

WOMEN'S SMART SELF DEFENSE DEVICE

A Project Report Phase - II

Submitted in partial fulfillment of the requirements for the award of Bachelor
of Engineering Degree in Electronics and Communication Engineering

by

SRIDHAR. U (39130440)

SRISHKUMAR MANI. J (39130441)



**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
SCHOOL OF ELECTRICAL AND ELECTRONICS**

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

Accredited with grade "A" by NAAC

JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI – 600119

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Accredited with "A" grade by NAAC

Jeppiaar Nagar, Rajiv Gandhi Salai, Chennai - 600 119

www.sathyabama.ac.in

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION
ENGINEERING**

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of SRIDHAR.U (39130440) and SRISHKUMAR MANI.J (39130441) who carried out the project entitled "WOMEN'S SMART SELF DEFENSE DEVICE" under our supervision from November 2022 to April 2023.

Internal Guide

Mr.K.T. ILAYARAJAA, M.E., (Ph.D.)

Head of the Department

Dr. T. RAVI M.E., Ph.D.

Submitted for Viva voce Examination held on _____

Internal Examiner

External Examiner

DECLARATION

We, SRIDHAR.U (39130440) and SRISHKUMAR MANI.J (39130441) hereby declare that the Project Report entitled “WOMEN’S SMART SELF DEFENSE DEVICE” done by us under the guidance of Mr.K.T. ILAYARAJAA, M.E., (Ph.D.), Assistant Professor, Dept. of Electronics and Communication Engineering, SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY, CHENNAI, is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Electronics and Communication Engineering.

DATE:

PLACE: Chennai

SIGNATURE OF CANDIDATES

1. 
2. 

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ABSTRACT

In Today's World Women Safety is the Most Important Issue In Every Country. Today women are harassed and troubled and sometimes when the urgent help is needed, there is no required information of the women so that people can help. It is necessary that we are all aware of the importance of women safety, but we must analyze that they should be properly protected. The issues of safety of women and other vulnerable sections of society are engaging the attention of the police and agencies concerned in and outside the government. It is being increasingly felt that there is a need for innovative ideas to tackle these issues and that effective use of technology can go a long way in ensuring safety. Therefore, in this project, we will be using a pepper spray which is modern self-defense for women's safety. The pepper spray is designed by our own through the ESP32 chip to control the battery. If the pepper spray is pressed, ESP32 module which can be configured to notify the user mobile app. a buzzer will be switched on and an SOS led will glow when spray is pressed. Also, we have developed two mobile applications for women's safety; one is for users and another one is for caretakers. A caretaker mobile application will be developed using react native to receive mobile notification, also to monitor the condition live and help the victim as soon as possible. A user mobile application is used to share the live location of the women to the caretaker application by passing the location through Google map. Thus, our project helps in saving the life of a woman and safeguarding her in the present situation.

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LIST OF ABBREVIATIONS

DSP	Digital Signal Processors
ASIC	Application-Specific Integrated Circuits
FPGA	Field-Programmable Gate Arrays
HFC	Hydro Fluoro Carbon
MT	Metric Tons
GSM	Global System For Mobile Communications
PCB	Printed Circuit Board
LED	Light Emitting Diode

CHAPTER 1

INTRODUCTION

1.1 GENERAL INTRODUCTION

In the past few years, the safety of women in India has been down because of some continuous and terrible crimes against women. There has been a decline in women from ancient to medieval periods which has continued in such an advanced era. Women of India have equal rights as men of this country as they occupy almost half the population of the country and are involved in half proportion in the growth and development of the country.

It is true that women in modern India are joining high offices (President, Speaker of Lok Sabha, Union Ministers, Leader of Opposition, Chief Minister, Governor etc.,) however on the back of curtain they are being exploited too. According to the Constitution of India, they have equal rights of dignity, equality, and freedom from gender discrimination. Indian women are continuously facing numerous problems such as sexual harassment, violent victimization through rape, acid attack, dowry deaths, forced prostitution, and many more.

1.2 EDUCATION AND ECONOMIC DEVELOPMENT

Number of women heading the households in India has decreased though the female literacy rate is still less than male literacy rate. Urban girls are nearly equal in education like boys however in the rural areas there is still a big gap. On the other hand, some Indian states (like Kerala and Mizoram) have achieved universal female literacy. So, women in such states have high social and economic status. Women literacy rate in India is still less because of the inadequate school facilities, sanitary facilities, increasing crimes against women, shortage of female teachers, gender discrimination in the society, etc. According to the statistics of 2015, it is found that women (above 15 years or older) literacy rate is 60.6% whereas male literacy rate is 81.3%.

1.3 CRIMES AGAINST WOMEN IN INDIA

There is a big list of crimes against women in India such as acid attack, women marriages, domestic violence, forceful domestic work, women abuse, dowry deaths, female infanticide and sex-selective abortions, women labour, honour killings, rape, sexual harassment, trafficking, forced for prostitution, and many more.

1.4 SAFETY LAWS FOR WOMEN IN INDIA

There is a list of safety laws for women in India working in the field to provide safety to the women from all type of crimes against women. Some safety laws are women Marriage Restraint Act 1929, Special Marriage Act 1954, Hindu Marriage Act 1955, Hindu Widows Remarriage Act 1856, Indian Penal Code 1860, Dowry Prohibition Act 1961, Maternity Benefit Act 1861, Foreign Marriage Act 1969, Indian Divorce Act 1969, Medical Termination of Pregnancy Act 1971, Christian Marriage Act 1872, Code of Criminal Procedure 1973, Equal Remuneration Act 1976, Married Women's Property Act 1874, Births, Deaths & Marriages Registration Act 1886, Indecent Representation of Women (Prevention) Act 1986, Muslim women (protection of rights on divorce) Act 1986, Commission of Sati (Prevention) Act 1987, National Commission for Women Act 1990, Prohibition of Sex Selection Act 1994, Protection of Women from Domestic Violence Act 2005, Prevention of womenren from Sexual Offences Act 2012, Sexual Harassment of Women at Work Place Act 2013, etc.

Another Juvenile Justice (Care and Protection of women) Bill, 2015 has been passed replacing the existing Indian juvenile delinquency law of 2000 (Juvenile Justice (Care and Protection of women) Act, 2000). This act was passed by the Lok Sabha on 7th of May in 2015 and by the Rajya Sabha on 22nd of December in 2015. This act is passed to lower down the juvenile age from 18 to 16 years in cases of heinous offense (especially after the release of Nirbhaya's case accused juvenile).

1.5 TECHNOLOGIES USED

In this section, the technologies we used are listed and explained. For example, embedded systems and React Native application.

1.5.1 Embedded system

An embedded system is a microprocessor-based computer hardware system with software that is designed to perform a dedicated function, either as an independent system or as a part of a large system. At the core is an integrated circuit designed to carry out computation for real-time operations. Complexities range from a single microcontroller to a suite of processors with connected peripherals and networks; from no user interface to complex graphical user interfaces. The complexity of an embedded system varies significantly depending on the task for which it is designed. Embedded system applications range from digital watches and microwaves to hybrid vehicles and avionics. As much as 98 percent of all microprocessors manufactured are used in embedded systems. Embedded systems are managed by microcontrollers or digital signal processors (DSP), application-specific integrated circuits (ASIC), field-programmable gate arrays (FPGA), GPU technology and gate arrays. These processing systems are integrated with components dedicated to handling electric and/or mechanical interfacing. Embedded systems programming instructions, referred to as firmware, are stored in read-only memory or flash memory chips, running with limited computer hardware resources. Embedded systems connect with the outside world through peripherals, linking input and output devices.

1.5.1.1 Structure of embedded systems

The basic structure of an embedded system includes the following components:

Sensor: The sensor measures and converts the physical quantity to an electrical signal, which can then be read by an embedded systems engineer or any electronic instrument. A sensor stores the measured quantity to the memory.

