

Women Safety Android App and IoT Device: Survey

Neha Nikam¹, Girija Gade², Jyoti Dundale³, Tauker Nakkwa⁴ and Mimi Cherian⁵

¹⁻⁵Department of Computer Engineering Pillai College of Engineering, New Panvel

Email: ntech860@gmail.com, girijagade13@gmail.com, jyotidundale14@gmail.com, nakkwatau56@gmail.com, cherianmimi@gmail.com

Abstract—Women's safety is a major issue in today's world. Women contribute to the development and growth of every country; still, they get treated badly. Crimes against women are re- during the growth of every other country. Women have been given equal rights as men, but people never follow this rule. Women are always required to think twice before stepping out of their homes, especially at night. This is, unfortunately, the very sad reality of our country which lives in constant fear. The project aims to provide security to ladies who feel any danger around them. This Application can be operated by just pressing the switch/help button in the mobile application or on IoT based smart device. They will send a signal/message to the selected contacts for help with the location link to locate the victim with the help of GPS and GSM modem. The project also provides a facility for analyzing the crimes in a particular location using machine learning and it can be used to determine whether the location is safe or not before reaching there. The analysis is dependent on reported cases in that particular area. These areas will be displayed on a map in the application, in case the user wants to check whether the area is safe or not.

Index Terms— Android phone, URL, GSM, GPS Tracker, Bluetooth access, Alert messages, Android studio, Embedded Systems, IoT.

I. INTRODUCTION

Women's empowerment refers to giving women the power to make their own decisions. For so many years, men have caused a lot of harm to women. They were considered to be practically nonexistent in prior eras. As though voting, one of the most fundamental rights, belonged exclusively to men. As society changed, women became more aware of their power. The movement for women's emancipation got underway then. Women have substantially increased their ability to perform any task in recent years. In today's environment, women sometimes have to consider their safety when traveling alone at night or in some areas. And whether at home, outside, or even at work, women's safety is very important. Even now, many women of all ages continue to experience abuse, violence, rape, and domestic abuse. Precautions must be taken, and one must be vigilant. In our nation, 80 percent of women worry about their safety. Women are catching up to men in many areas of society right now but at the expense of their safety.

With the exception of 2020, when the Covid-19 outbreak raced through India and a strict lockdown forced the country to shut down for months, crime statistics show a constant upward trend year after year. It also affected data collection, according to experts. India reported the highest number of crimes against women ever in 2021, according to data on crime given by the government. Women must always exercise caution when leaving their houses, especially late at night. This is, regrettably, the extremely terrible truth of our nation, which constantly

lives in our heads.

In order to ensure your safety, it may be beneficial and practical to carry an app or IoT gadget. The IoT device is in the shape of a band or carrier type, and it offers the same features as smart apps while also adding some improvements like the ability to sense temperature, heart rates, voice data, and a mild shock that enables the victim to protect herself from any danger or dangerous circumstance. Additionally, women in today's world must demonstrate their value just as much as men do, and they are doing so by working hard and remaining determined. But it also raises concerns about their security.

As can be observed, crime rates and the number of events involving women have grown in comparison to the previous two years. In order to ensure and address the safety-related issues that go hand in hand with needing them, it is necessary to have some safety-related device apps for women. The system's major goal is to create a low-cost option for GPS-based women tracking systems that can be used in a variety of commercial and personal settings. Android software also offers the ability to forecast the level of crime in a given area. The project offers the capability of applying machine learning to analyze the crimes in a location, which can be used to evaluate if the location is safe or not. As can be observed, crime rates and the number of events involving women have grown in comparison to the previous two years. In order to ensure and address the safety-related issues that go hand in hand with needing them, it is necessary to have some safety-related device apps for women. The system's major goal is to create a low-cost option for GPS-based women tracking systems that can be used in a variety of commercial and personal settings. Android software also offers the ability to forecast the level of crime in a given area.

II. LITERATURE REVIEW

In this section the literature survey is conducted in three categories namely category 1 survey on applications build for women's safety, category 2 Women's Safety Technique using IoT devices, and category 3 Women's safety technique using both applications as well as IoT.

