Malnad College of Engineering, Hassan

(An Autonomous Institution affiliated to VTU, Belgavi)

A Main Project Report

On

"Women's Safety System"

Submitted in partial fulfillment of
the requirements for the award of the degree of

Bachelor of Engineering
in
Computer Science and Engineering

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2022-2023

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Certificate

This is to certify that main project work entitled **"Women's Safety System"** is a bonafide work carried out by **Punith B S (4MC18CS101), Rohan D (4MC18CS108), Hithin H U (4MC18CS053), Pramith U (4MC19CS107)** in partial fulfillment for the award of Bachelor of Engineering in Computer Science and Engineering of the Visvesvaraya Technological University, Belgavi during the year 2022-2023. The project report has been approved as it satisfies the academic requirements in respect of main project work prescribed for the Bachelor of Engineering Degree.

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1.	
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ABSTRACT

The Women's Safety System is an innovative and comprehensive solution designed to address the pressing issue of women's safety in today's society. This abstract provides an overview of the project, highlighting its objectives, key features, and potential impact.

With the aim of empowering women and enhancing their personal security, the Women's Safety System encompasses five distinct scenarios. The first scenario involves an emergency press button, which, when activated, sends the live location of the device to selected individuals and emits a loud audible alarm to attract nearby assistance. The second scenario focuses on accident detection, utilizing advanced accelerometer sensors to promptly notify pre-selected contacts in the event of an accident. The third scenario incorporates RFID verification, allowing efficient tracking and verification of a woman's presence at designated locations and ensuring secure arrivals and departures. The fourth scenario integrates an alcohol sensor, which detects alcohol consumption by drivers and prevents vehicle start-up if alcohol is detected, promoting responsible behavior and reducing the risk of accidents. Finally, the fifth scenario involves surround sensing, where ultrasonic sensors detect the proximity of individuals in the surrounding environment, triggering an audible siren to alert nearby individuals of potential danger.

Powered by the Raspberry Pi 3 Model A+, the Women's Safety System leverages cutting-edge technologies such as IoT, sensors, and real-time communication to provide prompt assistance, proactive prevention measures, and reliable communication channels. By addressing diverse safety concerns comprehensively, the system aims to instill confidence in women, enabling them to navigate their lives without fear or apprehension.

Through this project, we aspire to make a lasting impact on women's safety and contribute to positive societal change. By harnessing the potential of technology and integrating various safety features, the Women's Safety System has the potential to revolutionize personal security for women and create a more inclusive and secure society for all.

ACKNOWLEDGEMENTS

We present with immense pleasure this work titled **"project title"**. An endeavour over a long period can be successful with the advice and support of many well wishers.

We take this opportunity to express our gratitude and appreciation to all of them. The satisfaction and euphoria that accompany the successful completion of any task would be incomplete without mentioning the people who made it possible. So, with gratitude we acknowledge all those whose guidance and encouragement made to successfully complete this project.

We would like to express sincere thanks to our Principal **Dr. Pradeep S**, Malnad College of Engineering for his encouragement made to successfully completion of the project work. We wish to express our gratitude to **Dr.Geetha Kiran A**, Professor and Head, Department of Computer Science & Engineering for providing a good working environment and for her constant support and encouragement.

It gives great pleasure in placing on record a deep sense of gratitude to our guide **Mrs.Shruthi T R**,Associate Professor, Department of Computer Science & Engineering for his daily evaluation of the work and for providing us constant encouragement with his unflinching support and valuable guidance throughout this project.

We would also like to thank all the staff of Computer Science and Engineering department who have directly or indirectly helped us in the completion of the project work. At last we would hereby acknowledge and thank our parents who have been a source of inspiration and also instrumental in the successful completion of the project work.

