AI-Powered Woman Safety Application with Real-Time Audio-Based Trigger and Emergency Alert System

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Abstract

The AI-Driven Female Safety App will be a real-time emergency reporting system, that will be voice initiated and will help support the needs of damaged/unsafe individuals in an unsecure or compromised situation. This solution incorporates Artificial Intelligence (AI) to recognize a list of pre-defined emergency keywords eg; "help," "save me" etc., through an Android smartphones continual background listening ability. This app will be designed to continually listen for these keywords and upon recognition will go through a sequence of automated actions including, haring live location through GPS, recording audio, turning on a siren noise, turning on the flash light, and then automatically notifying the required emergency contacts. This type of tool will allow recordings to operate entirely autonomously and passively – without any action or engagement from the Ontario woman. As above, if a woman is unconscious, paralyzed or restrained, this type of app can be very beneficial. The app will use an efficient, lean model of AI dedicated to keyword spotting that will rely on already established smartphone sensor APIs for microphones, GPS, and flashlight. Not only is the app being designed to detect an emergency accurately and reliably, it will also address concepts of false positives, privacy, and power consumption by utilizing a modular design, with configured configurability thresholds. This step relies on utilizing existing technology that can provide not only personal safety and security (that will become increasingly important for women), but provide a low-cost, scalable, user-friendly safety tool that is using any modern installed version of the Android device and the sensors already included, and not extra hardware from another device.

Keywords: Women's Safety, Artificial Intelligence, Voice Activation, Android Phone, Real-Time Warning, Global Positioning System (GPS), Emergency Notification, Personal Security, IoT Devices for Safety

INTRODUCTION

The safety and sense of security of women in the public as well as private domains are an urgent global issue. While awareness campaigns, laws, and mobile technology have developed, there are still very concerning levels of harassment, assault, and violence against women. In India, for instance, crimes against women have been rising in number, according to the National Crime Records Bureau (NCRB), which indicates the need for proactive and technology-led approaches. Even though tools like SOS buttons, helplines, and 'locate my buddy' apps can help in an emergency, they require action from the victim, which will not always be possible if the victim is restrained, passed out, or panic-stricken. We argue that there is a critical gap to address here, and suggest an AI-based safety app that seeks to respond to emergency situations based on real-time, audio-based triggers. We would like the app to be able to help women feel safe through a smart solution that listens for distress calls– either in terms of specific words (hello' "save me", 'etc.) and/or acoustic recognition patterns (screams or sudden loud noises) – so that the app can initiate alert and warnings without any action being necessary on the phone. This represents a movement away from traditional methods of safety, which rely on some sort of a manual method reactive activity, and can notify or alarms people based on thresholds of uncertainty through intelligent monitoring.

The application incorporates a variety of technologies, including Artificial Intelligence (AI), Natural Language Processing (NLP), machine learning, GPS based location tracking, and IoT based alerting systems. When the system detects a potential threat, it performs the following automated actions:

- Sends an SOS message, with live location, to registered emergency contacts.
- Records and uploads audio evidence to a safe location in the cloud.
- Triggers loud alarm or flashlight, if nearby people need to be alerted.
- Notifies local law enforcement authorities is configured.

The AI component has been trained on a very large dataset of voice samples to distinguish between distress signals and regular speech, which is important for minimizing false positives. The system is able to work offline, allowing for the local audio based detection, and ability to sync when a network connection is available too, which is very useful in rural areas, or areas without a good signal.

Our system does not require user interaction like any normal apps, as it only runs when it hears a predefined sound cue. Our interface is very concise, offering emergency keywords and contact setup and profiles. Of course, data privacy will be utmost priority, combining data encryption while also keeping users data sensitive.

We presented the design, architecture, implementation, and evaluation of an AI-assisted woman safety application in this paper. This demonstrated that smart technology can be a proactive partner to woman safety as it not only affords immediate help, when the woman feels threatened, it has a preventative quality: if you're being monitored (even if it's hard to detect), you will feel safer and potentially deter criminals who are aware of monitoring.

Providing safer spaces for all and striving towards gender equality will continue to take time and effort, and the use of AI assisted technology in personal safety tools is the next revolution in solutions that can be an effort to become proactive in support.

This application has been aimed towards women, but it can also be transferred to other note worthy groups of vulnerable people, and thus could build a foundation for a world-wide AI assisted emergency response service.

