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Missing Person Identification System – Crowd Trace

Abijith K [1], Akash R[2], Ashwin Biju[3], Aswathy K R[4], Soumya T[5]

[1]Bachelor of Technology in CSE, NCERC
[2]Bachelor of Technology in CSE, NCERC
[3]Bachelor of Technology in CSE, NCERC
[4]Bachelor of Technology in CSE, NCERC
[5]Assistant Professor, Department of CSE, NCERC

Abstract - The increasing number of missing person cases and rising public safety concerns require a shift from outdated paper-based investigation methods to a unified technology-driven system. This project introduces Crowd Trace, a digital platform designed to modernize law enforcement operations by streamlining investigation and case tracking across multiple jurisdictions. The system integrates Image Processing for evidence analysis, Geolocation Tracking for real-time sighting verification, and Data Centralization to provide a secure and shared database for authorized users. Crowd Trace follows a four-tier access model Admin, Police, Registered User, and Public User to ensure controlled information flow and enable collaboration between authorities and the public through reporting sightings and submitting images. An added Criminal Identification Module connects missing person and criminal databases, helping investigators identify links between cases and speed up resolutions. By creating a centralized and secure digital environment, Crowd Trace reduces redundant work, improves inter-agency coordination, and enhances decision-making with real-time updates, ultimately enabling faster recovery of missing individuals and better crime management.

Key Words: Image processing, Geo-location tagging, Data Centralization, Digital Investigation Platform, Criminal Identification Module, Real Time Case Tracking, Public Collaboration, Law Enforcement System, Crowd Trace, Missing Person Identification

1.INTRODUCTION

Missing person investigations are highly time-sensitive and require quick response and effective coordination. However, traditional investigation methods often rely on paper-based reports, scattered police records, and limited communication channels, which can lead to delays and difficulties in locating missing individuals. The lack of a centralized system also makes it harder for law enforcement agencies to share information efficiently and track investigation progress. To overcome these challenges, the Crowd Trace Missing Person Identification System is proposed as a unified digital platform that utilizes modern technologies such as image processing, geolocation tracking, and centralized database management. This system enables police officers to maintain detailed records of missing persons, monitor investigation progress in real time, and analyze evidence more effectively. It also encourages community participation by allowing registered users and public users to report sightings and upload images along with GPS location information, helping authorities receive timely and valuable leads. In addition, the system integrates a criminal identification feature that allows law enforcement agencies to maintain criminal records and identify possible links between missing person cases and criminal activities. By combining advanced technology with public involvement, the platform improves coordination between authorities and communities, reduces investigation delays, and increases the chances of quickly locating missing individuals while promoting overall public safety.

2. LITERATURE REVIEW

The problem of locating missing persons has attracted significant attention from researchers due to the increasing number of cases worldwide. Traditional investigation methods mainly depend on manual reporting, physical search operations, and local police records. However, these approaches are often slow and inefficient because information is not centralized and communication between agencies and the public is limited. Recent research focuses on integrating modern technologies such as artificial intelligence, facial recognition, image processing, and geolocation systems to improve the efficiency of missing person investigations.

Several studies have explored the use of facial recognition technology to identify missing individuals. Facial recognition systems analyze facial features from images and compare them with stored databases to detect possible matches. These systems have shown promising results in biometric identification and security applications, making them suitable for missing person detection. Advanced algorithms can recognize faces even under varying lighting conditions, angles, and facial expressions, improving identification accuracy.

Research has also demonstrated that deep learning and artificial intelligence techniques significantly enhance the accuracy of missing person identification systems. Convolutional Neural Networks (CNNs) and other machine learning models are widely used to extract facial features and match them with images stored in databases. These AI-based systems can automatically analyze images from surveillance cameras or user uploads and identify potential matches with missing person records. Such systems help law enforcement agencies detect individuals more quickly compared to manual investigation methods.