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Introduction

Ensuring the safety and well-being of women is a fundamental necessity for fostering a just and equitable society. Unfortunately, women often face numerous safety challenges, including the threat of violence, harassment, and assault. These pervasive issues not only restrict women's freedom of movement but also have profound psychological, social, and economic consequences. To address these concerns, our team has embarked on a mission to develop a Women's Safety System—a groundbreaking solution that combines innovative technologies with proactive safety measures. This report presents an introduction to the project, highlighting the pressing need for a comprehensive safety system tailored to the specific needs of women.

The Women's Safety System is designed to provide women with a sense of security and confidence, enabling them to navigate their daily lives without fear or anxiety. By harnessing the power of emerging technologies such as Internet of Things (IoT), sensors, and real-time communication, our system aims to revolutionize the way we approach women's safety.

By developing this comprehensive safety system, we aim to empower women, instill a sense of security, and contribute to the creation of a society where women can freely pursue their aspirations without compromising their safety. This report will delve into the technical details, system architecture, implementation methodology, and evaluation of each scenario, presenting a holistic and transformative approach to women's safety.

1.1 About Project

1.1.1 Problem Statement

The problem of women's safety is a complex and multifaceted issue that demands immediate attention. Women face numerous safety challenges, ranging from potential threats while walking alone to instances of domestic violence and workplace harassment. The lack of effective safety measures and a comprehensive system exacerbates these issues, leaving women vulnerable to harm and impeding their freedom of movement. Existing safety solutions often fall short in providing real-time assistance, reliable communication, and proactive prevention measures tailored to women's unique security concerns. Therefore, a pressing need exists for an integrated Women's Safety

System that addresses these challenges comprehensively and empowers women to reclaim their personal security.

1.1.2 Motivation

The motivation behind our Women's Safety System project stems from the urgent need to create a safer environment for women and alleviate the persistent threats they face daily. We firmly believe that every woman deserves the right to move freely and confidently, without fear or apprehension. By harnessing the power of technology and innovative sensor networks, we aim to develop a solution that not only reacts to emergencies but also actively works towards preventing them.

Our motivation is driven by the following factors:

Empowerment: We strive to empower women by providing them with tools and resources that enhance their personal safety. Our system aims to instill confidence and reassurance, enabling women to live their lives without constantly looking over their shoulders.

Proactive Prevention: Reactive measures are important, but we also recognize the significance of proactive prevention strategies. By integrating a range of sensors and intelligent algorithms, our system can identify potential threats and take preemptive actions to ensure women's safety.

Real-time Assistance: Prompt response and real-time communication are critical during emergencies. Our system facilitates immediate assistance by providing accurate location tracking, alert notifications to trusted contacts, and audible alarms to attract nearby help.

Accountability and Tracking: By incorporating RFID technology, our system enables efficient tracking and verification of a woman's presence at designated locations, such as offices or educational institutions. This feature ensures greater accountability and contributes to a safer environment.

Holistic Approach: We believe that women's safety should be addressed comprehensively, considering various scenarios and potential risks. Our system encompasses multiple features, including accident detection, alcohol sensing, and surround sensing, to provide a holistic solution that caters to diverse safety concerns.

Through our Women's Safety System, we aim to create a positive societal impact by fostering an environment where women can thrive, confident in their personal security. By taking proactive measures and leveraging technological advancements, we aspire to contribute to a world where every woman feels safe, valued, and empowered to pursue her dreams.

1.1.3 Objectives

The primary objectives of our Women's Safety System project are as follows:

1. Emergency Press Button:

   Develop a user-friendly button interface that can be easily activated during emergencies. Implement a live location tracking feature using GPS sensors to

transmit accurate location information. Integrate a buzzer sensor to create an audible alarm to attract nearby assistance.

2. Accident Detection:

   Utilize accelerometer sensors to detect sudden impacts or collisions indicative of accidents. Establish a communication mechanism to send immediate notifications to pre-selected contacts. Enable prompt response and assistance in case of accidents or potential harm.

3. RFID Verification:

   Incorporate RFID scanning technology to verify the presence of women at designated locations. Develop a system to send notifications to selected individuals upon successful RFID verification. Improve accountability and tracking capabilities for women's movement and safety.

