Project Report 1
Safety Device

Group 37

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Introduction and Motivation

In a world of boundless crime and with the advent of independent lifestyles, security is a growing concern, especially for children and women. But with all the technology available to us in recent times now, it's also not hard to build a safety device that can help raise an alarm and gather help. To help resolve this issue we aim to design a GPS based protection system that has dual security features. This system can be turned on by the person in case they even think they would be in trouble. It is useful because in a plain button press alerting system, in case the person is hit on the head from behind or is taken by surprise, they may never get the chance to press the panic button. Our system solves this problem. This feature can be turned on in advance and only the person authenticated to the devices can start the system by fingerprint scan. Once started the device requires the person to constantly press their finger on the system or, else the system will send her location to the authorized personnel number through SMS message as a security measure and also rings a buzzer continuously so that nearby people may realize the situation. The device uses a GPS sensor along with a GSM modem, LCD display, LEDs and Microcontroller based circuit to achieve this system.

Market Survey or Literature Survey of current products

As the concern of safety is not a new one, there have been an array of attempts to create application systems that provide an additional security layer to the user. In the past, many researchers have done a lot of work for citizen safety using different technologies. In one paper[1], the authors designed a smart ring device for women's safety using Raspberry Pi and a Raspberry Camera Module. The focus here is on helping the victim by sending the victim's real-time location and attacker's information to the police or to specific individuals. This device is manually controlled. If the victim is in trouble, the smartphone app can perform the above stated tasks by the emergency switch of the device in her hand. Although this device is working with the safety of women, due to the access being stationary, it will be difficult to get the assistance, if the victim is away from the access number.

The authors of this other paper[2] designed a smart shoe project emphasizing on two things. One is self-defense, and the other is to send the location of the victim to the precise access numbers. Raspberry Pi, Arduino Uno, GPS, GSM, etc. are used in this project. Raspberry Pi has been used for real-time photo and video streaming. In addition, GPS, GSM, and Electric taser are attached to Arduino Uno, providing real-time location and self defense of victims. This device also sends information about the Victim's location to the fixation number, just like the previous device. Moreover, even though the

[1] N. R. Sogi, P. Chatterjee, U. Nethra and V. Suma, "SMARISA: A Raspberry Pi Based Smart Ring for Women Safety Using IoT,"2018 International Conference on Inventive Research in Computing Applications (ICIRCA), Coimbatore, 2018, pp. 451-454. https://www.semanticscholar.org/paper/SMARISA%3A-A-Raspberry-Pi-Based-Smart-Ring-for-Women-Sogi-Chatterjee/74f2c77ee69a945cd55d0c65e8429b6a536262ce.

[2] V. Sharma, Y. Tomar and D. Vydeki, "Smart Shoe for Women Safety,"2019 IEEE 10th International Conference on Awareness Science and Technology (iCAST), Morioka, Japan, 2019, pp. 1-4. https://ieeexplore.ieee.org/iel7/8913318/8923121/08923204.pdf.

self-defense provided here is beneficial, it is likely that the life of the victim will still be threatened if the number of attackers is more than one.

"Reach360" is another android application designed for women safety[3]. A victim can send her location and wary note to the police station, family member, compatriots, and admin by this app. Then the admin will forward the victim's notification to the users within the 100 meters of the victim. One App user can track another user by the unique code generated by the App. This system can help to secure women's movement but its benefit is limited considering two things. Firstly, this system would be more beneficial, if it was fully automated and it did not depend on the admin for finding users within the 100 meters of the victim. Also, if the victim is away from the police station, family members and the app users, then her safety would be compromised. This problem can be avoided by developing a system which manages some fixed volunteers for every area.

Here's a table that summarizes and compares the features of the products that we explored:

	SMARISA	**Smart Shoe for Women Safety**	**Reach360**
Micro-controller	Raspberry-pi	Raspberry Pi , Arduino	Mobile-Device
Wearable Device	Yes	Yes	No
Inbuilt camera	Yes	Yes	No
Contains GPS module	Yes	Yes	Yes
Alert to emergency contact	Yes	No	Yes

[3] S. Pandey, N. Jain, A. Bhardwaj, G. Kaur and V. Kumar, "Reach360: A comprehensive safety solution," 2017 Tenth International Conference on Contemporary Computing (IC3), Noida, 2017, pp. 1-3. https://ieeexplore.ieee.org/document/8284348.

Inbuild defence mechanism	No	Yes	No
Device holder	Ring	Shoe	Phone
Alarm	Yes	No	No
Weakness	Access is stationary, which will cause issues if the victim is away from the access number.	Self-defense provided will not be efficient if the number of attackers is more than one.	If the victim is away from the police station, family members and the app users, then her safety would be compromised.
Strength	Sends the attacker's information alongside the user's location and to the police and contacts.	Comes equipped with an electric taser that helps in self-defense.	Can get more immediate help if there are other users in the same area.

Block Diagram and Explanation

This project is designed with ARDUINO. It presents a safety detection system using GPS and GSM modems. Here we will be using a rectifier and regulator power supply which helps in converting AC to DC power supply. This detection and messaging system is composed of a GPS receiver, Arduino and a GSM Modem. GPS Receiver gets the location information from satellites in the form of latitude and longitude. If a finger is not detected on the fingerprint scanner in some time interval then the Ardunio will collect information regarding the GPS coordinates of the person. The ARDUINO UNO processes this information and this processed information is sent to the user using GSM modem and the information is displayed on LCD display. A GSM modem is interfaced to the MCU. The GSM modem sends an SMS to the predefined mobile number. When a woman is in

danger and in need of self defense then she can press the switch which is allotted to her. By pressing the switch, the entire system will be activated then immediately a sms will be sent to concern the person with location using GSM and GPS.