Another important approach discussed in previous studies is the integration of surveillance systems and real-time image analysis. Some research proposes systems that compare facial images of missing persons with video streams captured from CCTV cameras or public surveillance networks. When a match is detected, alerts can be automatically sent to nearby authorities or police stations. This real-time monitoring capability significantly increases the chances of identifying missing individuals in crowded public areas.

In addition to facial recognition, researchers have explored web-based and mobile platforms that allow the public to participate in missing person investigations. These systems enable citizens to upload photographs, report sightings, and provide location information through digital platforms. By combining community participation with automated image analysis and centralized databases, such platforms improve collaboration between law enforcement agencies and the public. Despite these advancements, many existing systems focus primarily on facial recognition or surveillance technologies and often lack a comprehensive platform that integrates case management, public reporting, criminal identification, and centralized data storage. Therefore, there is a need for a unified system that combines these technologies while ensuring secure access and efficient information sharing.

The proposed Crowd Trace Missing Person Identification System addresses these limitations by integrating image processing, geolocation tracking, centralized databases, and role-based access for different users. By combining modern technologies with community participation, the system aims to improve investigation efficiency and support law enforcement agencies in locating missing individuals more effectively.

3. Technology used in Crowd Trace Missing Person Identification System

Software used:

VS Code / PyCharm: These development environments are used for writing, editing, and debugging the application code. They support multiple programming languages and provide useful extensions that improve development efficiency.

Python (Django Framework): Django is a high-level Python web framework used to develop the backend of the system. It manages server-side logic, authentication, database communication, and secure handling of user requests within the platform.

Flutter (Dart): Flutter is used to develop the mobile application for the system. It allows the creation of cross-platform applications for Android and iOS using a single codebase. Users can report missing persons, upload images, and track case progress through the mobile interface.

MySQL Database: MySQL is used to store and manage all system data including missing person records, criminal profiles, user information, complaints, and investigation progress. It ensures structured storage and efficient data retrieval.

HTML5: HTML5 is used to design the structure of the web interface used by administrators and police officers. It defines the layout of pages such as login, dashboard, and case management sections.

CSS3: CSS3 is used to style and enhance the visual appearance of the web interface. It improves the layout, responsiveness, and overall user experience of the platform.

Bootstrap: Bootstrap is a frontend framework used to create responsive and mobile-friendly web pages. It

provides ready-made components that help in designing dashboards, forms, and navigation systems efficiently.

Image Processing Techniques: Image processing methods are used to analyse uploaded images of missing persons and compare them with stored records. This helps authorities identify potential matches and improves the accuracy of the identification process.

GPS and Geolocation Services: The system uses GPS-based geolocation to capture the exact location of sightings submitted by users or public contributors. This helps police track movements and identify possible locations of missing individuals.

CCTV Integration: The system allows image inputs from CCTV cameras to assist in identifying missing persons. Images captured from surveillance systems can be analysed and stored as potential evidence in case files.

4. PROPOSED SYSTEM

Improvements Over the Existing System:

• Centralized Digital Case Management
The system provides a unified digital platform where police departments can store, manage, and track missing person cases in a centralized database, reducing dependency on paper-based records.

• Image-Based Identification System
The platform allows users, public contributors, and surveillance systems to upload images of missing persons. These images can be analysed and compared with existing records to assist authorities in identifying individuals quickly.

• GPS-Based Location Tracking
The system captures GPS location data when users upload images or report sightings. This helps law enforcement agencies identify the exact location of possible sightings and narrow down search areas.

• Real-Time Case Tracking
Registered users can monitor the progress of missing person investigations after their case has been approved by police authorities, ensuring transparency and timely updates.

• Public Participation and Community Reporting
The system encourages public involvement by allowing citizens to upload images and location details of missing persons without complicated procedures. This increases the chances of receiving valuable leads.

• Integrated Criminal Identification Module
In addition to missing person tracking, the platform includes a criminal identification feature that allows police officers to maintain criminal profiles and identify possible links between missing person cases and criminal activities.