4. Alcohol Sensor:

   Implement an alcohol sensing mechanism in vehicles to detect alcohol consumption by drivers. Enable the system to prevent vehicle start-up if alcohol is detected, ensuring responsible driving practices. Display appropriate alerts to indicate the presence of alcohol to discourage impaired driving.

5. Surround Sensing:

   Utilize ultrasonic sensors to detect proximity of individuals in the surrounding environment. Activate an audible siren to alert nearby people and prompt them to take necessary action. Enhance situational awareness and deter potential threats. By accomplishing these objectives, our Women's Safety System aims to provide a comprehensive safety solution that addresses various scenarios and enhances women's security.

In the subsequent sections of the report, we will delve into the technical details, system architecture, implementation methodology, and evaluation of each scenario, culminating in a holistic women's safety system that contributes to a safer society for all.

Chapter 2

Literature Survey

[1] This project describes about safe and secured electronic system for women which comprises of an Arduino controller and sensors such as temperature, pulse rate sensor, sound sensor. A buzzer, LCD, GSM and GPS are used in this project. A wire it can be placed to the body of the Victim. So,s When the women isin threat, the device sensesthe body parameterslike heartbeat rate, change in temperature, and the voice of the victim is sensed by sound sensor. When the sensor crosses the threshold limit the device gets activated and traces the location of the victim using the GPS module. By using the GSM module, the victim's location is sent to the registered contact number.

[2] In our Country, even though it has super power and an economic development, but still there are many crimes against women. The atrocities against the 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 controller for the hardware device is the most efficient and it consumes less power. We use radio frequency signal detector to detect hidden cameras.

[3] This paper focuses on a security system that is designed merely to serve the purpose of providing security to women so that they never feel helpless while facing such social challenges. An advanced system can be built that can detect the location and health condition of person that will enable us to take action accordingly based on electronic gadgets like GPS receiver, body temperature sensor [1], GSM, Pulse rate sensor.

[4] This research proposes a wearable "Wrist band" that addresses the challenges faced by women. The wrist band integrates various devices and communicates with a smartphone via the internet. It includes a trigger, microcontroller, GSM module, GPS module, IoT module, neuro stimulator, buzzer, and vibrating sensor. When a woman senses danger, she activates the device, which uses GPS to track her location and sends an emergency message via GSM to a registered phone number. The device also alerts nearby individuals with an alarm signal, delivers non-lethal electrical shocks using the neurostimulator, and sends the last known location if forcefully removed. Its compact size allows for easy portability.

[5] Women's safety remains a pressing issue despite technological advancements. Existing handheld safety devices require manual activation, making them less effective.

To address these limitations and provide foolproof safety, we propose an IoT-based safety device that utilizes fingerprint-based connectivity. The device automatically alerts nearby individuals and the police when an unsafe situation is detected, indicated by a lack of fingerprint verification for one minute. Additionally, a shockwave generator is included for self-defense. The design incorporates features like group messaging and audio recording. Furthermore, a mobile app is developed, displaying safe locations on a map, enabling women to navigate from their current location to a secure place. This comprehensive solution aims to enhance women's safety and provide them with a reliable means of protection.

Chapter 3

Project Design

3.1 System Architecture

The Women's Safety System project design involves the integration of hardware and software components to create a comprehensive safety solution. The hardware includes a Raspberry Pi 3 Model A+, emergency button, sensors (accelerometer, GPS, alcohol, RFID, ultrasonic), and a display module. The software components encompass the operating system, programming language (Python), communication modules, and user interface. The design includes scenarios such as emergency button activation, accident detection using the accelerometer, RFID verification, alcohol detection, and surround sensing using the ultrasonic sensor. The system will be thoroughly tested and documented, ensuring a user-friendly interface and comprehensive reporting of the project.