A. Category 1: Women Safety Application

Sharma et al. created a user-friendly, well-functioning Women's safety-savior android application in 2022. Emergency contacts, such as friends, family, and relatives, will continuously receive messages every 30 seconds that reveal the user's precise location. Additionally, it offers details on neighboring police stations. Additionally, repeatedly hitting the panic button activates the camera, which takes pictures that may be crucial proof. GPS and GSM technologies are employed in the project [1].

In 2021, Singh et al. developed a project called NAARI Safety Application which makes use of a QR code reader to read the vehicle number and retrieve the real-time location using GPS. The chosen contacts will receive the message with the location and the vehicle's number. In order to help women learn new and different things for their safety, it also offers safety advice such as different tricks which can be used in suspicious situations to get out of it. The application supports Android versions of KitKat and later, it requires GPS, and a database to store the vehicle's information and these are the technologies employed [2].

Shrinivas et al looked into the Android App for Women Safety also known as the "Security Alert" app for smart android phones in 2021. The user can create and save their own content message in this project. also chooses the people to whom the message should be sent in an emergency. The saved message will be sent to the saved contacts when the assistance button is pressed. The primary function of the program is that it will keep sending messages until the Help button is touched. GPS and databases are the technologies employed [3].

In 2020 Women's safety system by voice recognition app for women's security in public spaces attempts to create a completely secure app. As a result, GSM is the most often used mode of dominant switching in this application. Additionally, it provides a wide range of options for how to use the equipment and access it. give the user the ability to track their current position on the web and transmit that information to their registered contacts. Users must first enter their information into the program, which they can later change as needed. Use this program by speaking, shaking your phone, or clicking. It also features a sound recording module that can be utilized as further evidence. Unless voice recognition doesn't function effectively, a mechanical procedure like shaking or clicking can start [4].

B. Women's Safety Technique using IoT devices.

In 2021, S. Pravinth Raja et al introduced the project Women's Safety with a Smart Foot Device. smart safety footwear using the Internet of Things was suggested because of these crimes happening in the current scenario.

A smart device was inserted inside the shoe well and triggered covertly. The smart wearable device has a button, a Microcontroller board, GPS, GSM, and a buzzer. By three times tapping one foot after the other, an alert is set off. As a result, the GSM and GPS can send a message to pre-set contacts like a guardian or police department. A decision tree classifier was used to assess the data, and the results showed that this inexpensive device had far higher dependability [5].

In 2021 Bannuru Ranjeeth et al introduced the project Smart Child Safety Wearable Device. This project's technical objective is to provide a regular channel of communication between the parent and child by employing a device that tracks the child's location, temperature, and heart rate using a GPS tracker, temperature sensor, and pulse sensor. The parent can sometimes view the child's data by using the device interface. To preserve the history of the children's old data for use in the future, the information is stored permanently in the cloud. When the sensors become sensitive to certain activities, they automatically turn on [6].

An IoT-based gadget known as Smart Wearable Device for Women Safety Using IoT including a microprocessor, buzzer, pressure sensor, pulse rate sensor, temperature sensor, GPS, GSM, and other components was unveiled by V.Hindavi et al. in 2020. It primarily relies on the processing of data from a variety of sensors to identify dangerous situations. For example, if pressure is being applied to women over a certain limit, a pressure sensor will identify it, and a pulse rate sensor will identify irregular heartbeats. Additionally,

one can push a buzzer-activated button that sends the location of the person to family members by using the GPS and GSM modules. But sometimes this may fail due to uncertain health issues by which the temperature or pulse rate of a person can vary but still the device will indicate it as suspicious activity [7].

The smart wearable device known as Raspberry Pi Based Smart Wearable Device for Women Safety using GPS and GSM Technology system, developed by Dhiraj Sunehra et al., is a smart security solution that is used to improve the safety and security of women and children. It was introduced in 2020. A buzzer alarm is provided in the system which provides the ability to get heard by others who are nearby the user. The system uses the Global Positioning System to locate the user and the General Radio Packet Service or Global System for Mobile Communications to send an SMS with the user's position to the emergency contact and the police. A USB web camera attached to the gadget is also used to snap images of the assault and the user's or victim's surroundings. So that these pictures can be used as evidence in front of the law to put the criminal behind bars. Not simply women are offered security and safety by the system [8].