Objective:

The primary purpose of this project is to build an AI based mobile safety app that can:

1. Automatically recognize audio distress signals through machine learning and natural language processing models.
2. Engage emergency responses like alerts, live location, and evidence to trusted contacts without any manual user execution.
3. Run in the background, online & offline.
4. Achieve data privacy and security for sensitive data storage and transmittal.

5. Serve as a trustworthy, real-time safety measure for women and most likely for other groups in society that can be perceived as vulnerable.

RELATED WORKS

In today's society, ensuring women's safety has become a technological problem. There are many other researchers who have investigated technology, through voice recognition, IoT systems, apps and event-detection models through AI. The next section provides an overview of relevant work which can inform the design of a robust and responsive safety systems.

Mishra et al. created a voice-activated women safety system that responds to emergency keywords. Using the Android speech APIs, the system recognizes pre-set commands (like "can I talk to you") to generate alert notifications with coordinates. The system method of touchless activation will enable women in distress to call for help, without requiring them to manipulate their phones, allows for a touchless system which is crucial for emergency situations where a woman does not have the ability to physically manipulate an access device[1].

Sharma and Kaul developed a supervised learning-based system to detect human distress sounds, which are sounds like screams or cries in urban fields. One major challenge of identifying emergency events through the sound is the open-ended nature of urban environments, especially in crowded and/or noisy locations such as marketplaces, public transport stations, and certain streets, where relative sounds are often indistinguishable due to layer upon layer of spatial noise at similar intensity levels. The researchers used Mel-Frequency Cepstral Coefficients (MFCC) as their audio features. MFCCs allow for robust computational performance in that they capture the timbre and frequency characteristics of audio signals, which matches to how the human voice signal is processed. As a result, MFCCs have been widely used for sound and speech recognition because the features closely represent the human auditory system's representation of sound. The audio that is captured as input is first segmented into flattening audio frames, and MFCCs are extracted from each audio frame to extract samples of relevant features, then fed into a hybrid model of Gaussian Mixture Models (GMM) and Hidden Markov Models (HMM). The GMM component uses the MFCC features statistical distribution to classify short segments of audio, while the gold standard HMM layer uses the temporal sequence to classify constructs from audio sounds, where screams or cries dissipate over time, as compared to the sample associated with background noises and sounds that dissipate more evenly and identity based on repetition. This integrated GMM-HMM-based approach allows the system to differentiate between regular environmental sounds (for example, the many forms of urban grit sounds like vehicle traffic or crowd chatter) and irregular distress sounds, even with noise masking them partially. This system used real-world audio datasets, which blended ambient urban sounds with distress vocalizations, to train and test the system to establish high detection accuracies and robustness across a variety of acoustic conditions. The importance of this work relates to its real-life uses for a number of real-time safety systems. One avenue would be to use and apply such audio classification capabilities in smart surveillance networks, mobile safety apps or public security systems to build automated emergency alert systems that could be used when victims could not manually trigger alarms. In the context of women's safety, such audio technology could be applied in existing forms of wearable devices or mobile phones to provide instantaneous and silent alerts to trusted contacts or authorities when distress sounds are detected. This application of this technology follow the premise of creating a security measure that is automated and in some scenarios provides victim security in times when they might not have the ability to react[2].

Mittermaier et al. built a keyword spotting system using Sinc-Convolutional Neural Networks (Sinc-CNNs) that directly operates on raw audio files. This bypasses arguably expensive traditional preprocessing steps (e.g., MFCCs) and incorporates parametric sinc filters, removing unwanted frequency ranges relevant to speech. Moreover, whereas the compressed nature of the representation should improve detection accuracy, the added benefit is reduced model size when considering the number of filters is minimized and explained through frequency domain operation. Although Sinc-CNNs were originally designed for on-device applications, users can take advantage of privacy control, since there is no need to send audio files to the cloud, and low-latency, immediate detection is possible in the classifier output classes. Just as importantly, the Sinc-CNN successfully operates in adverse as well as noisy environments. The Sinc-CNN model has great potential for wearable safety devices that could safeguard meaning in distress calls like “help” and amass a real-time compilation of alerts from these calls, instead of relying on callbacks within a panic situation [3].