A-D Converter: An analog-to-digital converter converts the analog signal sent by the sensor into a digital signal.

Processor & ASICs: Processors assess the data to measure the output and store it to the memory.

D-A Converter: A digital-to-analog converter changes the digital data fed by the processor to analog data

Actuator: An actuator compares the output given by the D-A Converter to the actual

output stored and stores the approved output.

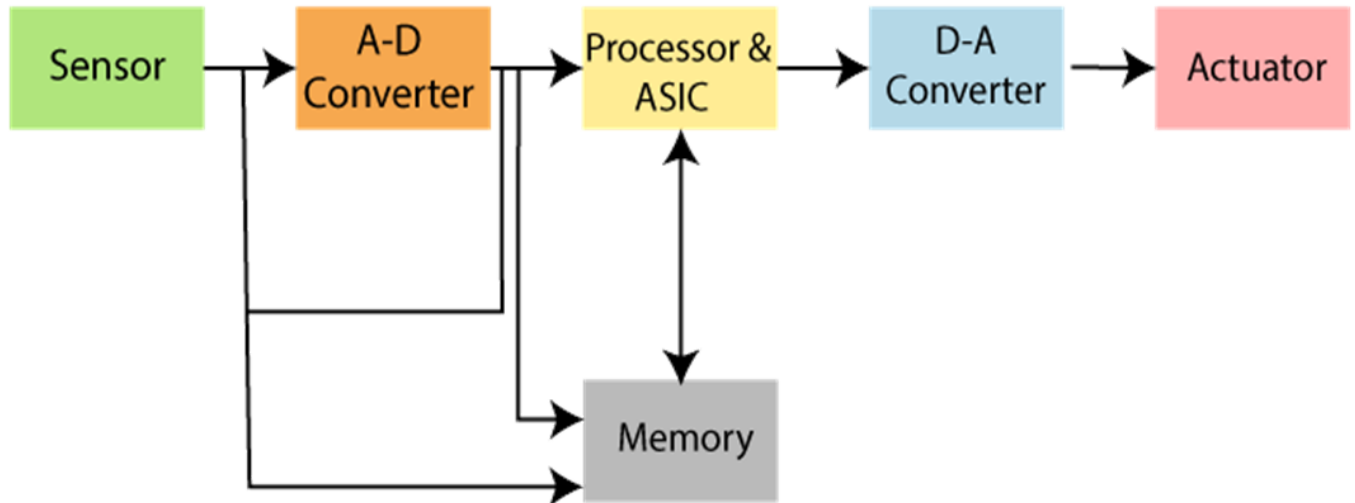


Fig: 1.1 Structure of embedded systems

1.5.1.2 Benefits of using embedded systems

- Small size and faster to load
- More specific to one task
- Easy to manage
- Low cost
- Spend less resources
- These operating systems are dedicated to one device so performance is good and use less resources like memory and micro-processors.

1.5.2 React native app development

Cross-platform development has become a great alternative to fully native mobile app development. Following the native mobile development approach, separate apps for Android and iOS can be created. The cross-platform development allows you to cut expenses and save time by using the same code across both platforms. The React Native framework is a rising mobile solution and is considered the future of cross-platform mobile app development.

React Native is an open-source framework that allows you to build a mobile app with only JavaScript. It was introduced by Jordan Walke, a Facebook software engineer, as a new technology for simpler development and a better user experience. The main distinctive feature of this framework is that React Native apps function just like native apps. They don't differ from apps built on Java, Objective-C or Swift and they use the same UI building blocks as native iOS or Android apps. But with React Native, building a mobile app is much faster and less expensive.

1.5.2.1 Community matters

React Native is an open-source platform. That means all documentation related to this technology is open for everyone and is available for free to everyone in the React Native community. There's a great advantage to using community-driven technology. For example, if you face any issue related to React Native development, anyone can get help from community experts or find information online.

1.5.2.2 Reusable code & pre-built components

This is probably the most important advantage of React Native. With the convenience of this framework, developers don't need to build a separate mobile app for each platform, as almost 90 percent of React Native code can be reused between iOS and Android.

1.5.2.3 Simplified UI

React Native is all about the mobile UI. Comparing this framework to AngularJS or Meteor JS, it looks more like a JavaScript library than a framework.

It's important to create a sequence of actions when building a mobile app, and React Native makes an implementing order just perfect. In addition, user interfaces designed in React Native are more responsive, decrease load time, and provide a smoother feel.

1.5.2.4 Third-party plugin support

The React Native framework is still advancing, so it might lack some components in the core framework. To fill this gap, React Native provides two types of third-party plugins: native modules and JavaScript modules.

1.6 OBJECTIVES

- The objective of the project is to safeguard the women using the intelligent device.
- To design and develop a mobile application for the woman that sends her location to a caretaker mobile application when in danger.
- To design a caretaker mobile application for the purpose of live location tracking.
- To design a user application for the purpose of pepper spray intimation and live location sharing.

1.7 SCOPE OF THE PROJECT

- It will be used for monitoring women's safety.
- It can be used for public places.

CHAPTER 2

LITERATURE SURVEY

2.1 INTRODUCTION

The following shows a survey done for safety devices for women. The most popular of the existing techniques has been discussed as follows.

2.2 LITERATURE SURVEY

A literature review is a type of academic writing that provides an overview of existing knowledge in a particular field of research. A good literature review summarizes, analyses, evaluates and synthesizes the relevant literature within a particular field of research. It illuminates how knowledge has evolved within the field, highlighting what has already been done, what is generally accepted, what is emerging and what is the current state of thinking on the topic. Additionally, literature reviews identify the gaps in the current knowledge - that is, uninvestigated or under-researched areas.

2.2.1 Modern Era and Security of Women: An Intellectual Device

Is it ethically right, if I say women in our society are not able to lead their lives independently even in this modernized era of 2020? A lot number of physical abuse attacks, rape cases, assaulting of women are being reported daily and are going exponentially high especially in the metro cities. The presence of CCTV's is helping in some manner, but when the attack happens there is no way to figure out the accused. This paper is intended with an idea for women self-reliance using technology, abating the crime rate against women and girls in India. The proposal document illustrates a rapid response, cost-effective, and easy-to-carry device empowering women a secure and independent life. Where IoT aims at unifying everything, we have designed and implemented the proposed system integrating IoT with SIM 800 GSM module, Force Sensing Resistor, Pulse Sensor, Bluetooth Module, LCD, Resistors, Transistors, Diodes, LED, Arduino UNO, Buzzers, PCB, Breadboards, Transformer, Switch, Arduino Compiler, and Neo6mv2 GPS module. The proposed system has a dual security feature using which women in agony can call for help and share her location

with their predefined emergency number. She can activate the system in three different modes as per situation demands, at times she feels she is out at odd hours or insecure. The device can be activated by the victim using a panic button or Bluetooth module. When the device is activated, pulse sensor, GPS module and GSM module incorporated in it automatically gets activated and the system will broadcast the message alert with latitude and longitude dimensions along with the heart rate measurement to the authorized predefined numbers and to the police, concurrently will sound a buzzer relentlessly, lenient nearby comprehend with the happening. Force Sensing Resistor is equipped in this device, in case of any external force experienced by the device during any type of misconduct and mishandling. In the era of pepper spray, smart bands, this device turned out to be more powerful and efficient in insulating the lives against barbarities caused to women.

Pros

The device can be activated in a quick span of time and can able to work even without internet connectivity.

Cons

When there's no cellular or internet connection, the device can only call a local emergency service. Sending messages with location, voice, or video recording is unavailable.