K Hari Kishore and colleagues proposed a proposal of An Application on Women's Safety Using Embedded Systems and IoT in 2021 that intends to automatically send a warning message and the user's current location to family members or friends when the user is in a perilous scenario without the user's involvement. The core of the system is a microcontroller, and the pulse rate sensor PPG—used to detect an abnormal increase in heart rate when a person is in danger—enables automatic message delivery. The system uses a network of GPS and GSM modules to track the user's location and send alarm messages. The project's future goals include developing the tool so that it should function in every situation possible [9].

In 2022, C K Gomathy and colleagues unveiled a proposal of WOMEN SAFETY DEVICE USING IoT that offers a wearable safety gadget powered by Arduino. Users can share their locations with relatives and the appropriate authorities using GPS and GSM. By pressing a switch, notifications are manually sent, and in an emergency, a panic switch is utilized to shock the user. A buzzer then activates Arduino, GSM, the switch, GPS, and the laser. Using diode technology in this project This method enables several users to control device operation, and the switch's built-in authentication feature speeds up failure detection [10].

Nalina et al. unveiled the Smart Women Safety Device Using IoT project in 2021, which intends to create a compact device that can be activated by simply pressing a button and has temperature, speech data, and heart rate incorporated into the Raspberry Pi. The camera records photographs of situations that are on external remote sensors, and the application on the controller transmits the alarm using SMS through GPS. The Raspberry Pi, camera, GPS, GSM, temperature sensor, tilt, and panic button are among the technologies used in projects. It also places a call to one of the maintained contacts [11].

In 2021, Palwadi et al. proposed the Women's Safety Technique using IoT devices also called as "Splendid band" wearable hardware project, which intends to provide a combination of various devices and wearable hardware that is always connected to smartphones. In the event of an emergency, the woman can transmit aid interest by space headings to neighboring police stations, persons in that area who have that specific application, and her family thanks to the project's usage of GPS and pre-charged message organizations. GSM, SIM, a 32F407VG microcontroller, BLE, a PIR sensor, and a direction sensor are among the technologies employed.[12]

C. Category 3: Women Safety Technique using Application and IoT device

In 2020, B.S.S. Tejesh et al have introduced a project A Smart Women protection system using Internet of Things and Open-Source Technology In this project, A strong foundation for women's safety and awareness has developed. The complex system ensures that women have a safety net in terms of monitoring, documentation, and self-defense. The smart women protection system is combined with open source and the Internet of Things in order to positively contribute. The victim location can be coordinated via latitude and longitude positions therefore requisite actions will be taken place. To effectively protect the woman, the Raspberry Pi 3 and ESP8266 Wi-Fi device is used with modules such as fingerprint, GSM, GPS, camera, body sensors, and nerve simulator. Tracking and identifying the woman is made possible via the GSM, GPS, camera, fingerprint module, and body sensors [13].

When a person feels dangerous, they can just tap twice on the band's screen, and the location will be communicated to emergency contacts. IoT-based Unified approach for Women safety Using IoT project was developed in 2021, thanks to

K. Venkatesh et al. Additionally, the device will produce a 50-meter-distance ring that can be easily heard by nearby people. An application is used to locate the territory, by identifying the location by analyzing the longitude and latitude and sending a message to the emergency contacts. The finding of location and message sending is done through the application and not by the IoT device or band. Even more dangerous gas is smeared on the attacker by the apparatus [14].

