

A Smart Protection Device

Savan Gondaliya¹, Rahil Khalak¹, Priyanka Mistry¹, Adolf Sibanda¹, Keyaben S. Patel²

¹Department of Computer Science and Engineering, Parul Institute of Technology, Limda, Vadodara, Gujarat, India

²Assistant Professor, Department of Computer Science and Engineering, Parul Institute of Technology, Limda, Vadodara, Gujarat, India

ABSTRACT

Article Info

Volume 7, Issue 2

Page Number: 207-214

Publication Issue :

March-April-2021

Article History

Accepted : 05 April 2021

Published : 11 April 2021

Human security is need of the hour in present times. Across the globe, there are many cases of unknown attacks, harassment and molestation. Safety of an individual matters whether it is at home, outdoor or their work place. We propose an idea which changes the way everyone thinks about once individual's safety, a day when media broadcasts more of achievements rather than harassment. Since we (humans) can't respond rapidly in critical situations, the need for a device which effectively rescues the victim is the venture of our idea in this project. We are proposing Arduino Nano and Alarm Grenade (sonic weapon) based portable device which can be effective in both in network and network outage scenarios. This device can be classified in 3 parts based on functionality.

1. Location Tracking on Device.
2. Alarm Grenade.
3. Application Interface.

Device will be activated with push of a button and track location with onboard GPS while being synchronized with a smartphone via Bluetooth with help of smartphone application. Alarm Grenade will trigger at the moment of pressing button and doesn't require any communication means to work. SOS message will be broadcasted to nearby police station and Emergency Contacts.

Keywords :- Portable, Arduino Nano, Alarm grenade, GPS, Bluetooth, Safety.

I. INTRODUCTION

In our digitally advanced world we live in today, we have benefitted a lot from various advanced technologies around us. World is more and more connected than ever before in human history. Devices invented using computing technologies are

becoming smaller in size and smarter in working. These devices have made our lives more productive and accessible. Despite having tremendous amounts of technologies, the concern of safety of an individual out in world still isn't addressed effectively. There is no complete solution for ensuring safety of a person. Attacker can attack anytime and anywhere in any

circumstances. A person is continuously at risk especially in scenarios where he/she is alone. Various solutions have emerged in response to this concerns in forms of devices that can be carried by person. The existing devices include technologies like live tracking, Emergency button and Pepper spray etc. But the Major concerns about these devices are that they are unreliable in times of emergency. These devices suffer from very common issue in form of network outage as major attacks happen in remote areas. The device we are proposing here addresses this main issue of network unreliability in very unique way. This device will equip technologies like real GPS location tracking, Bluetooth (Smartphone Communication) and Alarm Grenade. Alarm Grenade is one type of Sonic weapon which produce very high pitch annoying sound which is not lethal and doesn't depend on Network availability. Our major device drawback could be the battery life as most of the time device will be in stand by state. The device's internal battery can only provide power for about 2 weeks in standby. If user forgets to recharge battery then it can lead to device failing to work in.

1.1 Problem definition

In most scenarios the attacker chooses to attack in a place where there is no one around. An attack can happen in matter of seconds and it gives very little window of time for a person being attacked to respond. Only sending emergency alert to authorities and contacts right at the time attack doesn't prevent attacker to stop from attacking. He may continue even if the emergency message is sent. Also, if the person being attacked is in an area which has very poor network coverage then it is total failure for device in this scenario. We have tried to address these concerns by making hybrid use case device using Alarm Grenade and Arduino nano, which is network fail proof and at the same time can also scare the attacker.

1.2 Objectives

1.2.1 To resolve the issue of network outage and ensuring the device's effectiveness in critical scenarios.

1.2.2 Preventing attacker from attacking at the time of attack being done.

1.2.3 Geofencing the child's activity premises using GPS to prevent child kidnapping and trafficking.

1.3 Scope

Our device has potential of preventing attack from happening in Realtime as attacker is annoyed by the sound of Alarm Grenade.

1.3.2 Device will improve overtime with help of analyzing user pattern and over the air updates.

1.3.3 Device is relatively simple in working and can be widely implemented across the world.

II. Literature Survey

Paper 1: Smart Intelligent System for Women and Child Security

Authors: Sunil K Punjabi, Suvarna

Chaure, Ujwala Ravale and Deepti Reddy have researched on a portable device which will have a pressure switch. Techniques used:

As soon as an attacker is about to even when they sense any insecurity from a stranger, they can then put pressure on the device by squeezing or compressing it. The main feature of our system is less response time will be required for helping the victim.