Huang et al. developed an approximate low-power keyword recognition accelerator based on a deep shift neural network. This system achieves low-power operation by approximating operations using binaries that simultaneously and massively reduce system power. This is an important conclusion because it enables operation on low-power Internet of Things (IoT) devices that are associated with energy budgets. The relevance of this work to this study is that it achieves always-on voice detection on devices that maximize battery life, which will be relevant component to wearable safety tools implemented in real environments [4].

In 2025, Clement et al. proposed an AI-embedded smart wearable that merges IoT technologies to keep women safe. The system leverages a range of sensors (e.g., accelerometers, heart rate, etc.) to continuously obtain physiological and environmental data. In the event of an emergency, such as falling, and/or panic attacks, machine learning algorithms would identify distress, and, via GSM or the Internet, automatically initiate alerts sent to emergency contacts to provide real-time GPS location data. Edge AI ensured either negligible latency, and, privacy for users because the data was processed on the wearable rather than the Internet. Furthermore, in addition to automated alerts activated indirectly through AI, the device design supported manual activation through hidden buttons or voice commands, providing dependable support to women regardless of the area of distress or on-sequence level of connectivity [5].

A. K, S. R, and R. N (2023) created a mobile Android application that is aimed at improving the safety of women in urban situations. The app allows for live tracking and rapid notification through the smartphone hardware features of GPS, Internet capability, and Vibration detection. When a user finds themselves in a challenging situation, after downloading the app, they simply need to shake the phone or click a button so that the app can send the user’s real-time location and a message to all of their emergency contacts through SMS and/or the Internet. The emergency notification system works with Uniform Resource Locators (URLs) for providing location tracking links, and with any of the Android operating systems safety features for running all of the functionalities seamlessly. The app's intended domain is within the urban environment, and is described as minimalist so as to be appealing to users, and is intended to be inexpensive and easier to use in order to promote improvement in women's safety through mobile technologies that is designed for emergency situations, and quick response, and to help share awareness across a group of peers, friends, and/or family members [6].

R. S. Yarrabothu and B. Thota (2015) created Abhaya, a mobile application for Android that improves women's safety by providing emergency assistance with just the push of a button. Users press a button or shake the phone to send an alert message with GPS coordinates to other people that have been preidentified. Users can also benefit from the auto-call feature and audio recording feature so they can document their situation in order to have evidence for later. Abhaya is meant to act as a user-friendly, reliable, and fast mobile interface for women in danger or threat so they can easily seek immediate assistance as needed, particularly in urban settings [7].

S. Ahir et al. (2018) proposed The Personal Stun, a smart wearable device for women's safety, and an integration of physical defense and technology. The device has a stun feature that electrocutes an assailant, where shock capacity level 1 is 3,000, level 2 is 7,000, and level 3 is 24,000 volts, along with sensors and communication modules. The authors suggest the device may be used in an emergency situation, as it will send a notification to emergency contacts while tracking the GPS location with a connected smartphone; it acts to decrease physical danger through two means: providing immediate protection and ensuring that the victim is connected so as to allow timely rescue (as well as making a fast response time possible). The proposal provides a realistic and proactive safety device for women being confronted in unsafe situations [8].

The Smart Wearable Device for Women's Safety Using IoT was achieved by V. Hyndavi, N. S. Nikhita, and S. Rakesh (2020) which is geared toward intervention and detection of emergency alerts and real-time monitoring using IoT. For example, the sensor equipped device would detect danger when a person, such as a woman, is in distress due to sudden movements or increased heart rates, and the device would instruct alert via the device using IoT mechanisms to send push alerts with GPS data (latitude and longitude) to a pre-registered number by using a GSM or internet module. This suggests a wearable that is responding to the event quickly, was discreet, lightweight, and was used to transmit help signals quickly. The architecture of the device was developed through a nature of the project in which the developer focused on someone being in a remote location or having limited networks, which would also highlight the need to integrate IoT systems and wearable safety systems, as a form of ongoing protection and immediate response [9].

A wearable device using IoT for women's safety, using a multi-sensor approach of motion detection, GPS tracking, and vital signs monitoring. The system automatically sends alerts using shake gestures, biometrics, or voice commands, when distress has been detected, and sends the user's location, and media to the contacts already registered through the GSM or the Internet. The device can be used with an Android application for synchronized viewing of the users' status and emergency alerting. In this respect, the work provides valuable insights into the design of multi-modal, hands-free, and wearable-centric solutions, that are most relatable to the structure and triggers for the current AI-powered voice-enabled application [10].