2.2.2 Civilian pepper spray for self-defense: Understanding user perception and impact of design on user performance

Pepper spray is widely used in the US, and is marketed as an effective self-defense device. While pepper spray can be useful in deterring an attacker, many pepper spray owners do not have any experience using it. There is a dearth of published studies that focus on civilian pepper-spray use, not to mention first time pepper-spray users. A study to analyze pepper-spray designs with first-time users, to see how the design, specifically the safety mechanism, affects response time and overall performance would be helpful. The study was conducted in 2 parts – a survey to understand user perception, and a lab experiment using a 2 × 2 randomized block design with two designs of pepper sprays (side-slide safety and flip-top safety) and the two starting locations for the pepper spray (purse or pocket) as the manipulated factors. Results revealed a significant difference in response times between the

flip-top pepper-spray and the side-slide pepper-spray. There was also a significant difference in response times between using the index or thumb as the trigger finger but no significant difference in response times when the pepper-spray for location (purse or pocket). Overall, participants rated the side-slide device as the most effective self-defense device. Relevance to industry: Because there is no other research in the area of first-time pepper-spray users, let alone civilian pepper-spray users, much can be learned about how well people use these devices in a real-world situation, and when there is a highly stressful situation how well does pepper-spray allow an individual to protect him or herself. This study starts the discussion on some of these topics.

Pros

Pepper spray might seem terrifying to some; however, it's worthy to have in case of any dangerous incident.

Cons

The responses were not very encouraging with 10 out of 11 participants indicating that they were not very confident.

2.2.3 Blue Lights and Pepper Spray: Cisgender College Women's Perceptions of Campus Safety and Implications of the "Stranger Danger" Myth

Through a case study including focus groups with 32 cisgender women and document analysis of campus newspaper and websites, it highlights ways college women navigate multiple and conflicting messages about campus safety and sexual violence on campus. Although students are aware of statistics indicating most sexual violence happens between two people who know each other, they still engage in safety strategies related to stranger danger. It highlights implications related to messaging about campus safety and sexual violence on campuses. The purpose of this study is to illuminate ways cisgender college women navigate conflicting information and messages about campus safety and sexual violence. Most women in this study indicated they understood that perpetrators generally target victims they know; however, when discussing campus safety, the same participants described strategies for protecting themselves from stranger assault. They also described frustration with victim-blaming messages they received at orientation, yet described ways they subscribed to these same victim-blaming messages through their behaviors

and treatment of other women. Through an examination of the contradictory nature of espoused knowledge and behavior related to sexual violence, we highlight the complex nature of educating college students about sexual violence and describe the cyclical nature of myths about sexual violence. It concludes with implications and recommendations for campus educators related to messaging about sexual violence.

Pros

This research, it seeks to advance previous scholarship about campus messaging and sexual violence by highlighting the inconsistencies in messaging and these messages impact college women's safety strategies.

Cons

There are enough people who use it and it costs too much.

2.2.4 Development of Self-Defense Devices for Women

This research analyses the situations faced by women in India that can lead to physical and sexual assault (groping, rape, stalking, and other forms of physical violence) and investigates the physical features of a self-defense device that can deter these attacks. A review of the available self-defense devices, including those available in the US and Indian markets, highlighted the absence of any handheld and easily reachable portable device that could effectively deter or protect the person from sexual and physical attacks. For example, pepper sprays inside a handbag are difficult to access under distress/emergency. Designers of the devices on the market have not yet adequately understood and responded to the complexity of physical and sexual assaults on women. For this paper,³⁶⁴ women were surveyed to explore the complexities: the context of the crime, reaction mechanism of the victim, avenues for deterring attacks, and access to safety/help. The possible design features which emerged from our survey results are loud alarms; help-beacons/signals that could be integrated with a deterrent (immobilizers like chemicals or electric shocks) to provide a larger window of opportunity to escape; something that can be used to call for help, preferably that can be integrated as a single wearable device (e.g. watch, bracelet, locket, footwear, belt, mobile apps, and handbags); or a combination of multiple devices. These results support the need for developing a self-defense safety device for women.

Pros

A technological solution in the form of a portable, wearable, and disguisable device could be a lifesaver to women.

Cons

Several features emerge as critical.

2.2.5 Cardiac Arrest in a Young Patient Triggered due to Pepper Spray: A Case Report

Pepper spray is a commonly used agent used by defense personnel. Active component Capsaicin has not been proven to cause cardiac arrest. Here, report a case where exposure to pepper spray triggered cardiac arrest in a healthy young patient. The case description is followed by review of the systemic effects of pepper spray and a possible mechanism of arrhythmias.

Pros

In healthy individuals, the effects are temporary and usually resolve with removing the subject from the exposure and washing the surface with warm water

Cons

Patients with unstable or poorly controlled hypertension or a recent history of cardiovascular or cerebrovascular events may be at an increased risk of adverse cardiovascular effects.

2.2.6 Review of Pepper Spray as a Self Defense Weapon

Pepper spray is nothing more than a small bottle of spray. It contains capscium as the active ingredient and is basically a chili spray. It can be very effective and can cause some severe damage to the eyes of the attacker. However, there are not such advantages; there are drawbacks as well. There is no lack of self-defense weapons. Explore the market and you will find plenty of lethal and non-lethal weapons. Pepper spray is one of the non-lethal self-defense weapons used by both men and women. It contains chili spray and can have some strong temporal effects. Usually sprayed on

the face of the attackers, it can leave them blind sighted for some time. It works quite well in a self-defense situation.

Pros

This spray is quite easy to use. It comes with a push button mechanism. All you need to do is aim at the face of the attacker and then push the button to spray it on his face or eyes.

Cons

It can also be a little dangerous for the user. Self-harm is quite a possibility with this spray.

2.2.7 Use of pepper spray in policing: retrospective study of situational characteristics and implications for violent situations

Pepper spray (OC) is a policing tool aimed to prevent or stop aggressive behavior by quickly and temporarily incapacitating without injuring. To date, few studies have investigated OC's operational usefulness and limitations. OC reduced violent behavior in 93% of the 936 incidents investigated. However, the operative range was often <2m and it took between 3 and 5 s of spraying before obtaining effect, partly owing to the difficulties of hitting a small, sometimes erratically moving target. Collateral hits were noted in 24% of the incidents, whereof 90% were other officers. Noteworthy, in 21% of incidents officers put themselves at large personal risk by using OC at close range against people armed with lethal weapons. Hence, OC emerges as a suitable tool for handling low threat situations but lacks key traits to ensure safe and efficient policing of high threat situations, e.g., handling armed assailants.

Pros

The dosages (or time) till reaching a perceived effect on the subject targeted include both dosages used till achieving a hit on the target and dosages used till the OC caused an effect.

Cons

OC was used about 1400 times within Skåne County. Detailed situational information was obtained from 936 of these incidents. In some of these cases,

complete information could not be obtained retrospectively, e.g., the individual effects when OC was used against crowds.

2.2.8 Market Characterization of the U.S. Defense Spray Industry

Defense sprays are aerosol-based sprays intended for self-defense, including pepper spray (a hot pepper-based spray for human-to-human self-defense) and animal sprays (pepper-based sprays labeled for protection against dog or bear attacks). Defense sprays contain capsaicin (oleoresin capsicum, as an irritant), an emulsifier, and an aerosol propellant. The defense spray industry historically used chlorofluorocarbons (CFCs) as a propellant and transitioned to hydrofluorocarbon (HFC) propellants as replacements to CFCs in the mid-1990s, specifically HFC-134a. In 2020, approximately 290 metric tons (MT) of HFC-134a propellant was contained in defense sprays sold in the United States. The use of HFC-134a propellant in defense sprays in the United States is expected to continue due to its non-flammability and physical properties to provide adequate spray distance for foam, fog, and vapor defense sprays (Safariland 2017a, EPW 2020c). Efforts to reformulate are underway but the alternatives have not yet reached the desired specifications of the industry (EPW 2020a, EPW 2020b). Based on self-reported significant increases in recent product sales by the industry, a 10% growth rate is assumed, resulting in a projected HFC-134a use in 2025 of 467 MT.

Pros

This project that approximately 467 MT of HFC-134a propellant will be used in defense sprays.