Unlike the existing systems, our system includes the following roles:

1. Admin Panel:
Manages the overall system including police station records, officer details, user accounts, complaints, and feedback.

2. Police Panel:
Allows police officers to register missing person cases, approve or reject reports, update investigation progress, upload criminal records, and view location-based evidence submitted by users or the public.

3. Registered User Panel:
Enables registered users to report missing persons, upload images with location details, track investigation progress, and communicate with authorities through complaints or feedback.

4. Public User Panel:
Allows the general public to view missing person and criminal profiles and upload images or location information of sightings to assist law enforcement agencies.

Table -1: Performance Matrix Table

Method	Accuracy (%)	Precision (%)	Time Efficiency (%)	Performance (%)
Traditional Manual Investigation	70.5	65.8	60.2	65.5
Existing Digital Reporting Systems	84.3	82.1	80.4	82.3
Proposed Crowd	92.6	90.8	91.2	91.5

Trace System				

5. Challenges Faced During Implementation

The development of the Crowd Trace Missing Person Identification System involved several technical and practical challenges that needed careful consideration and resolution.

• Data Accuracy and Image Quality:
One of the major challenges was ensuring the accuracy of uploaded images. Poor image quality, variations in lighting, and different angles can affect the effectiveness of image-based identification.

• Integration of Multiple Technologies:
The system combines mobile development (Flutter), web technologies, backend frameworks (Django), and database management (MySQL). Ensuring smooth communication and data flow between these components required careful system design and testing.

• Real-Time Data Handling:
Managing real-time updates such as case progress, image uploads, and GPS location tracking was challenging, especially in ensuring that data is synchronized across all users without delays.

• Geolocation Accuracy:
Obtaining precise GPS location data from users can sometimes be unreliable due to network issues or device limitations, which may affect the accuracy of reported sightings.

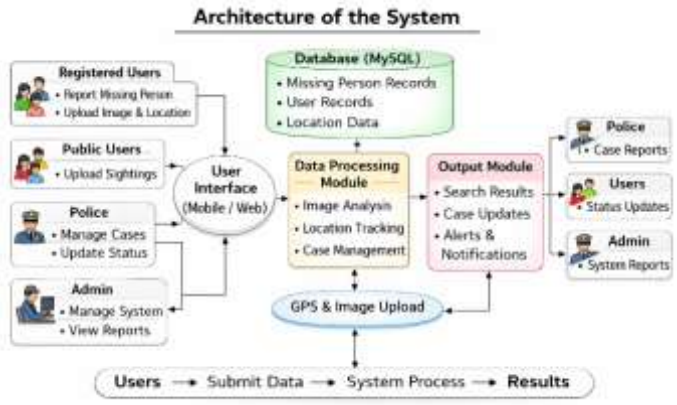
• Data Security and Privacy:
Handling sensitive information such as personal details of missing persons and criminal records required implementing secure authentication and access control mechanisms to prevent unauthorized access.

• User Participation and Reliability:
Encouraging active participation from the public while ensuring the authenticity of submitted data was a challenge, as false or misleading information can affect investigation efficiency.

• System Scalability:
Designing the system to handle a large number of users, case records, and image uploads without performance degradation was an important challenge during development.

6. SYSTEM DESIGN

6.1. Architecture of the System



6.2 Module Include

The Crowd Trace Missing Person Identification System is divided into several functional modules to ensure efficient operation, secure access, and proper management of missing person investigations.

• Admin Module:
The admin module is responsible for managing the overall system. It includes functionalities such as managing police stations, monitoring police officers, viewing registered users, handling complaints, and responding to feedback. This module ensures proper control and maintenance of the system.

• Police Module:
The Police module allows law enforcement officers to manage missing person cases and criminal records. Officers can approve or reject reported cases, update investigation progress, upload missing person and criminal details, and view images and location data submitted by users, public contributors, or CCTV systems.