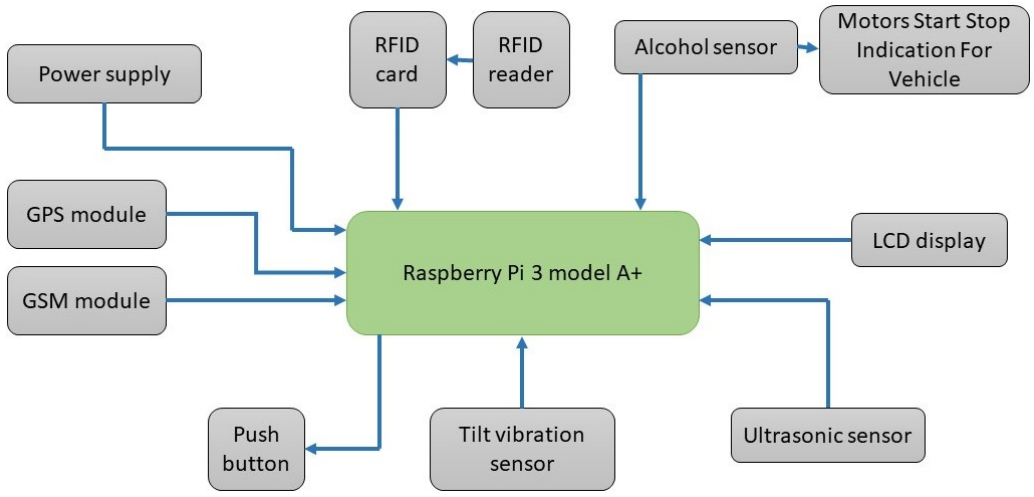

Figure 3.1: System design

Chapter 4

Implementation

4.1 Hardware and Software Requirements

4.1.1 Hardware requirements

- Power supply
- RFID reader
- RFID Card
- Alcohol Sensor
- Motor start and stop indication for cab
- GPS Module
- GSM Module
- Emergency push button
- LCD display
- Accelerometer sensor for accident detection
- Ultrasonic sensor
- Raspberry-pi

4.1.2 Software requirements

- Raspberry-pi OS
- VNC viewer
- Python 3

4.2 Raspberry Pi 3 Model A+

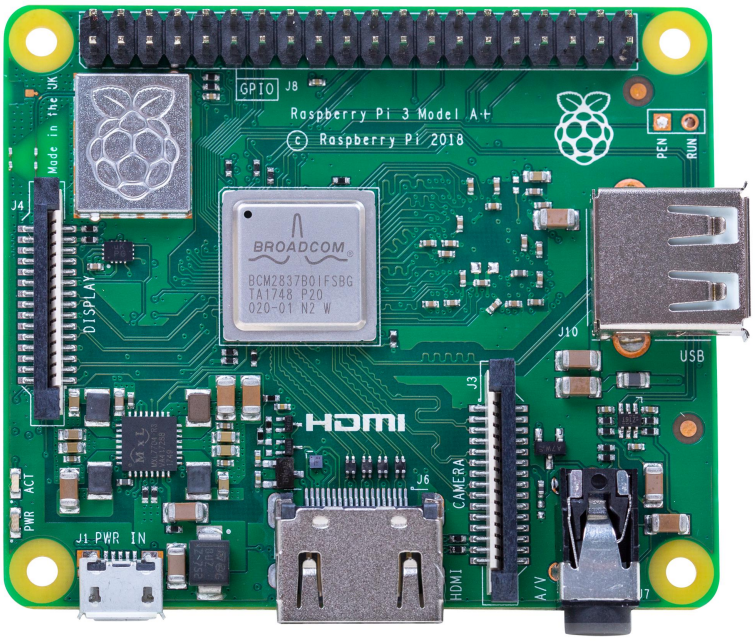

Figure 4.1: Raspberry Pi 3 Model A+

The Raspberry Pi is a small single-board computer that serves as the central processing unit of the Women's Safety System. It integrates and controls the various components, processes data, and facilitates communication with external devices and networks.