Cons

May cause irreversible eye damage if sprayed in the eyes at close range. Contact through touching or rubbing eyes may result in substantial but temporary eye injury. Strongly irritating to my nose and skin.

2.2.9 Ventricular fibrillation due to coronary spasm after pepper spray

Pepper spray is used as a crowd control agent and for self-defense. It has been thought to be safe; however, 27 persons have died in police custody after exposure to pepper spray. The report on a 21-year-old man, with no underlying heart disease and

a normal ECG and echocardiogram in the past, who was pepper sprayed and developed ventricular fibrillation. An admission ECG showed marked ST segment elevation but subsequent coronary arteriography was normal. They Hypothesize that pepper spray triggered coronary spasm, resulting in ventricular fibrillation. This report adds to a body of information that pepper spray is dangerous.

Pros

The transient receptor potential vanilloid subfamily member 1 (TRPV1) is a ligand-gated cation channel that is the primary target of this compound

Cons

After exposure to pepper spray, the admission ECG changes with diffuse ST segment elevation were consistent with coronary spasm.

2.2.10 A Toxicological Aspect on Pepper Spray

Tear gasses as known “lacrimators” are highly potent riot control agents which have strong irritant effects. Tear gasses show their site-specific and time-dependent toxic effects via interaction with sensory neurons. These chemicals cause strong pain and irritation at the site of exposure areas such as mucous membranes, eyes or skin. Formulations of pepper spray contain different amounts of Oleoresin capsicum as a major compound that is an oily resin derived from *Capsicum annuum* or *Capsicum frutescens*. Capsaicin and capsaicinoids are organic compounds of Oleoresin capsicum. These extracts primarily affect the ocular and skin and the other effects are on respiratory system, nervous system, mucous membranes and reproductive system. Pepper spray has been accepted by government and law enforcement agencies as a less-than-lethal inflammatory agent. Pepper sprays active ingredients mostly associated with public health risk when they are used. In this review we discussed chemical characteristics, systemic and local effects and the toxic effects on several systems of pepper spray and its main compound, capsaicin

Pros

It is believed that pepper spray is safe because it is an easily attainable, cheap and natural source product.

Cons

Pepper spray becomes a major incapacitating agent against protesters that don't matter who they are.

2.2.11 Design of a Smart Safety Device for Women using IoT

Women are not safe anywhere and are most vulnerable when traveling alone into lonely roads and deserted places. Existing hand held safety devices for women require human intervention for activating the device such as pressing the button or shaking the device etc after sensing the danger. They propose a solution which will try to overcome the disadvantages of the existing systems and also aim at providing false proof safety to women. The proposed work aims at designing an IoT based safety device that relies on providing security to women by fingerprint-based method of connectivity to the device and alerting nearby people and police when a woman is not safe. An unsafe situation is sensed by fingerprint verification for a minute then it will automatically alert nearby people and police if the device senses no signal. Moreover, for first-hand safety, a shockwave generator is also designed that women can use to attack the perpetrator. Additional features such as sending group messages, audio recording are also part of the proposed design. A mobile app will automatically alert nearby people and police if the device senses no signal. Moreover, for first-hand safety, a shockwave generator is also designed that women can use to attack the perpetrator. A mobile app is designed for women safety where safe locations from the victim's current location will be shown on the map so that women can reach the safe place from her current location.

Pros

GSM (Global System for Mobile Communications) module for sending alert messages, buzzer for alerting the environment and shock wave generator for self defense.

Cons

Implement encryption protocols to ensure that, should hackers be able to infiltrate a smart device or intercept its data, that data will be unreadable.

2.2.12 Women Safety Device and Application-FEMME

In our Country, even though it has super power and economic development, there are still many crimes against women. The atrocities against women can be brought to an end with the help of our product “FEMME”. This device is a security system, specially designed for women in distress. Method/Analysis: Using ARM, use radio frequency signal detector to detect hidden cameras. Findings: it analyzed that there are no security devices for our total safety. The user has to carry multiple devices. We found an ALL-IN-ONE security device which has all the features in one click. Applications/Improvements: In this paper we used an ARM controller and android application in which both the device and the smart phone are synchronized using Bluetooth, hence both can be triggered independently. We can record audio for further investigation and can give an alert call and message to the preset contacts with the instant location every 2 minutes and can be tracked live using our application. Hidden camera detector is also a distinct feature using which we can ensure our privacy.

Pros

“FEMME” is a guide, that aids people to take preventive measures as soon as being stalked while walking, attempted physical or sexual assault, Unsafe neighbors and Domestic violence

Cons

There is no hidden camera detector which is portable to ensure our privacy.

2.2.13 Women’s Wearable Security and Safety Device

In today’s world, one of the major issues that women all across the globe face is threats to their safety and security. This paper presents a quick safety device that responds immediately when women are in danger. The device is equipped with a button and on pressing the button, a “HELP” message is sent along with the location coordinates to the trusted contacts via an SMS. The device is also capable of capturing an image and a video which can then be analyzed to identify the perpetrator. When a woman feels threatened or she finds herself in a compromising situation, she can use this device for her safety.

Pros

The button on the device is pressed if the Pi camera is activated; the image is captured and uploaded to Drive; the image copy is sent to email IDs of trusted contacts

Cons

One of the major drawbacks of this system is the dependence on biological measures which can be triggered by an intense workout.

2.2.14 Women's Safety Device and Alert System

Women endure a lot of sexual harassment these days which is becoming alarming day by day. The situation is extremely serious in developing countries as well as underdeveloped ones. In this project, they are advancing an IoT device along with an android app that can make women's movement safer. Women can get supreme safety support by tapping the device. The device consists of ESP12E – Microcontroller, Flex Sensor, GSM, GPS, Wireless 802.11, etc. The aggregate of all elements collectively offers this device to be affordable and easy to navigate.

Pros

These batteries provide higher specific energy than other lithium battery types and are used in applications where weight is a critical feature, such as mobile devices, radio-controlled aircraft and some electric vehicles.

Cons

When the power will turn OFF, then the total system will turn OFF, so battery is always required

2.2.15 Safety apps for women

If you wish to learn more about different types of safety apps for women, check one of our previous articles. Here is the general classification: Apps for safe walking at night or jogging, these apps support real-time location tracking/sharing and send notifications on persons' leave and arrival. Some apps include automatic triggering of SOS alerts. Safety apps for solo travelers and safe route planners, in addition to the

functionality similar to "walk-at-night-alone apps," these safety devices for women give advanced suggestions for mapping a risk-free route. The tips based on human expert assessment and AI analysis will keep you updated on the neighborhoods you better stay away from. Emergency alert apps, along with activating SOS alerts by the panic button, apps like AllsWell can launch alerts automatically by inactivity monitoring. At times using any safety devices for women openly can only provoke the attacker. So this feature can back you up secretly. AllsWell Alert App gets activated by prolonged smartphone inactivity and can also immensely assist self-isolated individuals with health issues. Supposedly, elderly or disabled people cannot reach the phone and call for medical aid. The AllsWell App will inform their emergency contacts in one way or another.

Pros

Simple installation and setting process.

Cons

Functions like live-streaming or multimedia sharing are unavailable offline.

2.3 CONCLUSION

From the above reference papers, we can conclude that the following are the major disadvantages,

- In the existing system, when there's no cellular or internet connection, the device can only call a local emergency service.
- The responses were not very encouraging with 10 out of 11 participants indicating that they were not very confident.
- Patients with unstable or poorly controlled hypertension or a recent history of cardiovascular or cerebrovascular events may be at an increased risk of adverse cardiovascular effects.
- Pepper spray becomes a major incapacitating agent against protesters that don't matter who they are.