In 2020 Safety Solution for Women Using Smart Band and CWS App was made which includes pushing the emergency switch on the gadget, women in this project can receive safety assistance. The alarm message is delivered to each person's family, volunteers, and nearby police box with their real-time location thanks to GPS when this button has been touched

twice within five seconds. Additionally, the user can find out where the closest safe zone is. The essential aspect is that this device functions in both online and offline modes. The user can still utilize the gadget to access the closest police station and volunteer assistance if there is no internet connection. And because it activates in two different ways, the app and it works in tandem. One by hitting the band button, and another by using the app's emergency button. The use of Bluetooth is utilized for this. The system will check to see if the GPS is ON when the emergency switch is depressed. If not, the application will activate the GPS location. Through Google Geolocation Service, the system will be informed of the victim's current location. The closest active user of the victim will then receive a notification from the app via the Firebase Notification Service. Raspberry Pi, GPS, GSM, Bluetooth, and Arduino mini with electric teaser are among the technologies employed [15]

D. Research Gap Identified

This section contains the research gap which was identified in the previous projects or papers. The gap is again divided into multiple parts such as application-based, IoT-based, and total analysis.

Figure1 tells about the technology used overall in these years in the application and which one was foremost used. And the most dominant(base) one in the application building is GPS and GSM. Whereas others are used for enhancing purposes.

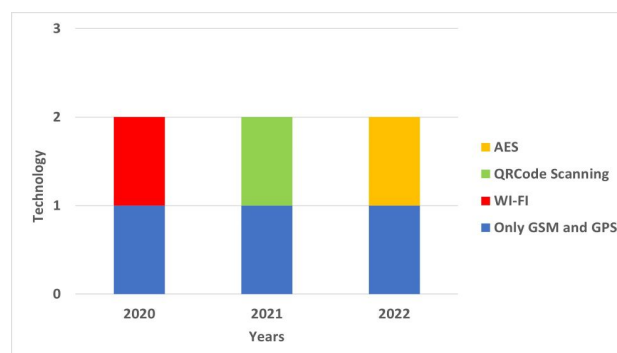


Fig. 1. Survey on Women Safety Application where various component technology been used

Figure 2 tells us about the technology used overall in these years in the application and which one was used for most and the dominant one. And the graph is plotted depending on the micro-controllers like Arduino UNO, Arduino NANO, and Raspberry Pi. So we can assume which controllers work nicely and provides great results.

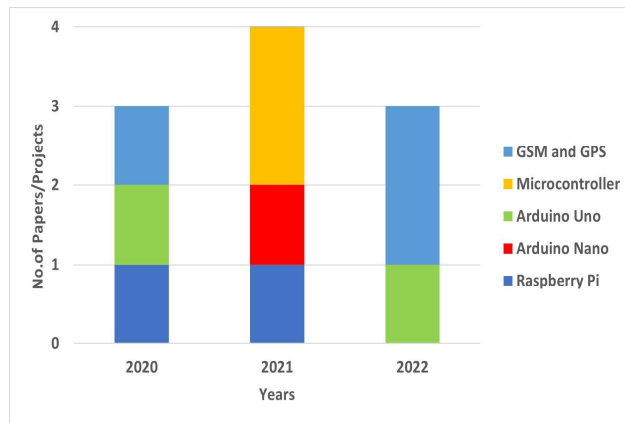


Fig. 2. Survey on Women Safety IoT Device where various component technology been used

The Figure 3 indicates the domain in which most works had been done such as Only applications, IoT based, or both domains combined together. This graph even shows that in which year the work was done in particular technology.

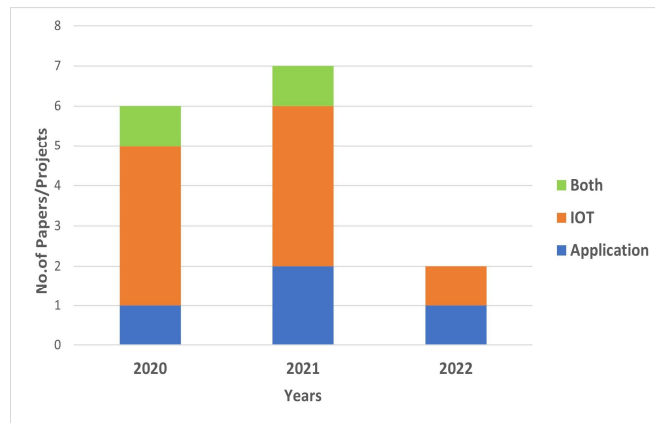


Fig. 3. Literature survey on number of papers which uses Application, IoT or Both Technology