Step1: Pressure Switch is activated by crossing the threshold value, which actuates the microcontroller.

Step2: Microcontroller then records the location using the GPS module and along with some other required parameters provides it to the GSM module.

Step3: GSM module sends the messages to the phone numbers stored in the SIM with the location following a call to those contact numbers for some time slots.

Step4: If the call is not answered by them, it will be redirected to the police.

Step 5: A geofence is created in the beginning by specifying the coordinates of the location. If the person crosses the geofencing, the device will send a notification to the cell phone number at particular intervals.

Paper 2: Smart Foot Device for Women Safety

Authors: Nandita Viswanath, Naga Vaishnavi Pakyala, G. Muneeswari have researched to develop a device that assist women when they feel vulnerable.

Techniques used

This device will be clipped to the footwear of the user and can be triggered by tapping one foot behind the other for four times; an alert is sent via Bluetooth to an application on the victim's phone, programmed to generate a message seeking help with the location of the device attached. The results obtained were analyzed using Naïve Bayes classifier, and this low-cost device showed an overall accuracy of 97.5%. Due to the small size of the device, it is discrete and difficult to notice. In the future, an appropriate case can be designed for the device to improve its durability and prevent any hardware damage. This study has a few limitations, such as the trigger of a false alarm; it works well only in scenarios where the user's feet are at ground level.

In order to analyze the performance of the device, Naïve Bayes classifier, which is a supervised learning method, is used. Forty data points are considered in each case for training as well as testing purposes where the first twenty data points represent the walking phase, and the next twenty data points represent the tapping phase. The average value for the walking and tapping scenarios are recorded each time the protocol is performed by each subject. To ensure that there is no bias, cross-validation is performed. The Naïve Bayes Classifier is simple to comprehend and can be implemented with ease. It is suitable in cases where the number of observations is

not very high. Also, it shows better Accuracy, F Measure and AUC in comparison to a Decision Tree. As this device will be triggered in dangerous situations, an algorithm achieving a high accuracy is essential. In the confusion matrix, these four parameters are used for evaluating the performance-
The True

Positive (TP) condition is satisfied when the classifier correctly identifies the tapping action, the True Negative (TN) is satisfied when the classifier identifies a walking scenario correctly, the False Positive (FP) condition exists when the classifier incorrectly identifies walking as a tapping scenario, and lastly, the False Negative (FN) condition exists when the classifier falsely identifies the tapping scenario.

Paper 3: Smart security solution for women based on Internet of Things (IOT)

G C Harikiran, Karthik Menasinkai, Suhas Shirol have made a device which is the integration of multiple devices, and the hardware comprises of a wearable Smart band which continuously communicates with the smartphone which is having access to the internet.

The application is programmed and is loaded with all the required information and data such as Human behavior and their reactions to situations like anger, nervousness, fear and anxiety; hence, generating a signal which is transmitted to the smartphone. The application is having access to GPS and Messaging services which is pre-programmed in such a way that whenever it receives an emergency signal, it will send help request along with the location coordinates to the nearest relatives, police station and the people in the near radius who have that application. It also provides a social platform where the people who have this particular app installed gets the notification instantaneously so that they too can contribute their help.

The following steps are initiated when the unusual behavior of the user is detected, and this decision is processed by the inputs given by the various sensors like pulse rate sensor, motion sensor and temperature sensor. The reactions are pre-programmed into the system based upon which the device makes the decision, and it is handled by the smartphone app. The following steps are as following- 1. Assign the transmitter and receiver pins of the

GPS module. 2. Set the serial buffer with the baud rate 9600 and bit rate 4800. 3. Now a loop is set which will then trigger the following actions: a) Scan the contact number from SIM. b) Get data from the GPS module. c) Convert the longitude and latitude obtained from GPS into a Goggle URL. d) Attach this URL with an alert message. e) Send this message to pre-selected ICE(In Case of Emergency) numbers from SIM memory periodically until the device is reset.

Paper 4: Children Security and Tracking System Using Bluetooth and GPS Technology.

Authors: Mohammad Zulhafiz Md Isa, Muhammad Mahadi Abdul Jamil, Tengku Nadzlin Tengku Ibrahim, Muhammad Shukri Ahmad, Nur Adilah Abd Rahman, Mohamad Nazib Adon have researched on the device that uses the alarm technique.