The Raspberry Pi 3 Model A+ is a compact and affordable single-board computer developed by the Raspberry Pi Foundation. It features a 1.4 GHz quad-core ARM Cortex-A53 CPU, 512MB of RAM, and offers wireless connectivity with built-in 2.4 GHz and 5 GHz Wi-Fi and Bluetooth 4.2. With its smaller form factor, measuring 65mm x 56mm, the Model A+ is ideal for projects where space is limited. It includes a 40-pin GPIO header for connecting external devices, a microSD card slot for storage, and HDMI and USB ports for video, audio, and peripheral connectivity. The Model A+ is compatible with various Linux distributions and offers power efficiency, making it a popular choice for diverse applications and projects.

4.3 RF-id

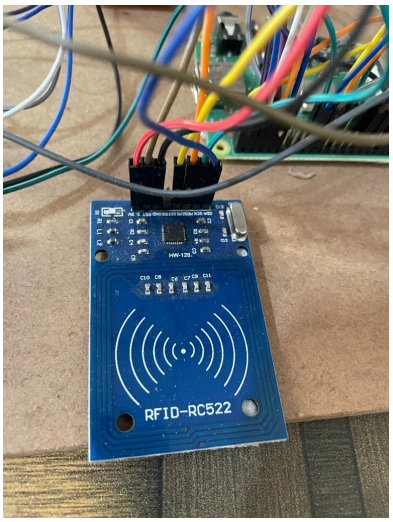

Figure 4.2: RF-id Reader

RFID Reader: An RFID (Radio Frequency Identification) reader is a device used to communicate with RFID tags or cards. It emits radio waves and receives signals from the RFID card to verify its authenticity or to access specific information stored on the card.

RFID Card: An RFID card is a small card embedded with an RFID chip that contains unique identification data. It is used for various purposes, such as access control, identification, and verification. In the Women's Safety System, the RFID card is used for verifying the presence of a woman at designated locations.

4.4 Alcohol Sensor

Figure 4.3: Alcohol Sensor

An alcohol sensor is a device that detects the presence of alcohol in the surrounding environment or breath. In the project, the alcohol sensor is used to detect alcohol consumption by drivers. It ensures that the vehicle can only be started if alcohol is not detected, promoting responsible behavior and preventing drunk driving incidents.

4.5 GPS Module and GSM Module

Figure 4.4: GPS Module and GSM Module

GPS Module: A GPS (Global Positioning System) module is used to determine the precise location coordinates of a device. In the Women's Safety System, the GPS module is utilized to track the live location of the device and send it to selected individuals for emergency assistance.

GSM Module: A GSM (Global System for Mobile Communications) module enables communication over cellular networks. It allows the Women's Safety System to send messages, notifications, and alerts to pre-selected contacts using SMS or internet-based messaging services.

4.6 Ultrasonic Sensor

Figure 4.5: Ultrasonic Sensor

An ultrasonic sensor emits high-frequency sound waves and measures the time it takes for the waves to bounce back after hitting an object. It is used in the Women's Safety System to detect the proximity of individuals in the surrounding environment. If someone comes too close, it triggers the system to activate an audible siren to alert nearby individuals.

4.7 Emergency Push Button

Figure 4.6: Emergency Push Button

The emergency push button is a physical button that can be pressed in case of an emergency. When activated, it triggers the system to initiate emergency protocols, such as sending the location data and alert notifications to selected contacts.

4.8 System design

The implementation phase of the Women's Safety System involved setting up the hardware components and developing the necessary software to integrate and control the system functionalities. The following steps were undertaken:

1. Hardware Setup:

   The RFID reader, alcohol sensor, motor start/stop indication, GPS module, GSM module, emergency push button, LCD display, accelerometer sensor, ultrasonic sensor, and Raspberry Pi were connected as per the provided specifications and pin configurations.

2. Software Setup:

   The required libraries and dependencies were installed on the Raspberry Pi, including RFID communication, alcohol sensor data processing, GPS tracking, GSM communication, LCD display control, accelerometer data analysis, and ultrasonic sensor readings.

