



International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

OrangeCity Shield — CityWatch: The Digital Guardian of Nagpur

Prof. Chaitali Khandate^a, Ishita Ghayade^b, Shraddha Bankar^c, Snehal Wath^d, Suhani Bode^e

Department of Computer Science and Engineering (Data Science), Suryodaya College of Engineering and Technology, Near Dighori Naka, Vihirgaon, Umrer Road, Nagpur, Maharashtra, 441204, India.

khandate.chaitali345@gmail.com^a; ighayade@gmail.com^b; shraddhabankar64@gmail.com^c; snehalwath782@gmail.com^d; suhanibode248@gmail.com^e

ABSTRACT:

Public safety in cities involves situations such as accidents, harassment, emergencies, and other incidents where quick access to safety services can be important. This paper presents OrangeCity Shield—CityWatch: The Digital Guardian of Nagpur, a unified platform designed to bring essential citizen safety services into one application. The system provides features such as SOS alerts, live location sharing, emergency contacts, incident reporting, safe-route assistance, safety updates, and notifications. It also includes an operator dashboard for monitoring SOS requests, managing incident reports, viewing safety information, and publishing advisories. Location-based features use GPS and map services, while Supabase and PostgreSQL/PostGIS support authentication and data management. The platform is designed to provide citizens with a simple way to access safety-related services while supporting authorized operators in managing reported information.

Keywords: Urban Safety, Citizen Safety, SOS Alert, Location Tracking, Incident Reporting, Safe Route, Safety Zones, Nagpur, CityWatch.

Introduction:

Public safety is an important concern in growing cities, where citizens may encounter situations such as road accidents, harassment, theft, medical emergencies, and other unexpected incidents. In such situations, timely communication and access to emergency assistance can play an important role in helping individuals seek support. Existing safety-oriented applications have explored features such as emergency alerts, communication with trusted contacts, and location sharing to support users during critical situations [2], [7]. Government-supported emergency services such as India's Emergency Response Support System (ERSS-112) further demonstrate the importance of providing accessible channels for reporting emergencies and connecting citizens with appropriate response services [8].

The increasing availability of smartphones, GPS, digital maps, and mobile communication technologies has created opportunities for developing technology-assisted safety platforms. Location-based services can provide the geographical position of a user during an emergency, while mobile applications can support digital reporting and communication of safety-related incidents. Previous research has investigated mobile-based crime reporting systems that use location information and communication features to support public safety management [3]. Similarly, emergency applications have been developed to provide alerts along with user location information, while accident detection systems have explored automated mechanisms for generating emergency notifications [9], [10].

Women's safety has also been an important area of research in technology-based public safety systems. Several proposed applications have incorporated features such as SOS alerts, emergency contacts, live location sharing, safe-route navigation, and communication with authorities [2], [4], [6], [7]. These studies indicate that combining multiple safety functions within a digital platform can provide users with different forms of assistance during emergency situations. In addition, citizen protection applications have explored web and mobile interfaces for supporting safety-related communication and services [5]. However, many existing approaches focus on specific safety requirements or particular user groups, creating a need for more integrated platforms that can bring different safety-related functions together.

For a city such as Nagpur, there is a need for a platform that organizes multiple citizen safety services within a single application. OrangeCity Shield — CityWatch: The Digital Guardian of Nagpur is proposed as an integrated citizen safety platform that combines emergency assistance, location-based services, incident reporting, and safety information. The system provides features such as SOS alerts, live location sharing, emergency contacts, incident reporting, safe-route assistance, safety updates, and notifications. These functions are designed based on concepts explored in previous safety, emergency response, crime reporting, and location-based systems [2]–[10].

The platform also includes a separate interface for authorized operators to support the management of safety-related information. Through this interface, operators can monitor SOS requests, review reported incidents, manage citizen-related information, view safety zones, and publish safety advisories. The main objective of the proposed system is to provide citizens with a convenient platform for accessing multiple safety services while supporting authorized

personnel in monitoring and managing safety-related information. By bringing together location services, digital communication, incident reporting, emergency assistance, and safety information, OrangeCity Shield — CityWatch provides a foundation for an integrated urban safety platform designed for Nagpur.

Literature Survey

Prior work on public safety has explored different approaches for providing emergency assistance, location-based services, incident reporting, and citizen protection. “Safety for HER” presents a technology-assisted safety system emphasizing SOS-based assistance, emergency contacts, live location updates, and coordination during distress situations [2].

