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A Review On a Smart Women Safety Application with Crime Prediction, Voice Activation, And IOT-Based Evidence Collection

Dr. Snehal Golait, **Ketki Dhawale** , **Tina Kongre** , **Vaishnavi Kathane**

Department of Computer Science Engineering, Priydarshni College of Engineering, Nagpur, Nagpur, Maharashtra, India

ketkidhawale4@gmail.com

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Abstract *– The rising number of harassment and assault cases against women highlights the need for smarter safety solutions. This review paper introduces a women's safety mobile application that uses modern technologies like real-time location tracking, voice activation, machine learning, and IoT to provide quick and reliable help during emergencies.*

The proposed app allows users to send instant SOS alerts with live location to trusted contacts, either by tapping a button or using voice commands like "help." It also includes a camera feature to capture real-time evidence and stores it securely. Additionally, the system predicts crime risk levels in different areas, helping users stay aware and make safer decisions.

By combining mobile technology, cloud services, and intelligent algorithms, this solution offers a fast, reliable, and user-friendly approach to improving women's safety, with quick response times and high prediction accuracy.

Keywords— Women Safety, Crime Prediction, Voice-Based SOS, Real-Time Alert System

INTRODUCTION

Women's safety has emerged as one of the most critical social and technological challenges of the 21st century. Despite continuous efforts through awareness programs and legal reforms, crimes against women such as harassment, stalking, abduction, and assault continue to rise globally. This growing concern highlights the urgent need for intelligent, technology-driven solutions that can provide immediate assistance while also enabling preventive safety measures.

In the modern digital era, the widespread use of smartphones and the rapid advancement of Internet of Things (IoT) technologies have created new opportunities to enhance personal safety systems. The integration of real-time data processing, location tracking, wireless communication, and intelligent analytics allows the development of applications that not only respond to emergencies but also help users avoid potentially dangerous situations through early risk assessment.

The proposed system, titled "A Smart Women Safety Application with Crime Prediction, Voice Activation, and IoT-Based Evidence Collection," is designed as a comprehensive and user-centric mobile safety solution. The application incorporates a secure user authentication mechanism, ensuring that only authorized users can access and manage the system. It also provides a trusted contacts management feature,

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allowing users to store and update emergency contacts who can be notified instantly during distress situations.

The application includes a one-touch emergency help button that enables users to send automated SOS alerts along with live GPS coordinates to predefined contacts. In addition to manual activation, the system features a voice recognition module that detects emergency keywords such as "help" or "emergency," allowing alerts to be triggered hands-free in critical situations where manual interaction may not be feasible.

To further enhance safety and accountability, the system integrates an IoT-based camera module capable of capturing real-time images during emergency events. These images are stored within the application and can serve as digital evidence for post-incident analysis. Furthermore, the application incorporates a crime prediction module based on machine learning algorithms, which analyzes location-based data to classify areas into low, medium, or high-risk zones. This feature enables users to make informed decisions and avoid potentially unsafe locations.

By combining mobile computing, Artificial Intelligence (AI), GPS technology, and IoT devices, the proposed system offers a scalable, efficient, and intelligent approach to women's safety. This chapter presents the background, motivation, problem statement, objectives, and scope of the project, while emphasizing the role of modern technologies in building responsive and proactive safety solutions.

II. LITERATURE REVIEW

In recent years, significant research efforts have been directed toward the development of IoT-based and AI-driven safety systems to enhance women's security and public safety infrastructure. Rajalakshmi and Harini (2019) developed an Android-based application that enables women to send emergency alerts to family members using GPS and GSM modules [1]. However, the system relied entirely on manual activation, limiting its effectiveness in critical situations. Similarly, Kumar and Singh (2018) proposed an IoT-based safety device integrating GPS and GSM for location transmission during emergencies, but the lack of multimedia evidence and real-time monitoring reduced its overall reliability [2].

To address these limitations, researchers explored IoT–cloud integration and automation. Shruthi and Ashwini (2018) introduced an IoT-based safety system that automates location sharing; however, it lacked visual evidence collection and predictive analysis capabilities [3]. Balaji (2021) emphasized the importance of cloud-integrated IoT frameworks for real-time safety monitoring, highlighting improved data synchronization and low-latency communication [4]. Furthermore, Zhang and Wei (2022) demonstrated the use of ESP32-CAM as a cost-effective IoT camera capable of capturing and transmitting real-time images, making it suitable for surveillance and emergency systems [5].

From a data analytics perspective, Khan et al. (2021) utilized machine learning algorithms to predict crime patterns based on spatial and temporal datasets, enabling identification of high-risk zones [6]. Prasad (2021) discussed the integration of Artificial Intelligence (AI) with IoT systems to enhance urban safety through real-time data fusion [7]. Similarly, Sinha (2022) proposed a data analytics model for crime prevention by classifying regions based on risk levels, reinforcing the role of predictive analytics in proactive safety systems [8].

In addition to IoT and AI, recent studies have explored voice-based emergency activation systems to improve accessibility during distress situations. For instance, researchers have proposed speech recognition-based safety applications that detect keywords such as "help" or "emergency" to automatically trigger alerts without manual intervention. These systems significantly enhance usability in situations where users are unable to physically access their devices. However, many of these solutions lack integration with real-time location tracking, evidence collection, or predictive analytics, limiting their practical effectiveness.

Mobile-based evidence generation has also been explored as a critical component of safety systems. Patel et al. (2018) developed a GSM-based alert device that transmits GPS location but lacks integration with camera modules or cloud storage for evidence management [9]. Borkar et al. (2025) highlighted the importance of secure cloud storage and efficient data handling for real-time IoT applications [10]. The Espressif ESP32-CAM platform, as described in its technical documentation [11], supports Wi-Fi-based communication and high-resolution image capture, making it highly suitable for real-time evidence collection in safety systems.

From the collective findings of these studies, it is evident that most existing solutions are limited by manual dependency, lack of automation, absence of

real-time analytics, or insufficient integration of multiple technologies. Very few systems combine voice-based activation, machine learning-based crime prediction, IoT-enabled evidence collection, and real-time communication into a single unified platform.

Therefore, this research aims to bridge these gaps by proposing a smart, integrated women safety application that combines voice-based emergency triggering, GPS-based real-time alerts, IoT-based image capture using ESP32-CAM, and machine learning-driven crime prediction within a cloud-supported mobile ecosystem. This integrated approach enhances automation, reduces response time, and improves overall system effectiveness in ensuring women's safety.

III. CONCLUSION

This review paper analysed recent studies on smart agriculture using IoT, AI, and machine learning techniques. The reviewed literature shows that sensor-based data collection and intelligent algorithms improve irrigation efficiency and crop productivity. Machine learning models are widely used for crop prediction, disease detection, and soil monitoring. IoT technologies enable real- time monitoring and automated decision-making in precision farming. However, many existing systems are tested only on small-scale or experimental setups. High cost, energy consumption, data security, and lack of standard datasets remain major challenges. Scalability and real- world deployment issues also limit practical adoption. Future research should focus on low-cost, scalable, and energy-efficient smart agriculture solutions. Overall, smart agriculture has strong potential to support sustainable and intelligent farming practices.

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