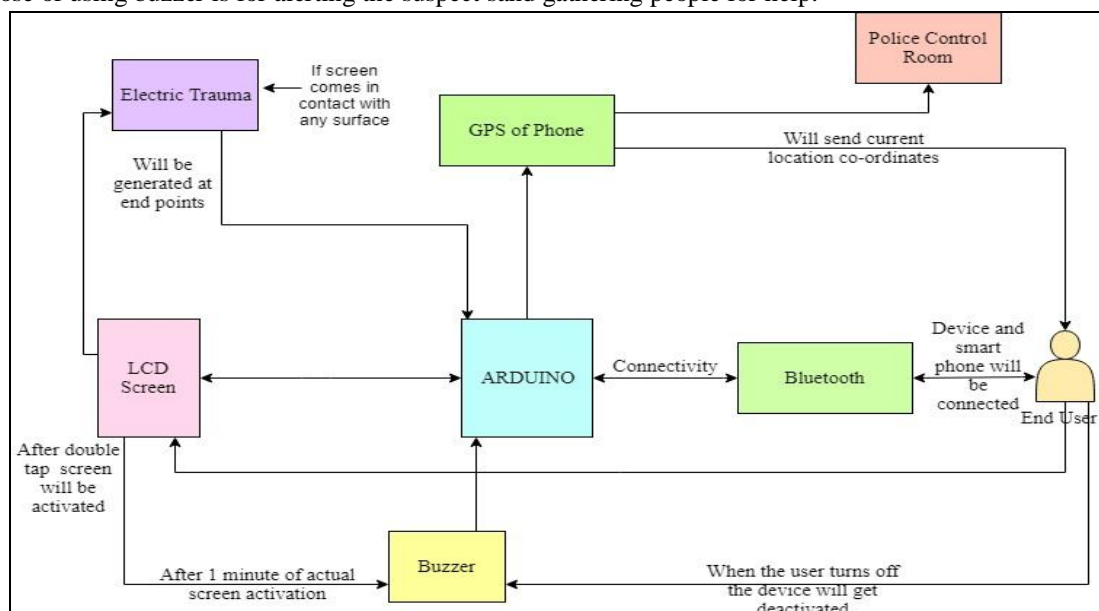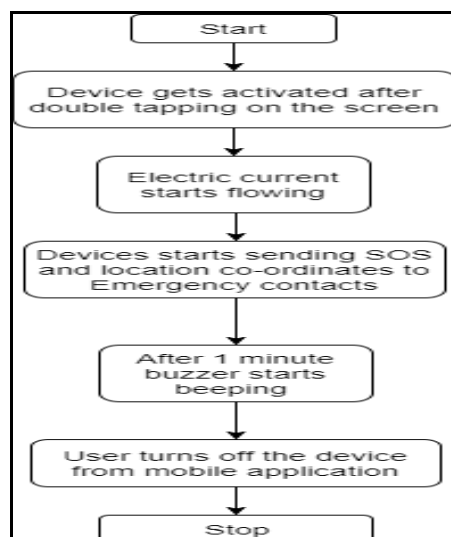

Fig. 3. System Architecture.

A. System Flow

Fig. 4. System Flow.

Following is the working of the system:

A. Mobile application need to connect with hardware circuit via bluetooth module.
B. In emergency situation women can double tap on captivative touch attached to the screen. This will activate the shocker circuit through the relay.
C. Buzzer is used as alarm to generate beep sound in both the conditions.
D. The bluetooth module is used to send signal to mobile when in danger situation.
E. Mobile will send SMS to predefined number with location using android application (these numbers will be stored in mobile application).
F. GPS is used to track live location and hence GPS of the phone needs to be kept ON.