• Registered User Module:
This module enables registered users to report missing persons by providing necessary details and uploading images with GPS location data. Users can also track the progress of their reported cases, view missing person records, and communicate with authorities through complaints and feedback.

• **Public User Module**:
The Public User module allows general users to access information without registration. They can view missing person and criminal profiles and upload images or location details of sightings to assist law enforcement agencies in investigations.

• **Image Processing Module:**
This module handles the analysis of uploaded images. It compares images of missing persons with stored records to identify possible matches and supports the investigation process

7. Implementation and Results

7.1 System Development

The Crowd Trace Missing Person Identification System was developed using a combination of modern web and mobile technologies to ensure efficient performance and usability. The system follows a client-server architecture where the frontend interfaces interact with the backend server for data processing and storage.

The mobile application was developed using Flutter, which provides a cross-platform environment for Android and iOS devices. It enables users to report missing persons, upload images with GPS location data, and track case progress through an intuitive interface. The web application, built using HTML, CSS, and Bootstrap, is primarily used by administrators and police officers for managing cases and system operations.

The backend of the system was implemented using the Django framework in Python. Django handles server-side logic, user authentication, API communication, and database interactions. It ensures secure data handling and efficient processing of requests from both mobile and web platforms.

The system uses a MySQL database to store all relevant information, including missing person records, criminal profiles, user details, uploaded images, and location data. Proper database design ensures efficient data retrieval and management.

During development, various modules such as user management, case reporting, image upload, geolocation tracking, and case monitoring were integrated. The system was tested to ensure smooth data flow between components, accurate handling of user inputs, and real-time updates of case progress.

Overall, the implementation of the system successfully integrates multiple technologies to provide a reliable, scalable, and user-friendly platform for managing missing person investigations and improving coordination between law enforcement agencies and the public

7.2 System Testing

To ensure system reliability and performance, the following testing strategies were used:

Unit Testing:
Individual modules such as user registration, login, case reporting, image upload, and GPS location tracking were tested separately to verify their correct functionality.

Integration Testing:
All modules were integrated and tested to ensure smooth communication between the mobile application, web interface, backend server, and database.

User Acceptance Testing:
The system was tested with sample users, including admin, police, and public users, to evaluate usability, functionality, and overall user experience.

Performance Testing:
The system was tested under different conditions to evaluate response time, data processing speed, and the ability to handle multiple user requests efficiently.

Security Testing:
Security measures such as authentication, access control, and data protection were tested to ensure that sensitive information is securely handled and unauthorized access is prevented.

Additionally, testing was conducted to verify the accuracy of image uploads and the proper functioning of geolocation features under different network conditions. The system was also evaluated for data consistency to ensure that all updates made by users and police were reflected correctly across the platform. Error handling mechanisms were tested to confirm that the system responds appropriately to invalid inputs or unexpected failures. Load testing was performed to assess system stability when multiple users access the platform simultaneously. Overall, the testing process ensured that the system operates reliably, securely, and efficiently in real-world scenarios.

Results:

The system performed effectively during testing of missing person case management and reporting. User inputs such as case reports, image uploads, and GPS location data were processed correctly. The image-based identification and location tracking features functioned successfully in assisting case analysis. Real-time case updates were accurately reflected for users and police authorities. The integration of modules, including case management and criminal identification, worked as expected, and the system demonstrated reliable performance in supporting missing person investigations.