The mobile application-based crime reporting system presented in [3] focuses on digital reporting, location services, real-time communication, and management of reported incidents. Such systems demonstrate how mobile technologies can be used to facilitate the collection and communication of safety-related information between citizens and responsible authorities.

The integrated women’s security system presented in [4] combines safe-route navigation, emergency reporting, and location-based assistance, with a primary focus on improving women's safety. Similarly, other smartphone-based safety applications have incorporated features such as SOS alerts, emergency contacts, location sharing, and emergency communication to provide assistance during potentially dangerous situations [6], [7].

Some studies have also investigated accident detection and emergency alert mechanisms. The Smart Accident Detection and Alert System explores the use of technology for detecting accident situations and generating alerts [9]. In addition, the mobile emergency application discussed in [10] focuses on providing notifications for health and safety emergencies along with location-related information. These approaches demonstrate the potential of automated alerts and location services in reducing delays during emergency situations.

At the national level, the Emergency Response Support System (ERSS-112) provides a unified emergency response mechanism in India [8]. The official ERSS-112 platform identifies 112 as the unified emergency number and provides multiple ways for citizens to request assistance, including telephone calls, SMS, panic alerts, and the 112 India application [8]. This provides an important reference for understanding the role of centralized emergency communication in public safety.

Existing research therefore demonstrates the usefulness of SOS assistance, emergency communication, location tracking, incident reporting, safe-route services, and centralized emergency response in technology-enabled safety systems [2]–[10]. However, these capabilities are often addressed through separate applications or systems. OrangeCity Shield — CityWatch: The Digital Guardian of Nagpur extends these concepts by bringing multiple citizen safety functions together within a single integrated platform, while also providing an operator interface for monitoring and managing safety-related information.

Problem Statement

Citizens may require several services while dealing with a safety-related situation, including emergency communication, location sharing, incident reporting, and access to safety information. Managing these activities through multiple applications or communication channels can become inconvenient, particularly during emergency situations when quick access to relevant services is required. There is also a need to provide safety-related information in an organized manner while limiting unnecessary exposure of personal and location-related information.

In addition to citizen-side requirements, authorized personnel need an organized way to monitor emergency requests, review reported incidents, manage safety-related information, and communicate relevant advisories. When such information is distributed across different systems or communication channels, monitoring and management can become difficult. Therefore, a platform is required that provides separate and controlled access for citizens and authorized operators while maintaining a structured flow of safety-related information.

OrangeCity Shield — CityWatch addresses these requirements through a common platform for emergency communication, location-based services, incident reporting, safety information, and route assistance. The system is designed for citizens of Nagpur city and also provides a restricted-access interface for authorized operators to monitor and manage safety-related information.

Proposed System Architecture

The proposed OrangeCity Shield — CityWatch architecture is organized into distinct modules to enable the integration of different citizen safety services in a structured manner. The system consists of a frontend application, application server, database, location and map services, notification services, and a restricted Operator/Admin dashboard. These modules work together to support emergency communication, incident reporting, location-based services, safety information, and operator-side management.

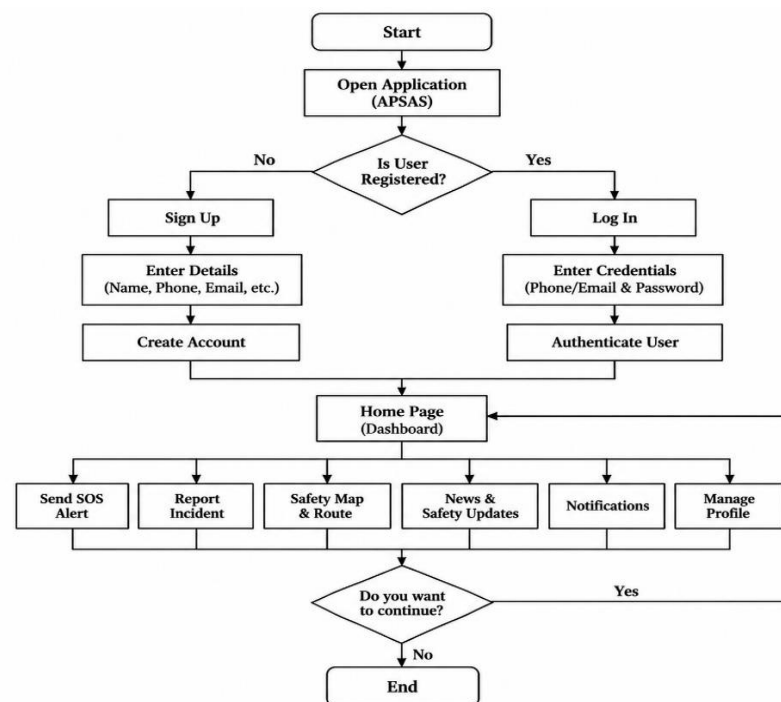


Fig 1. Flow Chart Diagram

a. Frontend Module

The frontend module provides an easy-to-use interface through which citizens can access the different safety features of OrangeCity Shield — CityWatch. Users can initiate SOS alerts, share their location, report safety incidents, access safety maps and route assistance, view safety-related updates, receive notifications, and manage their profiles. The interface is designed to provide access to essential safety functions from a common platform.

