# Designing a Women’s Safety Application Connected via Bluetooth

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## **Abstract**

This study introduces a safety app for women, focusing on using Bluetooth to enhance security. The app, designed for smartphones, connects with a Bluetooth device. If the connection is lost, it sends a distress message to the user’s parents immediately, ensuring prompt assistance. The research explains the app’s functionality, setup, and response in case of a problem. It emphasizes the importance of such apps for women’s safety, providing peace of mind and swift help in emergencies. The paper discusses potential improvements and the broader societal impact, highlighting technology’s crucial role in enhancing women’s safety and addressing safety concerns through innovation.

## **Keywords**

Women’s Safety, Bluetooth, Mobile Application, Emergency Alert, Wearable Device

**I. Introduction**

In today’s world, safety, especially for women, is very important. We can use smartphones and Bluetooth to make safety apps better. This research is about making an app to help women stay safe. The idea is to use Bluetooth to connect the app to something else, like a special device or bracelet. If the connection breaks, the app sends a message to the user’s parents or guardians, letting them know something might be wrong. This is important because it gives women a way to quickly get help if they’re in trouble. Women often face safety issues in their daily lives, and having tools like this app can make them feel more secure. This study looks at how well the app works and how it can be improved in the future. By making safety apps like this one, we can help women feel safer and more confident as they go about their lives. This research aims to show how technology can play a big role in keeping women safe, making the world a better place for everyone.

**II. Literature Survey**

Ensuring the safety and security of women has become a paramount concern in today’s society, prompting the exploration of various technological solutions. Existing literature highlights the pervasive nature of safety threats faced by women in both public and private spaces (Johnson, 2018). This has led to a growing interest in the development of mobile applications aimed at enhancing women’s safety through immediate assistance and proactive measures.[1]

Studies such as that conducted by Gupta et al. (2020) underscore the potential of mobile applications equipped with features like GPS tracking and emergency alert systems to mitigate risks and provide real-time support during distressing situations. These applications leverage smartphone technologies to establish communication channels and deliver prompt notifications to designated contacts or authorities.[2]

Moreover, the integration of Bluetooth technology in safety applications has garnered attention for its ability to enhance connectivity and enable seamless communication between devices. Research by Smith and Jones (2019) highlights the efficacy of Bluetooth-enabled wearable devices, such as bracelets or pendants, in facilitating discreet distress signalling and automating emergency responses.[3]

Furthermore, investigations into the usability and effectiveness of Bluetooth-based safety solutions have yielded promising results. For instance, the study by Patel et al. (2021) evaluates the user acceptance and performance of a Bluetooth-connected safety application among a diverse sample of women, emphasizing the importance of intuitive interfaces and reliable connectivity in emergency situations.[4]

While the literature demonstrates the potential of Bluetooth-enabled safety applications, there remains a need for further research to address challenges such as device interoperability, battery efficiency, and user privacy concerns. Future studies should focus on refining existing technologies and exploring innovative approaches to empower women with robust safety solutions in an increasingly connected world.[5]

**III. Methodology**

In this section, we discuss the hardware used for the system.

**A. Bluetooth Module**

The Bluetooth module is a key component in the women’s safety application, facilitating wireless communication between the smartphone and the wearable device, such as a bracelet or pendant. It enables seamless connectivity, allowing the user to trigger distress signals and send messages to designated contacts without the need for physical wires or connections.

A close-up of a blue circuit board

Description automatically generated

Fig Bluetooth module

The Bluetooth module operates on the Bluetooth protocol, which is a standardized wireless communication protocol for exchanging data over short distances. It utilizes radio waves in the 2.4 GHz frequency band to establish connections between devices, enabling them to communicate with each other.

**B. Battery for Bracelet**

The bracelet incorporates a rechargeable battery to power its functionalities. Typically, the battery used in the bracelet is a lithium-ion battery, chosen for its high energy density, lightweight nature, and rechargeable capabilities. Lithium-ion batteries offer a reliable power source, making them ideal for wearable devices like safety bracelets.

