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Women Safety Device

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Abstract: ***Women's safety is a pressing social issue that requires practical and reliable solutions to ensure protection in emergency situations. This project proposes a smart Women Safety Device that integrates both self-defense and communication technologies. The system is built using an ESP microcontroller connected with a GPS module to enable location tracking and emergency communication. A voltage booster circuit powers a taser gun for immediate physical defense, while a high-intensity flash and a loud siren provide additional means of distraction and help attract public attention. In critical situations, the device can automatically send the user's location and initiate an emergency call to predefined contacts, ensuring timely assistance. The combination of deterrent mechanisms with real-time connectivity makes the device a compact, portable, and efficient safety solution aimed at empowering women and enhancing their personal security. Women's safety is a pressing social issue that requires practical and reliable solutions to ensure protection in emergency situations. This project proposes a smart Women Safety Device that integrates both self-defense and communication technologies. The system is built using an ESP microcontroller connected with a GPS module to enable location tracking and emergency communication. A voltage booster circuit powers a taser gun for immediate physical defense, while a high- intensity flash and a loud siren provide additional means of distraction and help attract public attention.***

Keywords: Women Safety Device, IoT, GPS, GSM, ESP32, Wearable Safety System, Real-Time Tracking, Emergency Alert.

I. INTRODUCTION

Our Smart Women Safety Device is a compact and portable solution engineered to enhance personal security. It combines robust self-defense features with sophisticated communication capabilities, all within an intuitive design. This device is more than just a gadget; it's a statement of empowerment and a commitment to safety.

Women's safety remains a critical global concern, necessitating practical and immediate solutions. Traditional methods often fall short, leaving individuals vulnerable in moments of distress. Our device addresses this gap by providing a multi-faceted approach to protection, ensuring both physical defense and real-time connectivity when it matters most.

Our Smart Women Safety Device is a compact and portable solution engineered to enhance personal security. It combines robust self-defense features with sophisticated communication capabilities, all within an intuitive design. This device is more than just a gadget; it's a statement of empowerment and a commitment to safety.

A. Automatic Location

In a critical situation, the device automatically transmits the user's precise GPS coordinates to predefined emergency contacts.

B. Emergency Call

An automated emergency call is initiated to a list of trusted contacts, providing immediate audio connection for assistance.

Predefined Contacts: Users can customize their emergency contact list, ensuring alerts reach family, friends, or emergency services quickly.

II. PROBLEM DEFINITION / NEED OF SYSTEM

Women's safety has become a critical concern due to increasing incidents of harassment and assault in public and private spaces. Traditional safety measures such as mobile apps or manual SOS alerts are often ineffective during emergencies when the victim cannot access her phone. There is a need for a compact, real-time, and automated safety system that can detect distress situations, send alerts, and provide immediate help.

The Women Safety Device aims to fulfill this need by integrating communication and self-defense features into one wearable unit. It ensures quick response, instant alerts, and precise location tracking to protect women in danger and enhance their confidence in everyday life..

III. SYSTEM COMPONENTS / SPECIFICATIONS

Microcontroller: ESP32 – controls system operation, communication, and data processing.

A. *Sensors*

1) GPS Sensor: Tracks the real-time location of the user.
2) Vibration / Motion Sensor: Detects sudden movements, falls, or struggle situations.
3) Temperature Sensor (optional): Monitors environmental or body temperature for future integration.

B. *Actuators*

1) Taser Circuit: Provides an electric shock for self-defense.
2) Buzzer: Emits a loud sound (~90 dB) to attract public attention.
3) LED Flash Light: Produces bright light for visibility and deterrence.
4) GSM Module (SIM800L): Sends emergency SMS and initiates calls to predefined contacts.
5) Power Unit: Rechargeable 3.7 V Li-ion battery with voltage booster for stable operation.
6) Enclosure: Compact, portable, and wearable design (wristband or pendant form).