3. RFID Verification:

   Software algorithms were developed to read RFID card data using the RFID reader. A database of authorized RFID card information was established for verification. The RFID verification process was integrated into the system, triggering notifications upon successful verification.

4. Alcohol Detection:

   The alcohol sensor was calibrated and configured to ensure accurate detection of alcohol presence. Algorithms were implemented to analyze the sensor readings and determine if alcohol is detected. The alcohol detection module was integrated into the system, allowing it to prevent vehicle start-up if alcohol is detected and displaying appropriate warnings.

5. Motor Start/Stop Indication:

   The motor start/stop indication mechanism was connected to the Raspberry Pi. Software logic was developed to monitor and control the motor's status based on user input or system conditions. Visual or auditory indications were implemented to signify the motor's state (started or stopped).

6. GPS Tracking and Location Sharing:

   The GPS module was configured to retrieve accurate location data. Software was developed to capture live location information from the GPS module. Communication protocols (such as HTTP or MQTT) were implemented to send the location data to pre-selected contacts or emergency services.

7. GSM Communication:

   The GSM module was set up for sending and receiving SMS or internet-based messages. Software was developed to handle message transmission and reception, including emergency alerts and notifications to selected contacts.

8. Emergency Push Button:

   The emergency push button was connected to the Raspberry Pi. Software logic was developed to detect button press events and trigger emergency protocols. Upon button press, the buzzer was activated for audible alerts, the live location data was captured from the GPS module, and emergency notifications were sent using the GSM module.

9. LCD Display:

   The LCD display was set up and configured to interface with the Raspberry Pi. Software was developed to display system status, notifications, and relevant information on the LCD screen. Clear and concise visual feedback was ensured to enhance user interaction with the Women's Safety System.

10. Accident Detection:

    The accelerometer sensor was integrated into the system to monitor changes in motion. Algorithms were developed to analyze accelerometer data and detect sudden impacts or collisions. Upon detection of an accident, the emergency protocols were triggered, including sending accident notifications to pre-selected contacts.

11. Proximity Sensing:

    The ultrasonic sensor was configured to measure distances and detect nearby objects. Software logic was developed to monitor the proximity readings from the sensor. When an individual approached too closely, the audible siren was activated to alert nearby individuals and deter potential threats.

12. System Integration and Testing:

    The integration of all components, sensors, and modules was ensured for seamless functionality. Thorough testing was conducted to verify the performance and reliability of the Women's Safety System, including functionality tests, usability tests, and performance tests.

The implementation phase successfully achieved the integration of hardware and software components, enabling the Women's Safety System to provide a comprehensive safety solution for women.