RESULTS

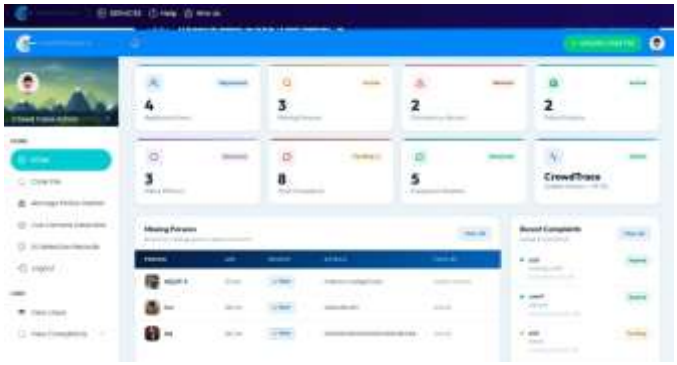


Fig:7.1 – Admin Home Page

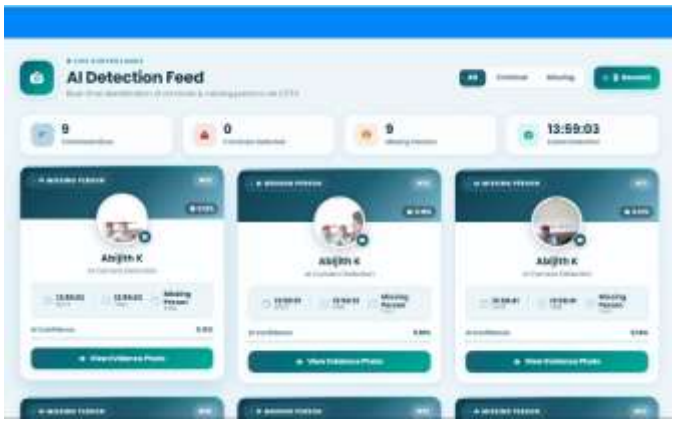


Fig:7.2 – AI Detection Feed

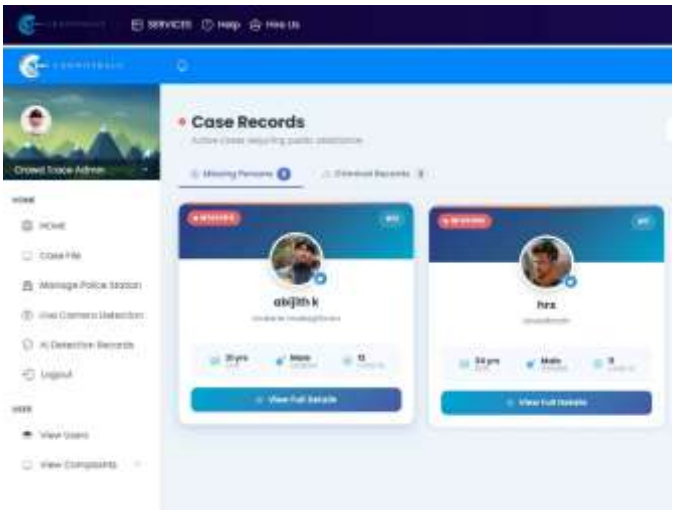


Fig:7.3 – Case Records

Fig:7.4 – Police Home Page

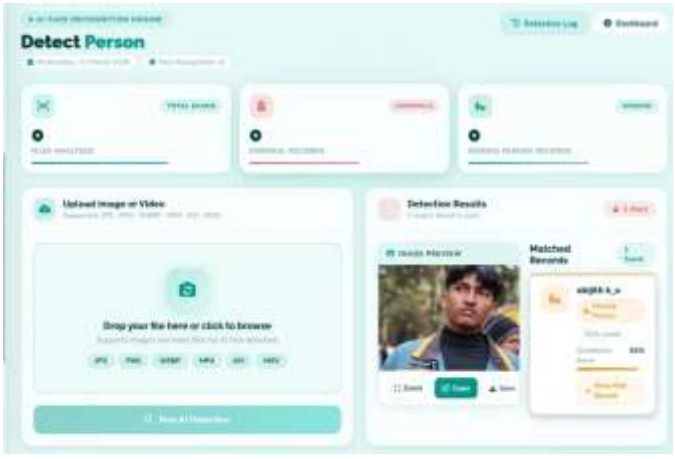


Fig:7.5 – Run AI Detection

Fig:7.6 – Live Camera Detection

8. DISCUSSION AND ANALYSIS

8.1 Advantages of Crowd Trace System

Centralized Case Management:
The system provides a unified platform for storing and managing missing person and criminal records, reducing dependency on manual documentation and scattered data.