V. RESULTS AND DISCUSSIONS

The device 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.
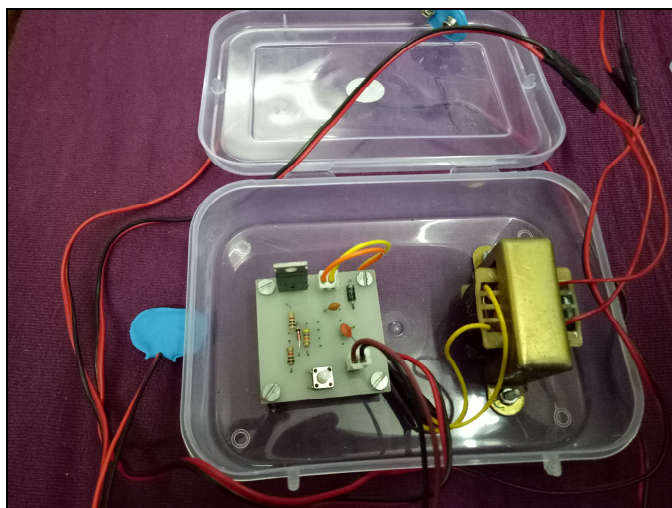

Fig. 5. Top view of Shocker Circuit, Relay and Transformer.

The security system for women which allows immediate response in case of any harassment and mainly focuses on two different parts, one is developed mobile applications for women safety and protection and secondly, the proposed work. The users can press a button that is located on device. The bluetooth device is embedded with it and sends data to the mobile phone. Mobile phone processor will perform the task and sends the messages to predefined contacts in which one is for police women cell where they can get the information about location of the victim through GPS and message alert HELP.
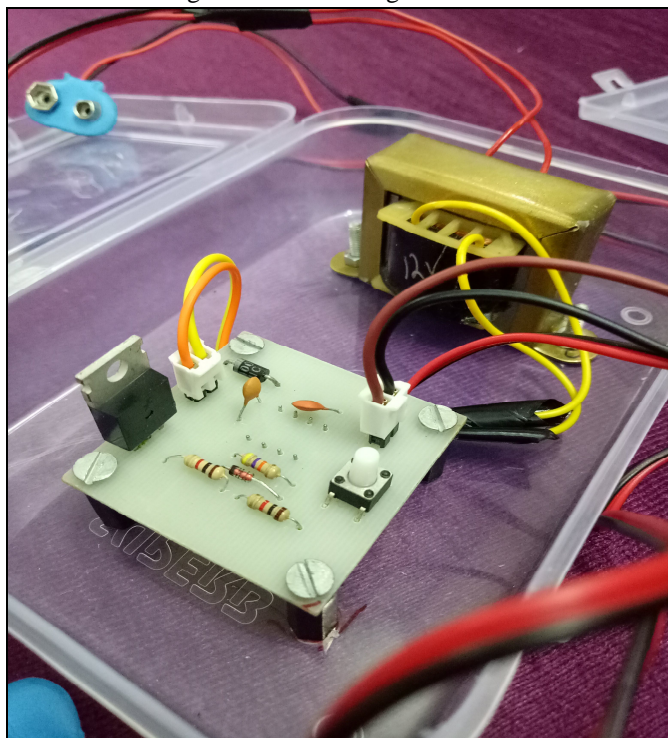

Fig. 6. Side view of Shocker Circuit, Relay and Transformer.

Fig. 7. Top view of Screen and Buzzer.

A. *Advantages*
1) Gives more confidence to women about their safety.
2) Women physical empowerment will be partially fulfilled.
3) Sexual harassment can be highly reduced.
4) Portable and efficient.
5) Gives Live location of person.

Fig. 8. Working Screen.

Fig. 9. Welcome Screen.

B. Applications

1) Can be used anywhere, where women safety is required.