CHAPTER 3

EXISTING AND PROPOSED SYSTEM

3.1 EXISTING SYSTEM

Is it ethically right, if I say women in our society are not able to lead their lives independently even in this modernized era of 2020? A lot number of physical abuse attacks, rape cases, assaulting of women are being reported daily and are going exponentially high especially in the metro cities. The presence of CCTV's is helping in some manner, but when the attack happens there is no way to figure out the accused. This paper is intended with an idea for women self-reliance using technology, abating the crime rate against women and girls in India. The proposal document illustrates a rapid response, cost-effective, and easy-to-carry device empowering women a secure and independent life. Where IoT aims at unifying everything, we have designed and implemented the proposed system integrating IoT with SIM 800 GSM module, Force Sensing Resistor, Pulse Sensor, Bluetooth Module, LCD, Resistors, Transistors, Diodes, LED, Arduino UNO, Buzzers, PCB, Breadboards, Transformer, Switch, Arduino Compiler, and Neo6mv2 GPS module. The proposed system has a dual security feature using which women in agony can call for help and share her location with their predefined emergency number. She can activate the system in three different modes as per situation demands, at times she feels she is out at odd hours or insecure. The device can be activated by the victim using a panic button or Bluetooth module. When the device is activated, pulse sensor, GPS module and GSM module incorporated in it automatically gets activated and the system will broadcast the message alert with latitude and longitude dimensions along with the heart rate measurement to the authorized predefined numbers and to the police, concurrently will sound a buzzer relentlessly, lenient nearby comprehend with the happening. Force Sensing Resistor is equipped in this device, in case of any external force experienced by the device during any type of misconduct and mishandling. In the era of pepper spray, smart bands, this device turned out to be more powerful and efficient in insulating the lives against barbarities caused to women.

3.1.1 Disadvantages of the existing system

- When there's no cellular or internet connection, the device can only call a local emergency service.
- Sending messages with location, voice, or video recording is unavailable.

3.2 PROPOSED SYSTEM

In this project, we will be using a pepper spray which is modern self-defense for women's safety. The pepper spray is designed by our own through the ESP32 chip to control the battery. If the pepper spray is pressed, ESP32 module which can be configured to notify the user mobile app. A buzzer will be switched on and an SOS led will glow when spray is pressed. Also, we have developed two mobile applications for women's safety; one is for users and another one is for caretakers. A caretaker mobile application will be developed using react native to receive mobile notification, also to monitor the condition live and help the victim as soon as possible. A user mobile application is used to share the live location of the women to the caretaker application by passing the location through Google map. Thus, our project helps in saving the life of a woman and safeguarding her in the present situation.

3.2.1 Advantages of the proposed system

- Cheap and Effective Solution for live monitoring of women's safety.
- Mobile applications developed for use to share the current location to caretakers.
- Capturing the live conditions happening.
- Tracking the Google location and sending it to the police and family
- Immediate action can be taken to save life.

3.3 SYSTEM ARCHITECTURE

The architectural diagram and pepper spray diagrams are shown in Figure 3.1 and Figure 3.2 respectively.

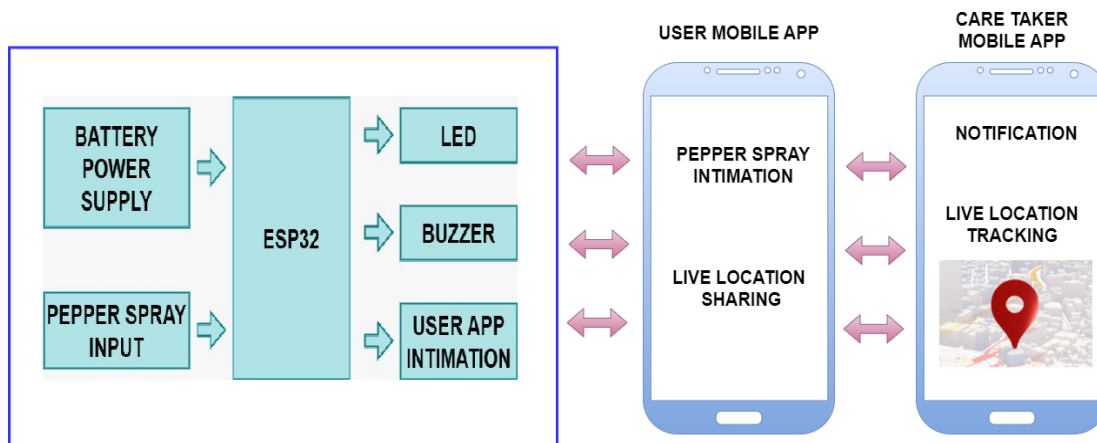


Fig: 3.1 Proposed System Architecture



Fig: 3.2 Pepper spray diagram

3.4 WORKING

Within the scope of this project, we will be making use of pepper spray, which is a form of modern self-defense designed specifically for the protection of women. The ESP32 chip that controls the battery operation of the pepper spray was designed and developed in-house by our team. When the button on the pepper spray is kept pressed, an ESP32 module that can be programmed to notify the user through their mobile app is activated. When you press the spray button, a buzzer will activate, and

an SOS led will begin to illuminate. Additionally, we have developed two mobile applications for women's safety. One of these applications is for the user, and the other is for the caretaker. In order to receive mobile notifications, as well as to monitor the victim's condition in real time and provide assistance as quickly as possible, a mobile application for caregivers will be developed using react native. A user mobile application is used to start sharing the live location of the women with the caretaker application by passing the location via Google map. This is done using an application that is installed on the user's mobile device. As a result, our project contributes to the process of having saved the life of a woman and protecting her in the current environment.

CHAPTER 4

SYSTEM ANALYSIS

4.1 HARDWARE MODULE DESCRIPTION

- Power supply
- Microcontroller ESP32
- Lithium Ion Battery
- Buzzer
- LED Display
- PLA Material for fabrication

4.1.1 Power Supply

The power supply circuit consists of a step-down transformer which is 230v step down to 12v. In this circuit 4 diodes are used to form bridge rectifier which delivers pulsating dc voltage & then fed to capacitor filter the output voltage from rectifier is fed to filter to eliminate any A.C components present even after rectification.

The filtered DC voltage is given to the regulator to produce 12v constant DC voltage. 230V AC power is converted into 12V AC (12V RMS value wherein the peak value is around 17V), but the required power is 5V DC; for this purpose, 17V AC power must be primarily converted into DC power then it can be stepped down to the 5V DC. AC power can be converted into DC using one of the power electronic converters and Rectifiers. There are different types of rectifiers, such as half-wave rectifiers, full-wave rectifiers and bridge rectifiers. Due to the advantages of the bridge rectifier over the half and full wave rectifier, the bridge rectifier is frequently used for converting AC to DC.

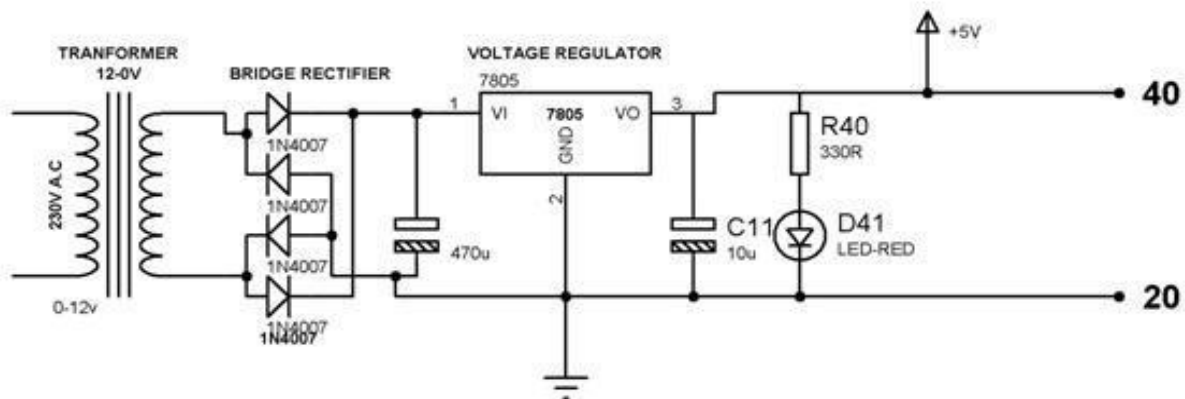


Fig: 4.1 Power supply

4.1.2 Microcontroller ESP32

ESP32 is a series of low-cost, low-power systems on a chip microcontroller with integrated Wi-Fi and dual-mode Bluetooth. The ESP32 series employs either a Tensilica Xtensa LX6 microprocessor in both dual-core and single-core variations, Xtensa LX7 dual-core microprocessor or a single-core RISC-V microprocessor and includes built-in antenna switches, RF balun, power amplifier, low-noise receive amplifier, filters, and power-management modules. ESP32 is created and developed by Espressif Systems, a Shanghai-based Chinese company, and is manufactured by TSMC using their 40 nm process.[2] It is a successor to the ESP8266 microcontroller.