Chapter 5

Results

5.1 Working Model

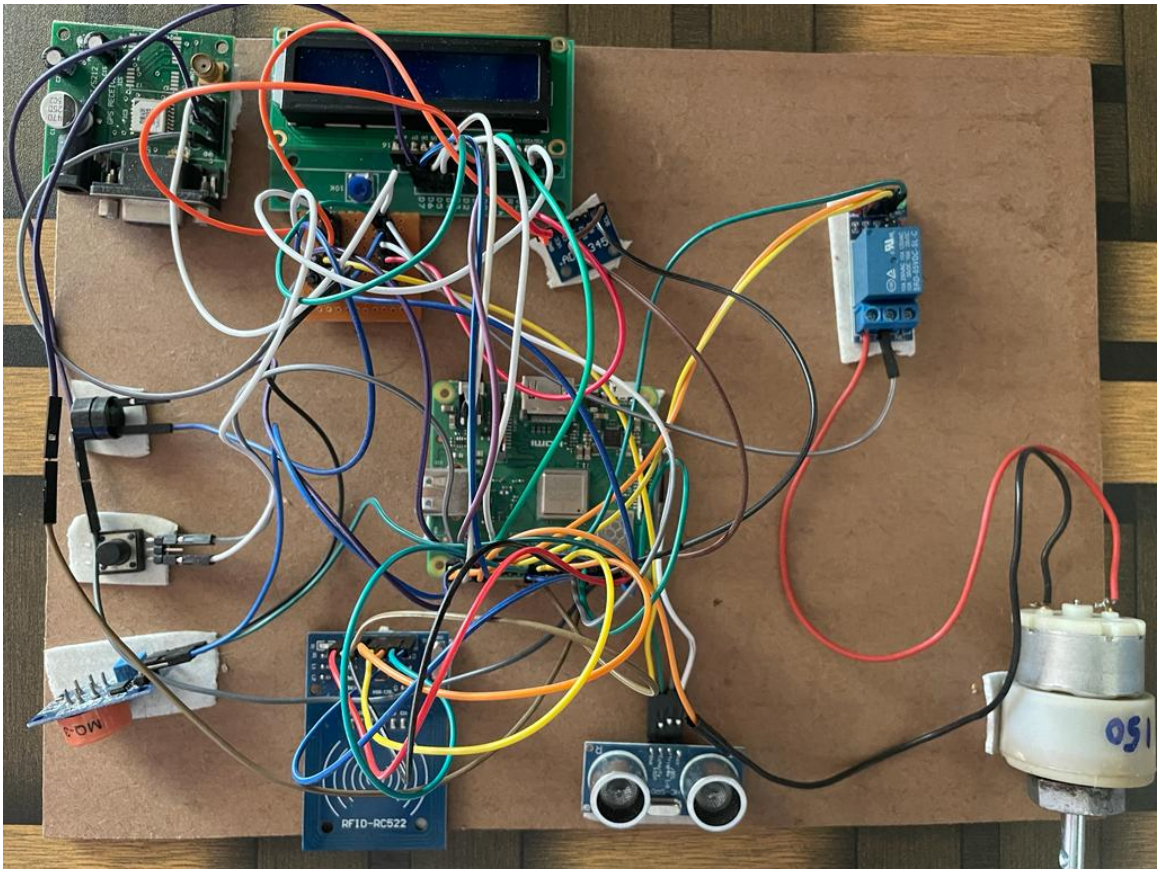

Figure 5.1: Working Model

5.2 Snapshots

Chapter 6

Conclusion

Our team has designed and implemented a comprehensive Women's Safety System consisting of five scenarios to address various safety concerns. Each scenario incorporates different sensors and technologies to enhance women's safety in different situations.

The first scenario focuses on emergency situations, where a user can press a button to trigger an immediate response. The system utilizes an oppressive button, a buzzer sensor, and a GPS sensor to send the live location of the device to a selected person. The loud buzzer sound helps attract attention from nearby individuals who can assist the person in distress.

The second scenario deals with accident detection. By utilizing an accelerometer sensor, the system can detect sudden movements or impacts associated with accidents. Once an accident is detected, a message is automatically sent to a selected person, alerting them about the occurrence and allowing them to take appropriate action promptly.

The third scenario involves verifying the RFID (Radio Frequency Identification) when a woman reaches the office. By scanning an RFID card, the system verifies the person's presence and notifies selected individuals that she has arrived safely. This feature helps in tracking a person's whereabouts and provides an additional layer of security in office environments.

The fourth scenario addresses the issue of alcohol consumption and its potential impact on safety. The system incorporates an alcohol sensor that detects alcohol consumption by a driver. If alcohol is detected, the system prevents the vehicle from starting, thereby ensuring that individuals under the influence of alcohol do not pose a threat to themselves or others on the road.

The fifth scenario focuses on surround sensing and damage prevention. When someone approaches a woman walking alone, the system activates a siren using ultrasonic sensors. The loud siren serves as a deterrent and alerts nearby individuals to the potential danger, encouraging them to intervene and protect the person at risk.

