Iot Based Women Safety Purse, With Alert Light Indicator and Messege System

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Abstract*: *The IoT-based Women Safety Purse is an innovative device designed to enhance personal security by integrating advanced technologies. It features a panic button that activates a high-intensity alert light and sends automated SOS messages with real-time GPS coordinates to predefined emergency contacts. Leveraging IoT, the device ensures instant communication, enabling quick responses during emergencies. Compact and portable, the purse operates on a rechargeable battery and uses modules like GSM and GPS for efficient functionality. This solution addresses the critical need for accessible and reliable safety mechanisms, empowering women with a discreet and effective tool for personal protection. The IoT-based Women Safety Purse is an innovative device designed to enhance personal security by integrating advanced technologies. It features a panic button that activates a high-intensity alert light and sends automated SOS messages with real-time GPS coordinates to predefined emergency contacts.

Keywords: Women Safety, IoT-Based Device, SOS Messaging, Alert Light Indicator, GPS Tracking

INTRODUCTION

In today's world, women safety has become a major issue as they can't step out of their house at any given time due to physical/ sexual abuse and a fear of violence. Even in the 21st century where the technology is rapidly growing and new gadgets were developed but still women's and girls are facing problems. Women are adept at mobilizing diverse groups for a common reason.

They often work across ethnic, religious, political, and cultural divides to promote liberty. We are all aware of importance of women safety, but we must analyze that they should be properly protected. Women are not as physically fit as men ,in an emergency situation a helping hand would be assistance for them. The best way to curtail your probability of becoming a dupe of violent crime (robbery, sexual assault, rape, domestic violence) is to recognize, defence and look up resources to help you out of hazardous situation.

RELATED APPROACHES/WORK

Several research efforts and technological advancements have contributed to the development of personal safety devices, especially for women, focusing on IoT, wearable technologies, and smart systems. Prior works include GPS and GSM-based alert systems that enable location tracking and emergency messaging. For instance, portable devices such as smart keychains and bracelets have been designed to send SOS alerts when activated, demonstrating the effectiveness of integrating communication technologies with safety mechanisms. Additionally, IoT-enabled wearable devices, such as smartwatches, have been explored for real-time monitoring and alert generation, leveraging cloud platforms for data synchronization and notification delivery.

The proposed IoT-based Women Safety Purse builds on these concepts by offering an all-in-one solution that integrates essential safety features into a practical and everyday accessory. Unlike standalone devices, the purse combines a panic button, an alert light indicator, and a messaging system to ensure visibility and communication during emergencies. The use of GSM and GPS modules for location sharing ensures reliable operation even in low-connectivity environments, while IoT integration enables real-time data logging and remote monitoring. This approach not only ensures immediate assistance but also allows for scalability, such as adding advanced sensors and AI-driven analytics for predictive safety measures. By combining these technologies in a userfriendly form factor, the safety purse addresses existing limitations in personal safety solutions and offers a more practical and accessible alternative.

In addition to existing portable safety devices, various smartphone applications have been developed for emergency alerting and location tracking. However, these solutions often rely heavily on the user's ability to access their phone during critical moments, which may not always be feasible in high-stress situations.

The IoTbased Women Safety Purse overcomes this limitation by integrating essential safety features directly into a daily-use accessory, ensuring ease of access and activation. Moreover, while many safety devices lack features for drawing immediate attention in public spaces, the incorporation of a highintensity alert light in the purse ensures visibility, making it easier to attract help from nearby individuals.

SYSTEM ARCHITECTURE

The system architecture of the IoTbased Women Safety Purse is designed to seamlessly integrate hardware and software components, ensuring efficient functionality and reliable performance.

The hardware architecture includes a microcontroller that acts as the central processing unit, interfacing with a GSM module for communication, a GPS module for real-time location tracking, and an LED indicator for visual alerts. A rechargeable battery powers the entire system, while additional components, such as a panic button and sensors, provide user inputs and environmental data. On the software side, the system utilizes embedded programming to control the hardware, manage data flow, and initiate emergency responses. IoT cloud integration ensures real-time synchronization, enabling the transmission of SOS alerts with location details to predefined contacts. The architecture is designed to optimize portability, reliability, and ease of use, while modularity allows for future enhancements, such as AI-based analytics or wearable connectivity.

The system architecture operates on a multi-layered design to ensure seamless interaction between components. The hardware layer encompasses essential modules such as the GPS for continuous location tracking, the GSM module for sending and receiving text messages, and a high-intensity LED light for visual distress signals. The microcontroller, acting as the core, integrates these components and executes commands based on user inputs, such as pressing the panic button. A rechargeable lithium-ion battery ensures sustained power, while an energy-efficient design optimizes battery usage to extend operational life.