Since the release of the original ESP32, a number of variants have been introduced and announced. They form the ESP32 family of microcontrollers. These chips have different CPUs and capabilities, but all share the same SDK and are largely code-compatible. Additionally, the original ESP32 was revised (see ESP32 ECO V3, for example). ESP32 is capable of functioning reliably in industrial environments, with an operating temperature ranging from -40°C to $+125^{\circ}\text{C}$. Powered by advanced calibration circuitries, ESP32 can dynamically remove external circuit imperfections and adapt to changes in external conditions.

Engineered for mobile devices, wearable electronics and IoT applications, ESP32 achieves ultra-low power consumption with a combination of several types of

proprietary software. ESP32 also includes state-of-the-art features, such as fine-grained clock gating, various power modes and dynamic power scaling. ESP32 is highly-integrated with in-built antenna switches, RF balun, power amplifier, low-noise receive amplifier, filters, and power management modules. ESP32 adds priceless functionality and versatility to your applications with minimal Printed Circuit Board (PCB) requirements.

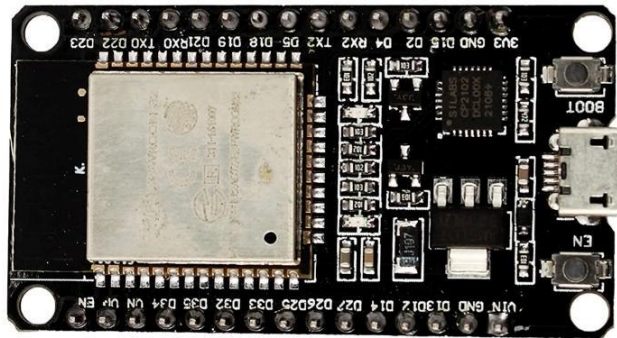


Fig: 4.2 Microcontroller ESP32

4.1.3 Lithium Ion Battery

A lithium-ion or Li-ion battery is a type of rechargeable battery which uses the reversible reduction of lithium ions to store energy. It is the predominant battery type used in portable consumer electronics and electric vehicles. It also sees significant use for grid-scale energy storage and military and aerospace applications. Compared to other rechargeable battery technologies, Li-ion batteries have high energy densities, low self-discharge, and no memory effect (although a small memory effect reported in LFP cells has been traced to poorly made cells).

Chemistry, performance, cost and safety characteristics vary across types of lithium-ion batteries. Most commercial Li-ion cells use intercalation compounds as the active materials. The anode or negative electrode is usually graphite, although silicon-carbon is also being increasingly used. Cells can be manufactured to prioritize either energy or power density. Lithium-ion batteries can be a safety hazard if not properly engineered and manufactured since cells have flammable electrolytes and if damaged or incorrectly charged, can lead to explosions and fires. Much development has made progress in manufacturing safe Lithium-ion batteries. Lithium Ion All Solid-State Batteries are being developed to eliminate the flammable electrolyte.

Improperly recycled batteries can create toxic waste, especially from toxic metals and are at risk of fire. Moreover, both lithium and other key strategic minerals used in batteries have significant issues at extraction, with lithium being water intensive in often arid regions and other minerals often being conflict minerals such as cobalt. Both environmental issues have encouraged some researchers to improve mineral efficiency and alternatives such as iron-air batteries.

Research areas for lithium-ion batteries include extending lifetime, increasing energy density, improving safety, reducing cost, and increasing charging speed, among others. Research has been under way in the area of non-flammable electrolytes as a pathway to increased safety based on the flammability and volatility of the organic solvents used in the typical electrolyte. Strategies include aqueous lithium-ion batteries, ceramic solid electrolytes, polymer electrolytes, ionic liquids, and heavily fluorinated systems.

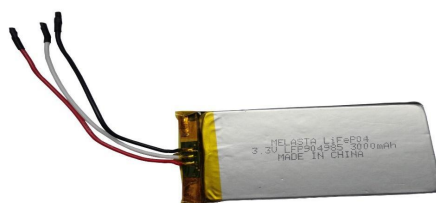


Fig: 4.3 Lithium-ion battery

4.1.4 Buzzer

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke. The fig shows the connection of the buzzer in the circuit. Piezo buzzers are used for making beeps, tones and alerts. This one is petite but loud! Drive it with 3-30V peak-to-peak square wave. To use, connect one pin to ground (either one) and the other pin to a square wave out from a timer or microcontroller. For the loudest tones, stay around 4 KHz, but work quite well from 2 KHz to 10 KHz. For extra loudness, you can connect both pins to a microcontroller and swap which pin is high or low ('differential drive') for double the volume. The PS series are high-performance buzzers that employ unimorph piezoelectric elements and are designed for easy incorporation into various circuits.

4.1.4.1 Features of buzzer

- They feature extremely low power consumption in comparison to electromagnetic units.
- Because these buzzers are designed for external excitation, the same part can serve as both a musical tone oscillator and a buzzer.
- They can be used with automated inserters. Moisture-resistant models are also available.
- The lead wire type (PS1550L40N) with both-sided adhesive tape installed easily is prepared
- A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke. Buzzer is an integrated structure of electronic transducers, DC power supply, widely used in computers, printers, copiers, alarms, electronic toys, automotive electronic equipment, telephones, timers and other electronic products for sound devices. Active buzzer 5V Rated power can be directly connected to a continuous sound, this section dedicated sensor expansion module and the board in combination, can complete a simple circuit design.

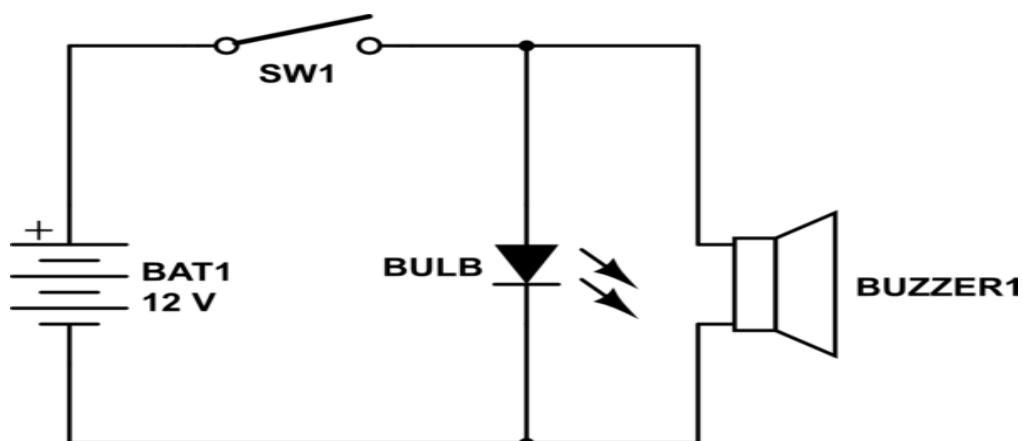


Fig: 4.4 Buzzer

4.1.5 LED Display

Light Emitting Diodes (LEDs) are the most widely used semiconductor diodes among all the different types of semiconductor diodes available today. Light emitting diodes emit either visible light or invisible infrared light when forward biased. The LEDs which emit invisible infrared light are used for remote controls. A light Emitting Diode (LED) is an optical semiconductor device that emits light when voltage is applied. In other words, LED is an optical semiconductor device that converts electrical energy into light energy.