III. PROPOSED SYSTEM AND ARCHITECTURE

The proposed system is directly focused on women's safety. So, the system will help to overcome existing systems drawbacks such as there was only one domain used android application or IOT hardware device, but in this project, the proposed system consist of both the domains implementation which includes not only android but also IoT hardware part. Both the domains will work hand in hand using wifi module.. The project will definitely require a GPS module, GSM module, internet connection, database for storing the contacts information and a predefined message which will be sent to the receiver along with the real time location during any emergency, it even involves a buzzer, microcontroller, etc.

The system serves android based applications along with the IOT hardware device to track the culprit with the geographical identification of the incident. The users are required to submit personal details such as email id along with emergency contact numbers. The users can configure their own list of contacts including close relatives and friends. At the time of any critical/unsecure incidents .The application will help the womens to be safe by sending the message or by making noise from buzzers present in the IOT hardware device. The application even evolves one domain which will directly provide the emergency contact numbers which includes ambulance, child support, police, etc.

Fig 4 shows the block diagram of the proposed system. Which includes various modules of the project which will provide the precise idea of the proposed system. We require a microcontroller to store the program and control the working of other hardware components which are required in this project such as the GSM module, GPS module, database, etc.

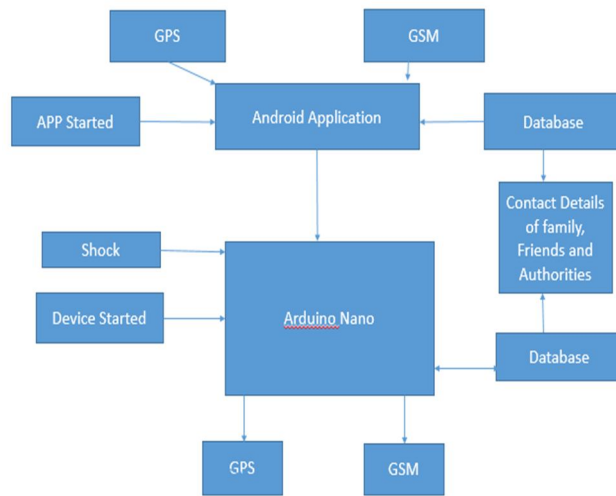


Fig. 4 Proposed system architecture

IV. RESULTS

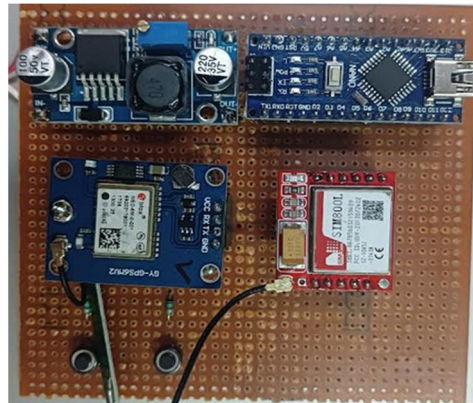


Fig 5 Hardware implementation

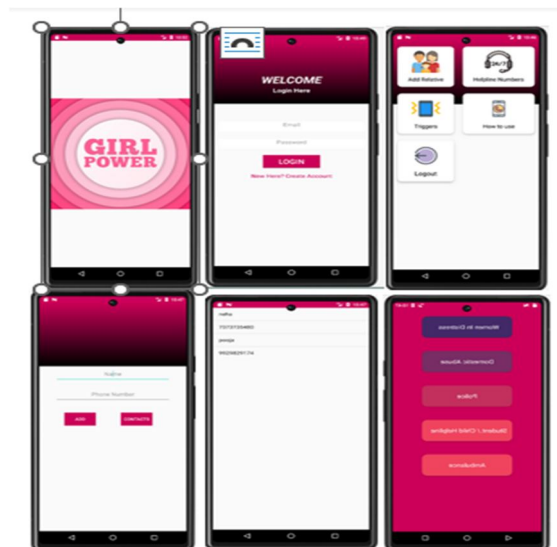


Fig 6 Application Implementation

V. CONCLUSION

The Emergence of various technologies such as android applications and IoT devices is done to solve the problems which women are facing. The advancement in every particular domain whether it is an application or an IoT device has contributed to providing the development of various powerful techniques. To update the existing systems which were mainly focused on a single domain and as there was very less work done in the combined domain. The project has not only a combined domain but along with-it crime prediction module is also considered in it which will be very helpful to prevent any suspicious activity.