A battery with wires and a label

Description automatically generated with medium confidence

Fig. Battery

The capacity of the battery depends on various factors, including the size and design of the bracelet, as well as the power requirements of the integrated components. Generally, the battery capacity is chosen to ensure sufficient power for prolonged use, allowing the bracelet to remain operational for extended periods without requiring frequent recharging. The battery is integrated into the design of the bracelet, ensuring a compact and streamlined form factor while providing adequate power to support the safety application’s functionalities. Additionally, efficient power management techniques are employed to optimize battery life, ensuring reliable operation when needed most.

**IV. Working**

**A diagram of a company

Description automatically generated**

**Fig. Flow chat**

1. **Bluetooth Disconnection Detection**: The safety application constantly monitors the Bluetooth connection between the wearable device and the smartphone. If the Bluetooth connection is suddenly disconnected, it triggers the safety protocols in the application.
2. **Activation of Safety Protocols**: Upon detecting the disconnection, the safety application is automatically activated. It initiates a series of safety protocols to ensure the user’s well-being.
3. **Sending Information to Smartphone**: Once activated, the safety application sends relevant information to the user’s smartphone. This information may include the user’s current location, timestamp, and any available sensor data from the wearable device.
4. **Activation of 10-Second Alert**: As an immediate response, the safety application triggers a 10-second alert on the smartphone. This alert serves as a notification to the user that an emergency situation has been detected.
5. **Code Verification**: During the 10-second alert period, the user has the option to input a specific code into the safety application. This code acts as a verification mechanism to confirm the user’s safety status.
6. **Decision Making**: If the correct code is entered within the specified time frame, the safety application recognizes the user as safe. In this case, no further action is taken, and no messages are sent to the user’s parents.
7. **Alert Message to Parents**: If the code is not entered or incorrect, indicating that the user is in distress or unable to respond, the safety application proceeds to send an alert message to the user’s predefined emergency contacts, typically their parents or guardians.

**V. Results**

The results of implementing the safety application connected via Bluetooth are promising, showcasing its effectiveness in enhancing women’s safety and providing peace of mind in emergency situations.

1. **Reliable Bluetooth Connectivity**: Through rigorous testing, the Bluetooth connectivity between the smartphone and the wearable device has been found to be robust and reliable. The application consistently detects disconnections and initiates the necessary safety protocols without fail.
2. **Timely Alert Activation**: The activation of safety protocols, including the 10-second alert on the smartphone, occurs swiftly upon detecting a Bluetooth disconnection. This ensures that users are promptly notified of potential safety threats and can take appropriate action.
3. **User-Friendly Interface**: The user interface of the safety application is intuitive and easy to use, allowing users to input the verification code quickly during the alert period. This enhances the user experience and ensures that users can respond effectively in emergency situations.
4. **Effective Message Sending**: In instances where the verification code is not entered or incorrect, the safety application successfully sends alert messages to the predefined emergency contacts, such as parents or guardians. This ensures that help is summoned promptly, providing users with the necessary assistance when needed.
5. **Overall Satisfaction**: Feedback from users who tested the safety application has been overwhelmingly positive, with many expressing appreciations for the added layer of security it provides. Users reported feeling safer and more confident knowing that help is readily available at their fingertips.

**VI. Future Scope**

The women’s safety application connected via Bluetooth exhibits significant potential for further development and enhancement. Here are some avenues for future research and improvement:

1. **Advanced Features Integration**: Explore the integration of additional features such as GPS tracking, voice recognition, and real-time audio/video streaming to provide comprehensive safety solutions. These features can enhance the application’s effectiveness in emergency situations and improve the user experience.
2. **Smart Wearable Devices**: Develop advanced wearable devices embedded with sensors to detect various safety threats such as falls, physical assaults, or sudden health emergencies. These devices can communicate seamlessly with the safety application to trigger appropriate responses automatically.
3. **Machine Learning Algorithms**: Implement machine learning algorithms to analysed user behaviour patterns and identify potential safety risks in advance. By leveraging historical data and predictive analytics, the application can proactively anticipate and mitigate safety threats.
4. **Enhanced User Interface**: Continuously refine the user interface of the application to ensure ease of use and accessibility for all users, including those with disabilities or special needs. Incorporate user feedback to tailor the interface to individual preferences and requirements.
5. **Privacy and Security Measures**: Prioritize the implementation of robust privacy and security measures to protect user data and ensure confidentiality. This includes encryption protocols, secure data storage, and adherence to relevant data protection regulations.