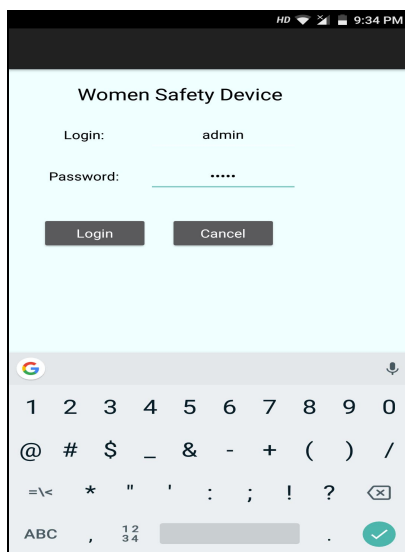*2)* Can be attached with vehicles.
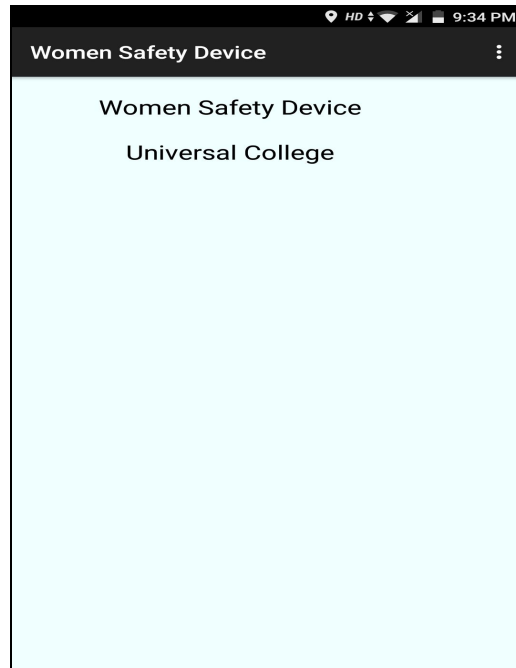

Fig. 10. Application's Login Page.
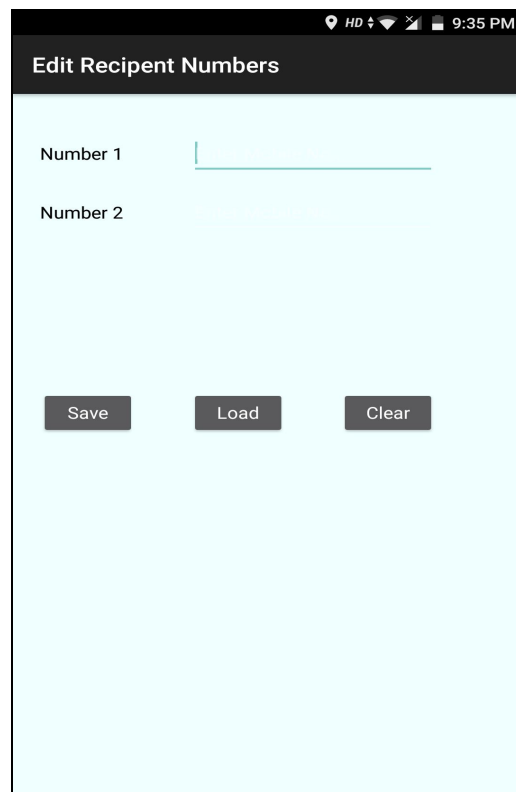
Fig. 11. After Login Page.

Fig. 12. Numbers Saving Page.

C. Limitations

The device is not concerned whether there is an internet connectivity or a cellular network in the smartphone. The messages and alerts are sent to people through smartphone so it is mandatory to have a connection with the smartphone via Bluetooth. It is mandatory to charge the device and smart phone for communication and wise usage of them.

VI. FUTURE SCOPE AND APPLICATION

In future, we can add shooting of video at the time of the emergency that helps in reaching the criminal very easily. It also provides an evidence against the criminal. We can also save the photos and videos on the drive so that it will be easy for further any used.

Prototype can be further calibrated into a complete market product which will be made with chips and utility hardware so that it can be attached to the public transport vehicles that will help every person to know about the location of their near

and dear ones. We can also capture and send photos to the registered number in the applications along with the location.

VII. CONCLUSION

Supportive device with smart system has been used to converse if attacked. There are highest chances to reduced crime by this system. Shock preventive tools are used for anticipation of event, alarm bell used for notifying will be supportive methods to alert the hostility. Message through GPS and GSM technology is the additional part to help the individual. For immediate action against the criminal, video processing information can be used. Fear or anger of user has to be considered by using Camera application in future which will generate the message to the control room and an alarm will be activated. The system can perform the real time monitoring of desired area and detect the violence with a good accuracy.

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