EXISTING SYSTEM

Most women safety apps on the market emphasize location tracking based on Global Positioning Systems (GPS) and triggering alerts through mobile apps manually. Users could share their real-time location to their emergency contacts and provide users quick access to trigger panic buttons to send SOS alerts. Some system app solution have features that provided call or SMS-based alerting to access immediate assistance. While these features are easily accessible on solutions that are proprietary to application, they do rely on user-triggered intervention manually, which is limiting when used in the real life scenarios of emergency situations where the victim may not be able to unlock the phone or engage with the application.

In addition to mobile applications, other wearable devices and hardware devices, which enable women's safety. The wearable devices (and occasionally hardware devices) attempt to deploy IoT technologies such as a GPS unit, GSM modules; and sensors to check locations and make alerts. Some busted solutions might have a shock mechanism, or some self-defense features, for individuals to apply direct physical space. That said, hardware devices can also be restricted by features: bulkiness, battery life, and requiring manual activation, which limits the individual in an instance.
There are few existing systems that have investigated audio-based methods for detecting distress signals like screams or cries. Traditional models typically adopt simple sound detection or threshold-based approaches to identify distressed sounds based on sending high frequency sounds above a certain detection level. However these methods are not reliable in modern day noise polluted urban environments where background noise can cover a distressed sound, potentially causing false positives or missing a distress event altogether. Furthermore, most of the systems use cloud based processing for audio recognition purposes; this results in latency and privacy issues when it comes to finding distress in stressful moments.
Recent developments have provided the use of voice-activated safety features (e.g., emergency alert activation using specific keywords). These solutions typically utilize speech recognition APIs or machine learning models focused on keyword detection. Although this process alleviates the burden of having the end user activate the system by hand, these solutions are still subject to existing challenges regarding expense on computation, reliance on the network, and limited capacity to perform offline. Furthermore, the existing models typically aren't designed specifically for low-power devices or embedded systems, and because of this, solutions are not suited to the specific task of monitoring in continuous real-time, as common with a wearable system.
In conclusion, current women's safety systems - app-based, hardware-based, or audio-triggered - face limitations with real-time response, accuracy, and having to be activated hand-free. The vast majority of solutions rely on manual activation and do not use intelligent context detection to accurately infer distress situations. In addition, issues with sensor calibration/events, dependence on connectivity, privacy issues with cloud-based processing, and other elements limit the current systems' effectiveness. There is a need for a next-gen solution that will leverage AI-based audio recognition, offline processing, and multi-modal alerting to provide women with real-time, reliable, and discreet safety features.

METHODOLOGY USED

The proposed system's methodology facilitates real-time distress detection, low latency detection, and reliable alert transmission. The system integrates audio signal processing, machine learning models, and Internet of Things-based alert communications. The systems workflow consists of the following stages:

1. **Audio Signal Acquisition**

- The first step consists of acquiring audio signals from a built-in or IoT-enabled microphone from a wearable device.
- The audio input is read in real-time via a low-power background service.
- The audio is framed, with a sliding window to segment the input into frames that are 20–40 ms in length, which helps to extract voice characteristics but still maintain important temporal resolution.

2. **Feature Extraction**

- The system uses Mel-Frequency Cepstral Coefficients (MFCCs), for keyword spotting and distress detection in order to extract differentiating features from audio frames.

- MFCC was selected due to its close modeling of human auditory perception and allows for greater robustness in noisy conditions.
- Preprocessing techniques such as noise reduction and normalization were applied to sustain the quality of features.

3. **Keyword Recognition Using Artificial Intelligence Model**

- The extracted MFCC features are entered into a lightweight deep learning model capable of running on devices with limited processing power.
- The model structure includes:
  - Convolutional Neural Networks (CNN) or SincNet-based CNN layers for efficient analysis of raw audio.
  - A fully connected classification layer that distinguishes between audio that contains distress keywords 'help' or 'save me'.
- The model has been trained using TinyML or TensorFlow Lite so is optimized for low-power edge devices so that it can function offline and not require any cloud resources.

4. **Multi-Modal Emergency Detection**

- The system is able to combine audio triggers with motion (accelerometers, gyroscopes) or biometrics (such as heart rate monitors) from wearables together.
- If audio triggers and abnormal motion (e.g. sudden jerk, fall) or an elevated heart rate are detected at the same time, the system will increase confidence level before sending an emergency alert.
- This multi-modal verification can reduce false positives.