When the Light Emitting Diode (LED) is forward biased, free electrons in the conduction band recombine with the holes in the valence band and release energy in the form of light. The process of emitting light in response to the strong electric field or flow of electric current is called electroluminescence. A normal PN junction diode allows electric current only in one direction. It allows electric current when forward biased and does not allow electric current when reverse biased. Thus, normal p-n junction diodes operate only in forward bias condition.

Like the normal p-n junction diodes, LEDs also operate only in forward bias condition. To create an LED, the n-type material should be connected to the negative terminal of the battery and p-type material should be connected to the positive terminal of the battery. In other words, the n-type material should be negatively charged and the p-type material should be positively charged. The construction of LED is similar to the normal p-n junction diode except that gallium, phosphorus and arsenic materials are used for construction instead of silicon or germanium materials. Light Emitting Diode (LED) works only in forward bias condition. When the Light Emitting Diode (LED) is forward biased, the free electrons from n-side and the holes from p-side are pushed towards the junction. When free electrons reach the junction or depletion region, some of the free electrons recombine with the holes in the positive ions. We know that positive ions have less number of electrons than protons. Therefore, they are ready to accept electrons. Thus, free electrons recombine with holes in the depletion region. In the similar way, holes from p-side recombine with electrons in the depletion region.



Fig: 4.5 LED Display

4.1.6 PLA Material for fabrication

Polylactic acid, also known as PLA, is a thermoplastic monomer derived from renewable, organic sources such as corn starch or sugar cane. Using biomass resources makes PLA production different from most plastics, which are produced using fossil fuels through the distillation and polymerization of petroleum.

Despite the raw material differences, PLA can be produced using the same equipment as petrochemical plastics, making PLA manufacturing processes relatively cost efficient. PLA is the second most produced bioplastic (after thermoplastic starch) and has similar characteristics to polypropylene (PP), polyethylene (PE), or polystyrene (PS), as well as being biodegradable.

PLA is a type of polyester made from fermented plant starch from corn, cassava, maize, sugarcane or sugar beet pulp. The sugar in these renewable materials are fermented and turned into lactic acid, when it is then made into polylactic acid, or PLA. The material properties of PLA make it suitable for the manufacture of plastic film, bottles and biodegradable medical devices, including screws, pins, plates and rods that are designed to biodegrade within 6 to 12 months). PLA can be used as a shrink-wrap material since it constricts under heat. This ease of melting also makes polylactic acid suitable for 3D printing applications. However, many types of PLA have a low glass transition temperature, making them unsuitable for making plastic cups designed to hold hot liquids. PLA production uses 65% less energy than producing conventional plastics and generates 68% fewer greenhouse gasses and contains no toxins. It can also remain environmentally friendly should the correct end-of-life scenario be followed. PLA is soluble in solvents including dioxane, hot benzene, and tetrahydrofuran. The physical and mechanical properties differ according to the exact

type of polymer, ranging from an amorphous glassy polymer to a semi or highly crystalline polymer with a glass transition of 60–65 °C, a melting temperature 130–180 °C, and a tensile modulus of 2.7–16 GPa. Heat resistant PLA can withstand temperatures of 110 °C, and the melting temperature can be increased by 40–50 °C and the heat deflection temperature can be increased from around 60 °C to as much as 190 °C by physically blending the polymer with PDLA (poly-D-lactide).

PLA FILAMENT FEATURES

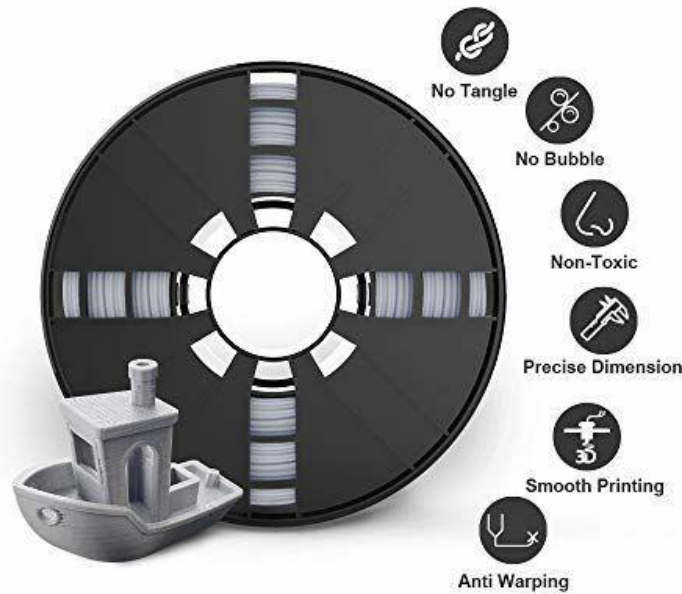


Fig: 4.6 PLA material for fabrication

CHAPTER 5

SOFTWARE DESCRIPTION

5.1 SOFTWARE DESCRIPTION

The purpose of the Software Requirement Specification is to produce the specification of the analysis task and also to establish complete information about the requirement, behavior and also the other constraints like functional performance and so on. The main aim of the Software Requirement Specification is to completely specify the technical requirements for the software product in a concise and in unambiguous manner.

5.2 ARDUINO

In this project the Arduino software is used. The Arduino software is easy-to-use for beginners, yet flexible enough for advanced users. It runs on Mac, Windows, and Linux. Teachers and students use it to build low-cost scientific instruments, to prove chemistry and physics principles, or to get started with programming and robotics. Designers and architects build interactive prototypes, musicians and artists use it for installations and to experiment with new musical instruments. Makers, of course, use it to build many of the projects exhibited at the Maker Faire, for example. Arduino is a key tool to learn new things. Anyone - children, hobbyists, artists, programmers - can start tinkering just following the step-by-step instructions of a kit, or sharing ideas online with other members of the Arduino community.

There are many other microcontrollers and microcontroller platforms available for physical computing. Parallax Basic Stamp, Netmedia's BX-24, Phidgets, MIT's Handyboard, and many others offer similar functionality. All of these tools take the messy details of microcontroller programming and wrap it up in an easy-to-use package. Arduino also simplifies the process of working with microcontrollers, but it offers some advantage for teachers, students, and interested amateurs over other systems:

Inexpensive - Arduino boards are relatively inexpensive compared to other microcontroller platforms. The least expensive version of the Arduino module can be

assembled by hand, and even the pre-assembled Arduino modules cost less than \$50

Cross-platform - The Arduino Software (IDE) runs on Windows, Macintosh OSX, and Linux operating systems. Most microcontroller systems are limited to Windows.

Simple, clear programming environment - The Arduino Software (IDE) is easy-to-use for beginners, yet flexible enough for advanced users to take advantage of as well. For teachers, it's conveniently based on the Processing programming environment, so students learning to program in that environment will be familiar with how the Arduino IDE works.

Open source and extensible software - The Arduino software is published as open source tools, available for extension by experienced programmers. The language can be expanded through C++ libraries, and people wanting to understand the technical details can make the leap from Arduino to the AVR C programming language on which it's based. Similarly, we can add AVR-C code directly into our Arduino programs if we want to.

Open source and extensible hardware - The plans of the Arduino boards are published under a Creative Commons license, so experienced circuit designers can make their own version of the module, extending it and improving it. Even relatively inexperienced users can build the breadboard version of the module in order to understand how it works and save money.