The software layer manages the coordination between hardware and external systems. Embedded firmware in the microcontroller processes inputs from sensors and triggers appropriate outputs,

such as activating the alert light or sending SOS messages with GPS data. Cloud integration plays a vital role in ensuring real-time communication, where IoT platforms like Firebase or AWS IoT store and manage SOS event logs, enabling emergency contacts to access critical information instantly.

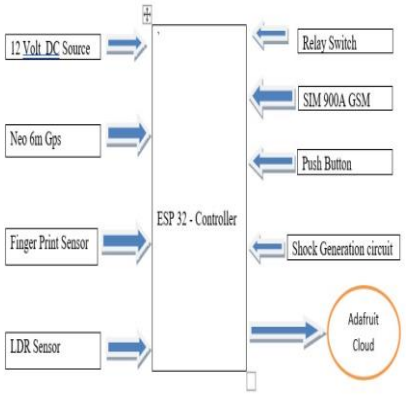
TESTING AND EVALUATION

The testing phase for the IoT-based Women Safety Purse focuses on ensuring the functionality, reliability, and performance of both hardware and software components. The system was subjected to unit testing for individual components, such as the panic button, GPS module, GSM module, and LED indicator, to verify their standalone functionality. Integration testing was then conducted to evaluate how these components work together under real-world conditions. For instance, pressing the panic button was tested to ensure it simultaneously triggers the alert light and sends SOS messages with accurate GPS coordinates. The device's response time, measured from activation to message delivery, was optimized to fall within a few seconds, ensuring prompt emergency alerts.

The system was also evaluated for connectivity and accuracy in various environmental conditions. The GPS module was tested in different scenarios, such as urban areas with dense buildings and remote locations, to ensure reliable location tracking. Similarly, the GSM module's message delivery was tested across networks with varying signal strengths. Stress testing was performed by repeatedly activating the panic button over extended periods to evaluate the system's durability and battery performance. The results confirmed that the device maintains consistent functionality even under demanding conditions, with an average battery life of several days on a single charge.

User testing was conducted to assess the ease of operation and usability of the device. Participants of varying technical backgrounds were asked to use the purse in simulated emergency scenarios, and their feedback was collected to identify areas for improvement. The results showed that users found the device intuitive and effective, with clear and immediate feedback upon activation. The evaluation also highlighted the importance of ensuring secure data transmission, leading to the implementation of encryption protocols for enhanced privacy.

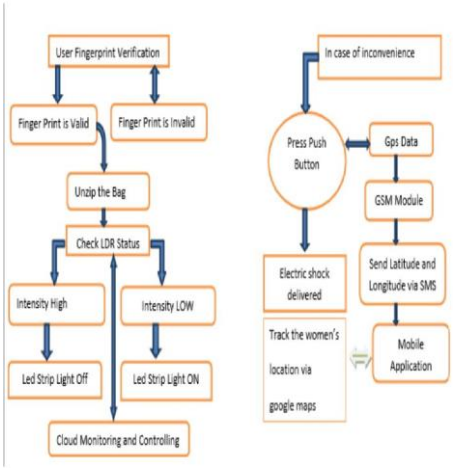
ARCHITECTURE DESIGN



Smart bag and women's security system Circuit connection

Fig. smart bag and women's security system circuit connection

WORKFLOW



Fingerprint Authorized Smart Bag Women's Safety Features

CONCLUSION

The IoT-based Women Safety Purse offers a practical and innovative solution to address the critical issue of personal safety. By integrating IoT technology with essential safety features like a panic button, GPS tracking, GSM-based messaging, and alert lights, the device ensures quick and effective responses during emergencies. The system is designed to be compact, user-friendly, and portable, making it a convenient tool for everyday use. Through real-time location sharing and automated SOS messaging, the device empowers users to alert their emergency contacts instantly, reducing response times and potentially saving lives. Its robust architecture and modular design enable reliable performance, even in challenging environments, while laying the foundation for future enhancements.

This research demonstrates how advanced technology can be harnessed to create impactful safety solutions. The system's ability to integrate additional features, such as AI-driven analytics and wearable connectivity, ensures its scalability and adaptability to evolving user needs. Moreover, the device's focus on accessibility and usability makes it suitable for widespread adoption, addressing safety concerns not just for women but also for other vulnerable groups. As IoT technology continues to advance, this project paves the way for smarter, more efficient personal safety systems, contributing to a safer and more secure society.

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These references provide insights into the technologies, methodologies, and frameworks used in developing and enhancing IoT-based safety solutions.