Techniques used:

The alarm will get triggered once the Bluetooth connection is disconnected, and then the GPS application is used to track the location of the child who is wearing this device. The child detector device has two main units which are for parents and children. The child's unit functions as a transmitter which transmits a GPS signal, while the parent's unit will receive the signal which will determine the position and distance of their child using their own smartphone. In this system, there are some main components of Arduino as a microcontroller, GPS

module for tracking the position, Bluetooth module to send notification and GSM module to send coordinate to the phone. The steps are as followed- Bluetooth module will be connected to the phone. When this connection is disconnected, Arduino will send the signal to the GSM module to send the coordinates and to locate the location, GPS will send a signal to the satellite, and then the satellite will detect the current position. Once the satellite has successfully identified the position, the data will be sent to the GPS module, and then it will send the data to Arduino, and then the GSM module will receive instructions from Arduino to send coordinates via SMS.

Paper 5: Working Principle of Arduino and Using it as a tool for Study and Research.

Authors: Leo Louis has discussed the working principle and applications of an Arduino board. Arduino board can provide a rapid tool in the development of VLSI test bench, especially of sensors. The main advantages are its fast processing and easy interface.

Techniques used:

Today the technology is forming a new direction by making complicated things look simpler and interesting. The open sources provide us with free or virtually low costs, highly reliable and affordable technology. This paper provides a glimpse of the type of Arduino boards, working principles, software implementation and their applications. The working principle of Arduino is based on hardware features, software features and its applications. It also shows how Arduino has its own IDE (software). It gives us the knowledge to build new devices of our own, and the possibilities of using an Arduino is infinite.

The elements of an Arduino Board can be done into two categories: 1. Hardware 2. Software.

HARDWARE:

The Arduino Development Board comprises of many components such as Microcontroller, External Power Supply, USB plug, Internal Programmer, Reset button, Analog Pins, Digital I/O Pins, Power and GND Pins.

SOFTWARE:

The program codes written for Arduino is known as a sketch. The software used for developing such sketches for an Arduino is commonly known as the Arduino IDE, and this IDE contains the following parts in it- 1. Text editor: simplified code can be written using a simplified version of C++ programming language. 2. Message area: It displays the error and also gives feedback on saving and exporting the code.

3. Text: The console displays text output by the Arduino environment, including complete error messages and other information 4. Console Toolbar: The toolbar contains various buttons like Verify, Upload, New, Open, Save and Serial Monitor. On the bottom right-hand corner of the window there displays the Development Board and the Serial Port in use.

Paper 6: Smart security solution for women .

Authors : M. Kavitha, V. Sivachidambaaranath an, "Women Self Protecting System Using Internet of Things", Computational Intelligence and Computing Research (ICCIC) 2018 IEEE International Conference on, pp.1-4, 2018

Techniques used:

In this paper, the Security Is Most Significant Factor For Wellbeing Of Women. Today Women Require Help For Their Wellbeing So There Is Requirement

For Building Up A Convenient Framework For Women Security. As Of Late Existing Security Framework For Women Is As Per The Following: She (Society Harnessing Equipment): This Specialist Structured A Gadget Which Has Electric Circuit. V Of Current Is Produced By Circuit. There is a two buttons: one for the signal button and second one is for the if that object push that button and from that device reflect one light in front of the attackers so for the few minuet it damages attacker eye retina so in this time period object protect him/ herself so this one also must be useful part of our device and if we talk about the first button action it At The Point When The Power Catch Of The

Smartphone Is Squeezed Twice Continuously, It Starts Sending Ready Messages With A Connection Of The Area Of The Client At Regular Intervals To The Contacts or near hospitals or near police stations for help. At The Point When The Threshold Of The Weight Sensors Crosses, The Gadget Will Be Actuated And Send An Alarms Asking Help. The main button action is Shouting Alert And Weight Sensors. The literature survey describes about the papers that are studied and analysed for the project. The following 14 are the corresponding papers which defines existing women safety project. [1] The main purpose of this paper is to introduce a women safety device. This device consists of a panic button which can be pressed by the victim when she is in danger. When the panic button is pressed alert message is sent to the predefined numbers along with the live location using GPS and GSM modules. It uses ATMEGA 328P microcontroller and embedded C language is used to interface the hardware components to the microcontroller. The alert message is sent in a loop with an interval of about 4 seconds. The device consists of three operation which is controlled using a mobile application. The first function is the default mode in this, when the device receives a message a call was initiated to the sender of