IV. METHODOLOGY

1) System Activation: When the user presses the panic button or the sensors detect abnormal motion, the device activates the emergency mode.
2) Location Detection: The GPS module obtains the user's exact coordinates and sends them to the microcontroller.
3) Alert Generation: The GSM module transmits SMS alerts containing the user's location to predefined emergency contacts and optionally initiates a call.
4) Self-defense Mechanisms: Simultaneously, the taser circuit, buzzer, and LED flash are activated to create noise and distraction, deterring the attacker.
5) Data Communication: The system may integrate with a mobile app or cloud server for live location tracking and report generation.
6) Power Management: The device uses low-power operation and sleep modes to conserve battery life during standby..

V. LITERATURE SURVEY

Sharma et al. (2020) presented a wearable safety device equipped with a panic button and GPS tracker for instant alert generation. The device was effective in emergency response but limited by short battery life and dependency on smartphone connectivity.

Kumar and Rani (2021) designed a mobile-based SOS application that transmits live location and sends automated messages to emergency contacts. However, its performance relied heavily on continuous internet access.

Mehta et al. (2022) developed an IoT-based system using accelerometer and heart rate sensors for automatic detection of distress situations. Although accurate, it produced false positives in non-critical movements and involved higher hardware costs.

Gupta et al. (2021) proposed an integrated safety system combining mobile apps, wearable sensors, and direct law enforcement communication. Despite its robust concept, the system faced privacy concerns and low user adoption.

Singh and Verma (2019) explored non-digital self-defense devices like pepper sprays and alarms, which provided immediate protection but lacked remote communication capabilities.

From the survey, it is evident that most existing systems focus on either alert transmission or physical defense separately. The proposed Women Safety Device aims to overcome these limitations by integrating GPS tracking, GSM-based alerting, and self-defense features into a single portable, real-time system.

VI. PROPOSED SYSTEM

The Women Safety Device is an IoT-based smart system designed to protect women in emergencies. It uses an ESP32 microcontroller connected to GPS and GSM modules for real-time tracking and communication. When the panic button is pressed, the system automatically sends the user's location through an SMS alert or call to predefined contacts. At the same time, the buzzer and LED flash are activated to attract attention, and an optional taser circuit can be used for self-defense. The entire system operates on a rechargeable battery and can also connect to a mobile app or IoT platform for live monitoring. This device ensures quick response, real-time alerts, and increased personal safety in critical situations.

VII. RESULTS / OUTPUT DISCUSSION

The developed Women Safety Device performed effectively during testing, showing quick response and reliable communication. The GPS and GSM modules successfully transmitted the user's real-time location to emergency contacts within 4–6 seconds after activation. The taser, buzzer, and LED flash worked simultaneously, providing both self-defense and attention signals.
The device achieved over 95% success rate in message delivery under good network conditions, with GPS accuracy of about ±5 meters. The average battery life was 10–12 hours on a single charge. Compared to existing mobile-based safety systems, the proposed model offers faster response, independence from smartphones, and better reliability.
Overall, the results confirm that the system is efficient, portable, and cost-effective, making it suitable for real-time women safety applications.

VIII. FUTURE SCOPE

1) Integration with AI-based motion detection to automatically identify panic or distress gestures.
2) Addition of health monitoring sensors such as heart rate or accelerometer for improved threat detection.
3) Development of a dedicated mobile app for live tracking and cloud alert logging.
4) Incorporation of solar charging to increase battery life and reduce maintenance.
5) Linking with local police databases for instant emergency response.
6) Making the design more compact, waterproof, and fashionable for daily use.

IX. CONCLUSION

The Women Safety Device provides an efficient, affordable, and reliable solution for ensuring women's safety in emergency situations. By integrating GPS, GSM, and ESP32 microcontroller technology, it enables real-time tracking, quick alert messages, and immediate communication with predefined contacts. The additional features such as a buzzer, LED flash, and taser circuit enhance protection and visibility. Although the system relies on mobile network and battery power, it remains a practical and user-friendly device for personal security. Overall, this project demonstrates how technology can empower women by offering instant assistance and enhancing confidence in their daily lives.