SUMMARY TABLE

Literature	Technology	Features	Research Gap
Women Safety Savior Android Application, IEEE, 2022	AES, GPS, GSM	Continuous message sending. photos clicking	Recording of audio is not present
NAARI Safety Application, 2021	QR code scanning, GPS, GSM	QR code scanning for getting vehicles information messages sent using GPS	Cannot contact the nearby police station
Android App for Women Safety, 2021	GPS and GSM	Automatic request for location activation and finds the precise location	The law enforcement database is not integrated with this application
Women Safety System by Voice Recognition, IEEE, 2020	GPS, GSM, WI-FI.	Use this program by speaking, shaking your phone, or clicking. It also features a sound recording module that can be utilized as further evidence	-Serves proof based on CCTV -No Camera snaps
Women's Safety with a Smart Foot Device, IEEE, 2021	GPS, GSM, Microcontroller Board	Sends message to emergency contacts, like a guardian or the police department.	Device can get break in footwear.
Smart Child Safety Wearable Device, IEEE, 2020	Pulse sensor, temperature sensor, GPS	The data is stored into a cloud permanently.	Not work in offline mode
Smart Wearable Device for Women Safety Using IoT, IEEE, 2020	Arduino UNO, Pressure sensor, temperature sensor, pulse rate sensor, buzzer	Detects dangerous situation by analyzing data through various sensors. Also sends a message and makes sound by using buzzer.	It may sometimes fail to detect the atrocity.
Raspberry Pi Based Smart Wearable Device for Women Safety using GPS and GSM Technology, IEEE, 2020	Raspberry Pi, IoT, GPS, GSM	It sends an email notification to the predefined contact. The device also captures the image of the assault	Improve efficiency and reduce maintenance.
An application on Women's Safety using Embedded Systems and IOT, TURCOMAT, 2021	Microcontroller, GPS and GSM module, Pulse rate sensor, Micro Vibration Motor	Alert message sent to emergency contact upon pressing the emergency Button	-False Trigger. -In Prototype only
Women Safety Device Using IoT, IJSREM, 2022	Arduino Uno, GSM and GPS module, Laser diode, Buzzer, and Transformer	The device work by sending manual alerts in case of emergency and as a panic switch to get the shock, then the Buzzer will also activate along Laser diode	The Product can be destroyed, snatched, or damaged.
Smart Women Safety Device using IOT, IJERT, 2021	Raspberry pi, camera, GSM, GPS, temperature sensor, panic button	Provides alert message with current location and temperature, voice data and heart rates are stored	Cannot work in offline mode

Women's Safety Technique using IOT device, TURCOMAT,2021	Arduino Uno, Pulse sensor, temperature sensor, GPS and GSM module	The device alert to the nearest police control room, to their parents as well as nearby people who were using this application	No wireless GPS mechanism
A Smart Women protection system using Internet of Things and Open-Source Technology, IEEE,2020.	Raspberry Pi , GSM, GPS	In difficult circumstances, the contacts who have signed up also get SMS and calls. Coordinating the victim's location using latitude and longitude	Overall efficiency of the system and device can be improved
IoT Based Unified approach for Women safety using IoT, IEEE, 2021	Atmega 2560, trigger, GPS, GSM, Buzzer, Vibrating sensor	Detect Critical situation using app and sends messages, make noise, smears poisonous gas	If mobile gets snatched, then the device will fall
Safety Solution for Women Using Smart Band and CWS App, 2020	GPS, GSM, Bluetooth, Switch, LCD screen.	Application relates to device with the help of Bluetooth which sends message to emergency contacts	Can fail when the device and mobile are not in range.

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