5.3 VISUAL STUDIO

In this project the Microsoft visual studio is used as an IDE. Visual Studio Code combines the simplicity of a source code editor with powerful developer tooling, like IntelliSense code completion and debugging.

First and foremost, it is an editor that gets out of our way. The delightfully frictionless edit-build-debug cycle means less time fiddling with our environment, and more time executing on our ideas.

Visual Studio Code supports macOS, Linux, and Windows - so we can hit the ground running, no matter the platform.

At its heart, Visual Studio Code features a lightning-fast source code editor, perfect for day-to-day use. With support for hundreds of languages, VS Code helps us be instantly productive with syntax highlighting, bracket-matching, auto-indentation, box-selection, snippets, and more. Intuitive keyboard shortcuts, easy customization and community-contributed keyboard shortcut mappings let us navigate our code with ease. For serious coding, we'll often benefit from tools with more code understanding than just blocks of text. Visual Studio Code includes built-in support for IntelliSense code completion, rich semantic code understanding and navigation, and code refactoring. And when the coding gets tough, the tough get debugging. Debugging is often the one feature that developers miss most in a leaner coding experience, so we made it happen. Visual Studio Code includes an interactive debugger, so we can step through source code, inspect variables, view call stacks, and execute commands in the console. VS Code also integrates with build and scripting tools to perform common tasks making everyday workflows faster. VS Code has support for Git so we can work with source control without leaving the editor including viewing pending changes diffs. Customize every feature to our liking and install any number of third-party extensions. While most scenarios work "out of the box" with no configuration, VS Code also grows with us, and we encourage us to optimize our experience to suit our unique needs. VS Code includes enriched built-in support for Node.js development with JavaScript and TypeScript, powered by the same underlying technologies that drive Visual Studio. VS Code also includes great tooling for web technologies such as JSX/React, HTML, CSS, SCSS, Less, and JSON.

Architecturally, Visual Studio Code combines the best of web, native, and language-specific technologies. Using Electron, VS Code combines web technologies such as JavaScript and Node.js with the speed and flexibility of native apps. VS Code uses a newer, faster version of the same industrial-strength HTML-based editor that has powered the "Monaco" cloud editor, Internet Explorer's F12 Tools, and other projects. Additionally, VS Code uses a tools service architecture that enables it to integrate with many of the same technologies that power Visual Studio, including Roslyn for .NET, TypeScript, the Visual Studio debugging engine, and more. Visual Studio Code includes a public extensibility model that lets developers build and use extensions, and richly customize their edit-build-debug experience.

CHAPTER 6

RESULTS AND DISCUSSION

6.1 INTRODUCTION

This chapter discusses the practical results obtained while implementing the project.

6.2 RESULTS OBTAINED

To begin with, testing of the trained model, we can split our project into modules of implementation that is done.

Before making an enclosure using a 3D printer, a 3D model for the pepper spray has been designed using modeling software. Once the design is finalized then the enclosure will be made using a 3D printer.

The below image represents the enclosure design of the pepper spray.

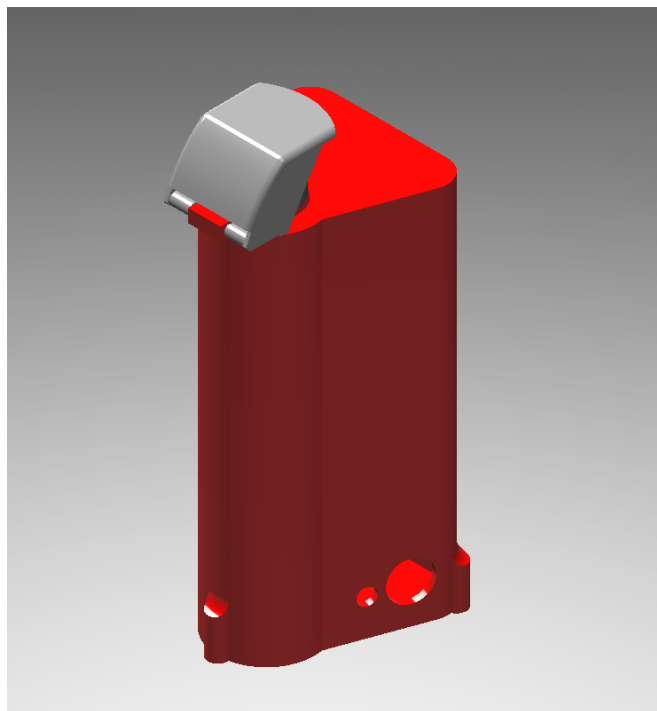


Fig: 6.1 Enclosure Design

The below image represents the 3D printed enclosure of the pepper spray.



Fig: 6.2 3D Printed Enclosure

The below image represents the right-side view of the pepper spray.



Fig: 6.3 Right Side View

The below image represents the isometric view of the pepper spray.



Fig: 6.4 Isometric View

We have developed two mobile applications for women's safety; one is for users and another one is for caretakers.

Login screen designed for the user as well as the caretaker where they can login with the respective credentials.

The login screen can be seen in the below figure.

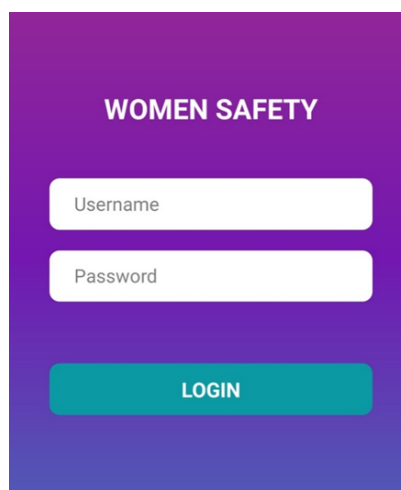


Fig: 6.5 Login screen

Whenever the user is in a danger zone, the live location is displayed in the caretakers mobile application.

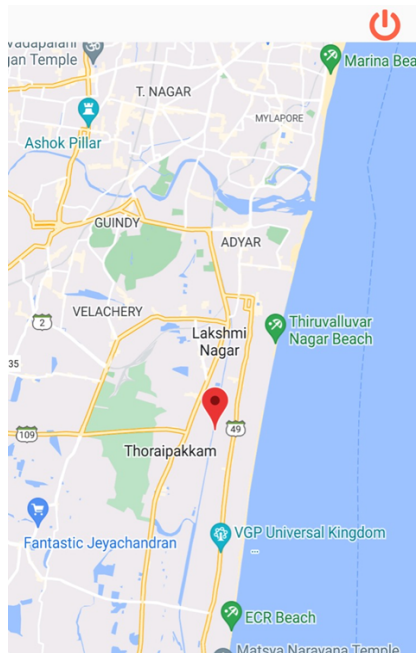


Fig: 6.6 Live location displays

CHAPTER 7

CONCLUSION AND FUTURE WORK

7.1 CONCLUSION

The project has been successfully implemented to provide the solution for modern self-defense for women's safety. The pepper spray is designed by our own through the ESP32 chip to control the battery. If the pepper spray is pressed, ESP32 module which can be configured to notify the user mobile application. Also, we have developed two mobile applications for women's safety; one is for users and another one is for caretakers. A caretaker mobile application is developed using react native to receive mobile notification, also to monitor the condition live and help the victim as soon as possible. A user mobile application is used to share the live location of the women to the caretaker application by passing the location through Google map. Moreover, this system can be utilized for all women's safety by continuous monitoring and is also very promising for real-time applications because of the fast-processing time.

7.2 FUTURE WORK

In the coming future, we will review the application of women safety to determine technology in the safety field and it can be used for capturing the live conditions happening with more accuracy. In this field they have more chances to develop or convert this project in many ways. The mobile application that has been implemented in this project can be further developed to use as a product in real time it can be further analyzed for higher accuracy. Thus, this project has an efficient scope in the coming future where manual prediction can be converted to computerized production in a cheap way and helps in taking care of women at the right time and to avoid difficulties.

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