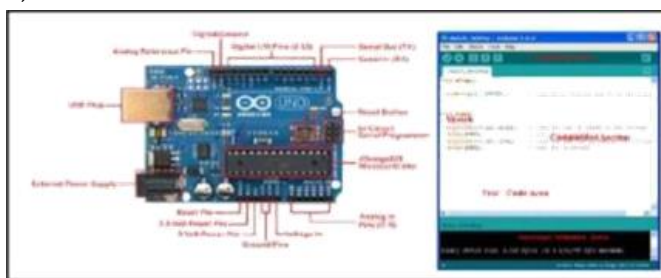
the message. The second function is location send mode. This function is activated through a push button. In this, it sends the location of the victim as a hyperlink to the trusted contact through message. The third function is call making mode. This function is activated through a push button and it makes call to the trusted contact.

III. Proposed Methodology

- ✓ We propose a unified approach towards the issue of personal safety.
- ✓ Alarm Grenade is a sonic non-lethal weapon and can be extremely useful in preventing physical attacks. We can implement it into the system, which would be useful in scenarios of network outage.
- ✓ At interface level, we can implement smart AI algorithm to determine the nature of attack and device efficiency.
- ✓ Individual device components can be integrated on smaller platforms for better portability.
- ✓ UI can be designed in better ways for easy use.

IV. Proposed System

1) Arduino:



Arduino is an open source microcontroller which can be easily programmed, erased and reprogrammed at any instant of time. Introduced in Figure 4.1.1 2005 the Arduino platform was designed to provide an inexpensive and easy way for hobbyists, students and to create device that interact with their environment using sensors and actuators. Based on simple microcontroller boards, it is an open source

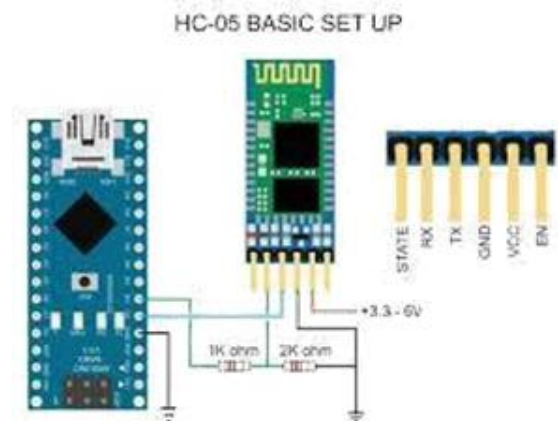
computing platform that is used for constructing and programming electronic devices.

2) GPS: The Global Positioning System (GPS) is a navigation system using satellites, a receiver and algorithms to synchronize location, velocity and time data for air, sea and land travel.

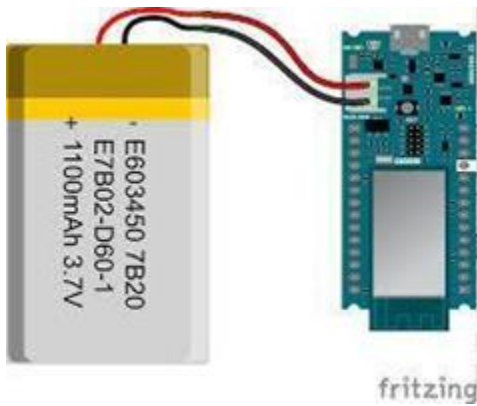


3) HC-05 Bluetooth:

HC-05 Bluetooth Module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Its communication is via serial communication which makes an easy way to interface with controller or PC.



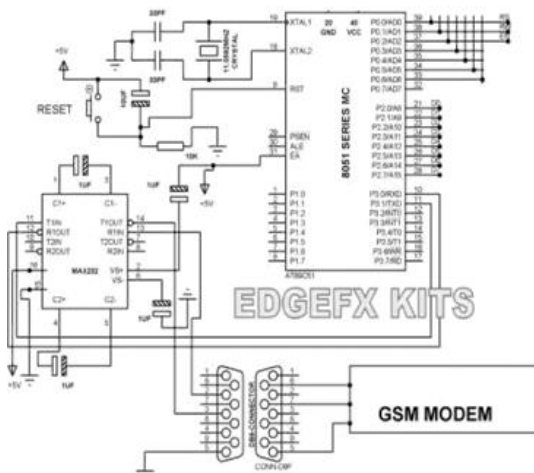
4) Alarm Grenade : Alarm grenade is type of device that works on principle of Non-lethal Acoustic System. It emits high pitch sound when the plug is pulled. A 130-decibel alarm is very loud. It's like listening to a jet taking off. It's louder.