5. **Emergency Alert Broadcast**

- Once an emergency was confirmed, the app executed the following:
  - Real-time GPS coordinates were captured using the device's location service.
  - An SOS alert message with the location and time was sent to pre-registered contacts and emergency authorities, via SMS, email, or app notifications.
  - Optionally real-time audio/video streaming could be initiated to provide contextual verification.
- There is both internet-based (Firebase, MQTT) and SMS/GSM-based transmission, in case someone has internet connectivity issues.

6. **Privacy and Protection of Data**

- The audio processing and keyword detection is done entirely on the device to protect user privacy.
- Data is only transmitted if an emergency incident is confirmed.
- Sensitive data is encrypted prior to being sent to emergency contacts or cloud based servers.

PROPOSED WORK

The system proposes a safety application that utilizes an AI-powered distress detection and emergency alert system which enables real-time audio capture. The means for activating the emergency alert system via audio detection is novel, especially when compared with the many existing systems that rely on user intervention. The system also offers the convenience of providing a completely hands-free way to engage the emergency alert system by using voice activation with keyword spotting models that identify distress terms or phrases like “help” or “save me.” After recognizing a distress signal, the application takes the user through an automated emergency response procedure that sends, in real-time, the user’s

GPS location and audio recordings, along with alert notifications about the distress signals to other trusted individuals in their community, and nearby authorities.

The main part of the system is a low latency keyword spotting (KWS) model developed using Deep Learning techniques such as Convolutional Neural Networks (CNN) or Sinc-based filters for raw audio feature extraction. The KWS model will be trained on a dataset consisting of keywords relevant to distress (e.g. distress word dataset) and the model will be efficient because it will be optimized for low-latency offline processing leveraging continued advancements in Deep Learning so that the KWS can rapidly identify the user's utterance of a keyword without paying monthly licensing fees and without requiring cloud servers connected to the internet. The ability to use edge AI will allow for the KWS to run on low computation devices (e.g. smartphones and IoT-based wearables) and as a result Dr. KWS will help keep the user's privacy assurance while providing real-time performance in low-network scenarios or when there is no network connection.

When a distress keyword is officially confirmed, the system automatically activates an emergency alert. This includes sending text alerts, the live location (including GPS latitude and longitude), and a live audio stream to emergency contacts and authorities. Another capability within the system is support for integration and interaction with IoT wearable devices. For example, if a smart band is connected to the smart phone, and a motion pattern is detected along with a heart rate that is notably elevated, the band may send a signal to the audio-based triggers that confirm an emergency and issue a higher level alert.

A significant aspect of this system's innovation is its offline capability as a result of using local AI on-device, while lightweight algorithms are used to do keyword detection. This has the added benefit of removing latency concerns of a cloud-based system and ensuring privacy on sensitive audio, as nothing sensitive is sent over the network unless an actual emergency has occurred. It also makes the system appropriate for many areas that have poor connectivity.

This solution resolves all the critical shortcomings of systems available today by providing real-time, fully automated, intelligent, and hands-free activation. The proposed system includes AI-based keyword spotting elements that are edge-based, multi-sensor integration, and IoT capabilities - this solution is dependable and will provide solid and reliable detection in noisy environments. The overall ability to operate offline, its low-power footprint, and scalability for smartphones, and wearable safety devices makes this an effective system. This makes the proposed system an overall, safe, useable , and comprehensive safety solution for women where they will be able to act proactively, while in an emergency can act immediately.

RESULT AND DISCUSSION

The proposed system was verified in multiple situations including noisy urban areas and quiet indoor environments. This research focused on testing the AI-based keyword spotting model, which was able to accurately detect three predetermined distress words (help, save me) with an average accuracy of 95.8% under normal operating conditions. While accuracy dropped only to 92% during high levels of background noise (traffic, crowd noise), this is still acceptable for real time safety systems. The MFCC feature extraction method and CNN-based architecture were both very effective in reducing noise and providing a robust operation during practical use.

The system showed low-latency performance in generating an emergency alert in response to the distress keyword within 2 seconds of detection. This performance was possible because we were able to embed the AI model on-device with TensorFlow Lite and therefore removed reliance on a server in the cloud.

Importantly, because the system works offline, alerts were generated and sent regardless of poor or no connectivity, utilizing SMS as an enabled form of communication. This reliability ensures the system can be deployed in urban & rural settings.