b. Application Server

The application server manages the core operations of the system and coordinates communication between the frontend, database, and other services. It handles functions such as user authentication, user requests, SOS alerts, incident reports, notifications, and access control. The application server also helps ensure that protected information and operator-level functions are accessible only to authorized users.

c. Database Module

The database module stores the information required by the application, including user profiles, emergency contacts, SOS events, incident reports, safety zones, location-related information, notifications, and other system records. PostgreSQL is used for structured data management, while PostGIS supports the storage and processing of geographical information required for location-based functionality.

d. Location and Notification Services

Location services are used to obtain the user's current geographical position and support location-based functions within the platform. Digital maps and routing services are used to display safety-related locations and provide route assistance. Notification services are used to deliver SOS alerts, emergency-related notifications, incident updates, and other safety information to the appropriate users.

e. Operator/Admin Module

The system provides a restricted Operator/Admin dashboard for authorized personnel. The dashboard allows authorized operators to review reported incidents, monitor SOS requests, manage safety-related information, view safety zones, and publish relevant safety advisories. Access to administrative functions is controlled to protect citizen information and restrict sensitive operations to authorized use.

System Design and Methodology

The development of OrangeCity Shield — CityWatch involves several stages covering user authentication, emergency communication, location processing, incident reporting, safety information management, operator-side monitoring, and system testing. The methodology is organized into the following major processes.

a. User Authentication and Profile Management

The first stage involves user registration and authentication. A citizen creates an account by providing the required information and can subsequently access the application's safety services. The profile section allows users to manage their personal information and emergency contacts along with relevant permissions. Authentication helps restrict protected services and ensures that user-specific functions are available only to authenticated users.

b. SOS and Emergency Communication

The SOS module allows a citizen to initiate an emergency alert when assistance is required. After an SOS request is activated, the system obtains the user's location and records the emergency event. The user can use the available emergency communication options, including contacting selected emergency contacts and accessing emergency service information. The system also records the status of the SOS event and associated notification information.

c. Incident Reporting

OrangeCity Shield — CityWatch provides citizens with a facility for reporting different types of safety-related incidents. These may include road accidents, theft, harassment, fire-related incidents, suspicious activities, missing-person cases, and other local safety concerns. Users can submit incident details along with relevant location information and supporting media where applicable. The submitted information can be reviewed by authorized operators before being used for safety-related updates or management.

d. Location-Based Services and Route Assistance

GPS and digital map services are used to provide location-based functionality within the platform. The system can display relevant safety locations, safety zones, and reported incidents on the map. Route assistance can also be provided to help users identify available routes based on the information incorporated into the system. The routes provided by the platform should be considered assistance based on available information and are not guaranteed to be completely safe.

e. Safety Information and Updates

The platform includes a dedicated section for safety-related information and updates. This section can provide citizens with relevant safety advisories, local updates, and other information intended to improve awareness of their surroundings. Information associated with an update may include its source, publication date and time, verification status, and validity or expiry information where applicable.

f. Operator Monitoring and Safety Information Management

The Operator/Admin module provides authorized personnel with a centralized interface for monitoring safety-related activities. Operators can review SOS requests and submitted incident reports, manage safety information, monitor safety zones, and publish appropriate safety advisories. This module establishes a separation between citizen-facing services and administrative functions, helping organize the management of safety-related information.

g. System Testing and Evaluation

The implemented modules are tested through representative user and operator workflows. Testing covers important operations such as registration and authentication, SOS activation, location retrieval, incident submission, map and route functions, notifications, profile management, and operator-side incident management. The objective of testing is to verify that the major functions operate correctly and that information is transferred appropriately between the different modules.

Conclusion

It can be observed from the implementation of OrangeCity Shield — CityWatch that multiple safety services can be integrated into a single platform. The system includes features such as SOS alerts, location sharing, emergency contacts, incident reporting, safety information, and route assistance, which can support citizens in different safety-related situations.