Faster Investigation and Response:
Real-time data updates, image uploads, and GPS-based location tracking help authorities respond quickly and improve the efficiency of investigations.

Improved Public Participation:
The platform allows both registered users and the general public to contribute by reporting sightings and uploading images, increasing the chances of locating missing individuals.

Image-Based Identification:
The use of image processing techniques helps in comparing uploaded images with existing records, improving identification accuracy.

Enhanced Coordination Between Agencies:
The system enables seamless communication and data sharing between police departments and users, ensuring better coordination during investigations.

Secure and Role-Based Access:
Role-based access control ensures that sensitive information is accessed only by authorized users, maintaining data security and privacy.

8.2 Future Work

- Integration of advanced AI-based face recognition techniques for improved identification accuracy.
- Enhancement of real-time CCTV monitoring and automatic detection features.
- Improved geolocation tracking with higher accuracy and live tracking capabilities.
- Development of a more user-friendly interface for better accessibility and usability.
- Deployment of the system on cloud platforms to support large-scale usage and improve system scalability.

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9. CONCLUSION

The Crowd Trace Missing Person Identification System presents an effective and technology-driven solution to address the challenges involved in locating missing individuals. By integrating image processing, geolocation tracking, and centralized data management, the system improves the efficiency and accuracy of missing person investigations. The platform enables seamless coordination between law enforcement agencies and the public, allowing real-time reporting, evidence sharing, and case tracking.

The inclusion of a criminal identification module further enhances the system by enabling authorities to maintain and analyze criminal records alongside missing person data. The role-based access structure ensures secure handling of sensitive information while supporting efficient communication among users.

Overall, the system reduces investigation delays, improves decision-making, and increases the chances of successfully locating missing individuals. With further enhancements and large-scale deployment, Crowd Trace has the potential to significantly contribute to public safety and modernize the process of missing person identification and crime management. The system also promotes community involvement, making citizens active participants in assisting law enforcement agencies. Furthermore, the use of real-time data and digital

technologies ensures quicker response times during critical situations. As technology continues to evolve, integrating advanced AI-based identification methods can further enhance system capabilities and reliability. Ultimately, Crowd Trace represents a step forward in building a safer and more connected society.

REFERENCES

1. S. Z. Li and A. K. Jain, "Handbook of Face Recognition," Springer, 2011.

2. W. Zhao, R. Chellappa, P. J. Phillips, and A. Rosenfeld, "Face Recognition: A Literature Survey," ACM Computing Surveys, vol. 35, no. 4, pp. 399–458, 2003.

3. A. Krizhevsky, I. Sutskever, and G. E. Hinton, "ImageNet Classification with Deep Convolutional Neural Networks," Advances in Neural Information Processing Systems (NIPS), 2012.

4. R. C. Gonzalez and R. E. Woods, "Digital Image Processing," Pearson Education, 2018.

5. M. Goodchild, "Citizens as Sensors: The World of Volunteered Geography," GeoJournal, vol. 69, no. 4, pp. 211–221, 2007.

6. P. A. Longley, M. F. Goodchild, D. J. Maguire, and D. W. Rhind, "Geographical Information Systems and Science," Wiley, 2015.

7. D. Hardt, "The OAuth 2.0 Authorization Framework," IETF RFC 6749, 2012.

8. A. V. Aho, M. S. Lam, R. Sethi, and J. D. Ullman, "Compilers: Principles, Techniques, and Tools," Pearson, 2006.

9. Django Software Foundation, "Django Web Framework Documentation," [Online]. Available: https://docs.djangoproject.com

10. Flutter Developers, "Flutter Documentation," Google, [Online]. Available: https://docs.flutter.dev