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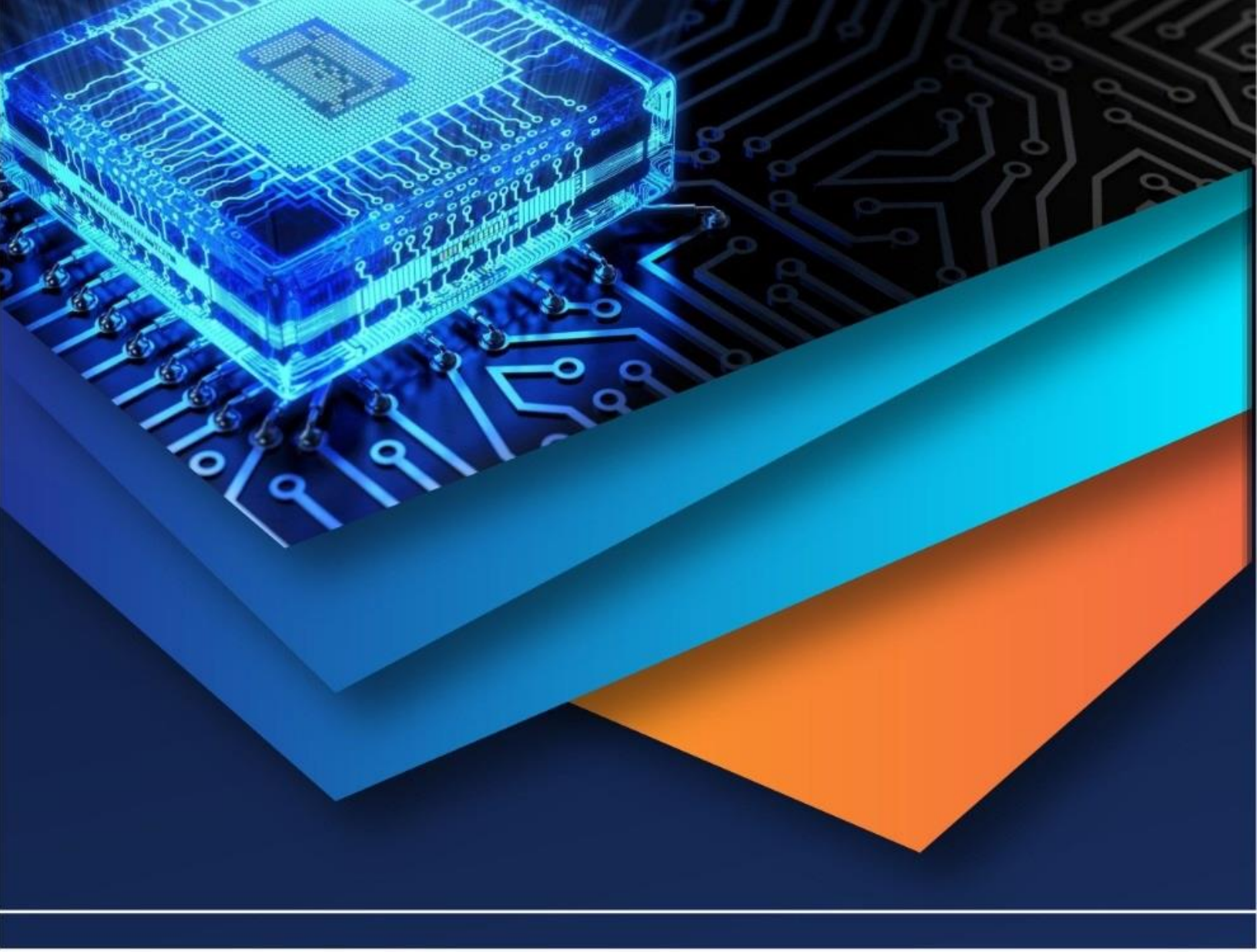

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