In this way, OrangeCity Shield — CityWatch provides a common platform for citizens to access both emergency communication and safety-related information. By bringing these functions together, the platform provides a structured approach to accessing different safety services while also providing an operator interface for monitoring and managing safety-related information.

OrangeCity Shield — CityWatch provides a foundation for an integrated public safety platform intended for Nagpur city. In future work, the platform can be enhanced through integration with verified emergency-response services and by adding further safety features, improving location-based services, expanding safety information management, and conducting broader real-world evaluation of the system.

Acknowledgements

The authors would like to express their sincere gratitude to the Department of Computer Science & Engineering (Data Science), Suryodaya College of Engineering and Technology, Nagpur, for providing the necessary support and resources to carry out this project successfully. Special thanks are extended to our project guide, Prof. Chaitali Khandate, for her continuous guidance, valuable suggestions, and encouragement throughout the development of this work.

We would also like to thank the users and participants who contributed to the testing and evaluation of the APSAS system. Their feedback and cooperation helped us improve the usability and functionality of the platform.

Finally, we acknowledge the open-source community and the developers of the various tools and technologies used in this project, which supported the development and implementation of the APSAS system.

REFERENCE

- [1] C. Khandate, I. Ghayade, S. Bankar, S. Wath, and S. Bode, "APSAS—Advanced Public Safety & Security System," *International Journal of Scientific Research in Engineering and Management (IJSREM)*, vol. 10, no. 9, Sep. 2026, Manuscript ID: IJSREM67569. **[Online]. Available:** IJSREM
- [2] L. Rajendran and S. Shankaran, "Safety for HER: A systematic approach with coalescence of technology and citizens," in *2021 IEEE International Conference on Electronics, Computing and Communication Technologies (CONECCT)*, Bengaluru, India, 2021, doi: 10.1109/CONECCT52877.2021.9622587. **[Online]. Available:** IEEE Xplore
- [3] K. Manivannan, T. Anuprathibha, K. Aakash, K. Balaji, R. Daniel Pavun Raj, and S. Dhivagar, "Mobile Application Based Crime Reporting and Management System for Enhanced Public Safety," in *2025 3rd International Conference on Artificial Intelligence and Machine Learning Applications Theme: Healthcare and Internet of Things (AIMLA)*, Namakkal, India, 2025, doi: 10.1109/AIMLA63829.2025.11040939. **[Online]. Available:** IEEE Xplore
- [4] P. Jeyanthi, M. Gladence, S. Tarunjee, and S. Nagavamsi, "Integrated Women's Security System with Safe Route Navigation and Instant Law Enforcement Reporting," in *2024 4th International Conference on Pervasive Computing and Social Networking (ICPCSN)*, 2024, doi: 10.1109/ICPCSN62568.2024.00041. **[Online]. Available:** IEEE Xplore
- [5] A. Chakraborty, F. T. Khan, T. Mahmud, M. S. Hossain, and K. Andersson, "Design and Implementation of a Web and Mobile Application for Citizen Protection Service," in *2024 Parul International Conference on Engineering and Technology (PICET)*, Vadodara, India, 2024, doi: 10.1109/PICET60765.2024.10716146. **[Online]. Available:** IEEE Xplore
- [6] "Enhanced Real-Time Women Safety App: Alert Notification and Emergency Response System With Live Location, Video, and Audio Streaming," in *2025 International Conference on Data Science and Business Systems (ICDSBS)*, Chennai, India, 2025, doi: 10.1109/ICDSBS63635.2025.11031609. **[Online]. Available:** IEEE Xplore
- [7] A. V. Agarwal, V. Singh, A. Kamboj, A. Sirohi, and A. Mehto, "Development of a Women Safety Smartphone Application—SAKHI," in *2023 Third International Conference on Secure Cyber Computing and Communication (ICSCCC)*, Jalandhar, India, 2023, pp. 212–217, doi: 10.1109/ICSCCC58608.2023.10176701. **[Online]. Available:** IEEE Xplore
- [8] Ministry of Home Affairs, Government of India, "Emergency Response Support System (ERSS) 112," Government of India. **[Online]. Available:** ERSS 112 Official Website
- [9] "Smart Accident Detection and Alert System," in *Proc. 2021 IEEE India Council International Subsections Conference (INDISCON)*, 2021, doi: 10.1109/INDISCON53343.2021.9582163.
- [10] "Mobile App to give notice of health and safety emergencies," in *Proc. 2021 Congreso Internacional de Innovación y Tendencias en Ingeniería (CONIITI)*, Bogotá, Colombia, 2021, doi: 10.1109/CONIITI53815.2021.9619634.