The idea is that that sound alone should be enough to deter an attacker.

5) GSM Module: A GSM modem is a device that can be either a mobile phone or a modem device that can be used to make a computer or any other processor communicate over a network. It requires a SIM card to be operated and operates over a network range subscribed by the network operator.

From the below circuit, a GSM modem duly interfaced to the MC through the level shifter IC Max232. The SIM card mounted GSM modem upon receiving digit command by SMS from any cell phone sends that data to the MC through serial communication.



While the program is executed, the GSM modem receives the command 'STOP' to develop an output at the MC, the contact point of which are used to disable the ignition switch.



6) LCD 16X2:



LCD screen is used for showing the status of the process being run on the device. The screen is usually monochrome and connects to the Arduino via special connector.

V. CONCLUSION

Our core goal of developing this device is to address the issue of personal safety more effectively.

We have discussed an in-depth analysis of the device we are aiming to create. This device can provide mental peace to anyone venturing out there in the world about their safety. The proposed device can demonstrate effectiveness even in bad Network situations too. We wish in this digitized and technologically advanced world of us, there should exist the effective solutions to the concern of safety. Technology today is advanced to the point that it is possible to venture the idea of universal safety devices for personal use.

This device may not be the single best solution for individual safety but it joins the important missing chain. It became possible by merging two widely

accessible technologies of IoT and Alarm Grenade. This paper concludes the merging of these two technologies in a seamless manner.

VI. FUTURE WORK

Further developments and iterations in are possible for this device. It can be updated via over the air updates with application. The device can be equipped with new technologies as the new developments take place. This device's portability can be further improved using new and more compact components. This device can be used as potential health monitoring device as well as security device by mobilizing it's idle time for the health tracking.

VII. REFERENCES

- [1]. S. C. U. R. D. R. Sunil K Punjabi, "Smart Intelligent System for Women and Child Security," in IEEE 9th Annual Information Technology, Electronics and Mobile Communication Conference(IEMCON), Vancouver, BC, Canada, 2018.
- [2]. N. V. P. G. M. Nandita Viswanath, "Smart Foot Device For Women Safety," in 2016 IEEE Region 10 Symposium (TENSYP), Bali, Indonesia, 2016.
- [3]. K. M. S. S. G C Harikiran, "Smart Security Solution for Women based on Internet Of Things(IOT)," in 2016 International Conference on Electrical, Electronic, and Optimization Techniques (ICEEOT), Chennai, India, 2016.
- [4]. S. L. J. P. R. W. C. N. D. T. G. L. B. L. Mark D Fletcher, "Effects of very high-frequency sound/ultrasound on humans and adverse symptoms after exposure to audible very high-frequency sound. ," in The Journal of the

Acoustical Society of America, New York , 2018.

- [5]. L. Louis, "Working Principal of Arduino and using it as a tool for Study and Research," in International Journal of Control, Automation, Communication and Systems (IJACS), Gujarat, 2018.
- [6]. M. Kavitha,V. Sivachidambaanathan, "Women Self Protecting System Using Internet of Things", Computational Intelligence and Computing Research (ICCIC) 2018 IEEE International Conference on, pp. 1-4, 2018
- [7]. S. A, Banker, Kedar Basatwar, Priti Divekar, Parbani Sinha, Harsh Gupta, "Foot Device for Women Security", Intelligent Computing Control Systems (ICICCS) 2018 Second international Conference on, pp. 345-347,2016.

Cite this article as :

Savan Gondaliya, Rahil Khalak , Priyanka Mistry, Adolf Sibanda , Keyaben S. Patel, "A Smart Protection Device", International Journal of Scientific Research in Computer Science, Engineering and Information Technology (IJSRCSEIT), ISSN : 2456-3307, Volume 7 Issue 2, pp. 207-214, March-April 2021. Available at
doi : <https://doi.org/10.32628/CSEIT217243>
Journal URL : <https://ijsrcseit.com/CSEIT217243>