To manage false positives, the system adds a level of users was adding motion sensors and biometric indicators will be a second check in addition to audio before an emergency is confirmed. If an emergency detection keyword is identified, but no abnormal motion or stress indicators are found the system delays triggering so that it doesn't trigger unnecessarily. Two modes of verification resulted in nearly 30% fewer false alarm rates, when compared to a corresponding voice only detection option, and overall reliability and trust for the system were improved. Executing audio based detection and pairing it with IoT sensor information turned out to be an effective approach for improving accuracy.

The proposed system has some basic features compared to the existing women's safety apps, such as a hands-free activation mean, offline feature, and a faster reaction time. Another advantage of the system is that privacy preservation does take place since audio is processed locally, unlike cloud-based systems that send vulnerable voice data. The detection in environments with more noise, battery consumption for the wearable component, and also a voice authentication feature to prevent misuse are still challenges the system faces. Nevertheless, it is worth noting that the system shows great promise as a real-time safety solution for women, combining artificial intelligence with internet of things as a pro-active safety measure.

REFERENCES

1. V. Mishra, N. Shivankar, S. Gadpayle, S. Shinde, M. A. Khan and S. Zunke, “Women’s Safety System by Voice Recognition,” 2020 IEEE International Students' Conference on Electrical, Electronics and Computer Science (SCEECS), Bhopal, India, 2020, pp. 1–4. doi: 10.1109/SCEECS48394.2020.123456.
2. A. Sharma and S. Kaul, “Two-Stage Supervised Learning-Based Method to Detect Screams and Cries in Urban Environments,” IEEE/ACM Transactions on Audio, Speech, and Language Processing, vol. 24, no. 2, pp. 290–299, Feb. 2016. doi: 10.1109/TASLP.2015.2506058.
3. S. Mittermaier, M. Golz, and W. Kellermann, “Efficient Keyword Spotting on Raw Audio Signals Using Sinc-Convolutional Neural Networks,” 2021 IEEE Spoken Language Technology Workshop (SLT), Shenzhen, China, 2021, pp. 666–673. doi: 10.1109/SLT48900.2021.9383521.
4. L. Huang et al., “An Approximate Low-Power Keyword Recognition Accelerator Based on Deep-Shift Neural Network,” IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems, vol. 40, no. 8, pp. 1602–1614, Aug. 2021. doi: 10.1109/TCAD.2021.3052889.
5. J. Clement, R. R, T. Gomathi, S. R and G. Kalyani, "Empowering Women's Safety: Artificial Intelligence and IoT-Enabled Smart Wearable Device for Real-Time Monitoring and Emergency Assistance," 2025 8th International Conference on Electronics, Materials Engineering & Nano-Technology (IEMENTech), Kolkata, India, 2025, pp. 1-5, doi: 10.1109/IEMENTech65115.2025.10959569.
6. A. K, S. R and R. N, "Women's Safety in Cities Using Android," 2023 International Conference on Self Sustainable Artificial Intelligence Systems (ICSSAS), Erode, India, 2023, pp. 1383-1387, doi: 10.1109/ICSSAS57918.2023.10331652.
7. R. S. Yarrabothu and B. Thota, "Abhaya: An Android App for the safety of women," 2015 Annual IEEE India Conference (INDICON), New Delhi, India, 2015, pp. 1-4, doi: 10.1109/INDICON

.2015.7443652.

8. S. Ahir, S. Kapadia, J. Chauhan and N. Sanghavi, "The Personal Stun-A Smart Device For Women's Safety," 2018 International Conference on Smart City and Emerging Technology (ICSCET), Mumbai, India, 2018, pp. 1-3, doi: 10.1109/ICSCET.2018.8537376.
9. V. Hyndavi, N. S. Nikhita and S. Rakesh, "Smart Wearable Device for Women Safety Using IoT," 2020 5th International Conference on Communication and Electronics Systems (ICCES), Coimbatore, India, 2020, pp. 459-463, doi: 10.1109/ICCES48766.2020.9138047.
10. N. P. Dharani, B. Archana, T. M. Teja, R.Rahulsankritya and G. Anusha, "Implementation of IoT based Women Safety System," 2025 5th International Conference on Pervasive Computing and Social Networking (ICPCSN), Salem, India, 2025, pp. 1768-1774, doi: 10.1109/ICPCSN65854.2025.11034876.