All these scenarios are seamlessly integrated into a Raspberry Pi 3 Model A+ platform, which acts as the central hub for data processing and communication. By combining multiple sensors, such as oppressive buttons, buzzers, GPS, accelerometers, RFID scanners, alcohol sensors, and ultrasonic sensors, our Women's Safety System

provides a holistic approach to address safety concerns faced by women.

Overall, our project aims to empower women by leveraging technology to create a safer environment. By employing these scenarios, we strive to enhance personal safety, improve emergency response, prevent accidents, monitor locations, discourage alcohol-related crimes, and provide immediate alerts in potentially dangerous situations. Through this project, we hope to contribute to the well-being and security of women in society.

APPENDIX A

Python Program

```
import RPi.GPIO as GPIO
import time
gas=38
relay=40
buzz=37
TRIG_PIN = 13
ECHO_PIN = 11

GPIO.setmode(GPIO.BOARD)
GPIO.setup(gas, GPIO.IN,pull_up_down=GPIO.PUD_UP)
GPIO.setup(relay, GPIO.OUT)
GPIO.setup(TRIG_PIN, GPIO.OUT)
GPIO.setup(ECHO_PIN, GPIO.IN,pull_up_down=GPIO.PUD_UP)
GPIO.setup(buzz,GPIO.OUT)

def get_distance():
        # Send 10us trigger pulse
        GPIO.output(TRIG_PIN, True)
        time.sleep(0.00001)

import RPi.GPIO as GPIO
from mfrc522 import SimpleMFRC522
import time

reader = SimpleMFRC522()

while 1:
        id, text = reader.read()
        print(id)
        time.sleep(0.15)
        if(id==644477638416):
                print("name:sanjay")
```

```
                print("address:hassan")
                print("phone:98324974974")
        elif(id==81644100691):
                print("card invalid")

%Use verbatim environment to insert code
\begin{verbatim}
import RPi.GPIO as GPIO
from mfrc522 import SimpleMFRC522
import time
reader = SimpleMFRC522()
while 1:
        id, text = reader.read()
        print(id)
        time.sleep(0.15)
        if(id==644477638416):
                print("name:sanjay")
                print("address:hassan")
                print("phone:98324974974")
        elif(id==81644100691):
                print("card invalid")

                import RPi.GPIO as GPIO
import time
import board
import busio
import telepot
import adafruit_adxl34x
import serial
i2c = busio.I2C(board.SCL, board.SDA)
accelerometer = adafruit_adxl34x.ADXL345(i2c)
accelerometer.enable_freefall_detection(threshold=10, time=25)
accelerometer.enable_motion_detection(threshold=18)
accelerometer.enable_tap_detection(tap_count=1, threshold=20, duration=50, late>
gps = serial.Serial("/dev/ttyS0", baudrate=9600)
link1 = 'http://maps.google.com/maps?q=loc:latitude'
pin=19
GPIO.setmode(GPIO.BCM)
GPIO.setup(pin,GPIO.IN,pull_up_down=GPIO.PUD_UP)


def gps_on():
```

References

[1] T V Sai Kalyani, V Mounika, P Pooja, V Sai Sahith, B Pranay Kumar, and C Akhil Kumar. A novel approach to provide protection for women by using smart security device. 2020.

[2] Dr G Monisha, M Monisha, G Pavithra, and R Subhashini. Women safety device and application-femme. *Indian Journal of science and technology*, 9(10):1–6, 2016.

[3] GC Harikiran, Karthik Menasinkai, and Suhas Shirol. Smart security solution for women based on internet of things (iot). In *2016 International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT)*, pages 3551–3554. IEEE, 2016.

[4] K Venkatesh, S Parthiban, P Santhosh Kumar, and CNS Vinoth Kumar. Iot based unified approach for women safety alert using gsm. In *2021 Third International Conference on Intelligent Communication Technologies and Virtual Mobile Networks (ICICV)*, pages 388–392. IEEE, 2021.

[5] Wasim Akram, Mohit Jain, and C Sweetlin Hemalatha. Design of a smart safety device for women using iot. *Procedia Computer Science*, 165:656–662, 2019.