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LOST & FOUND HUB: A SMART CITY-BASED DIGITAL PLATFORM FOR ITEM RECOVERY

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Abstract : In modern urban environments, the frequent loss of personal belongings such as mobile phones, wallets, identification documents, and other valuables has become a significant challenge. Existing recovery methods, including police reporting systems and social media platforms, lack real-time coordination, structured data handling, and reliable verification mechanisms. As a result, users often face delays, low recovery rates, and difficulty in locating their lost items efficiently.

In this work, an innovative web-based Lost & Found Hub system is proposed, which enables users to report lost and found items in real time. The system utilizes structured data input, image uploads, and location-based filtering to improve search accuracy. A hybrid matching mechanism is implemented to compare item descriptions, visual features, and geographic proximity for identifying potential matches. Authenticated users can securely access the platform through one-time password (OTP) verification, ensuring trust and reducing fraudulent activities.

The proposed system allows for efficient and automated matching of lost and found items, thereby increasing recovery rates and minimizing manual effort. The initial results demonstrate improved accessibility, faster response time, and enhanced reliability, making it a practical solution for smart city environments.

Keywords: Lost and Found System, Smart City, Real-Time Matching, OTP Authentication, Web Application, Image-Based Matching, Location-Based Filtering, Data Management, Automated Recovery System.

I. INTRODUCTION

In modern urban environments, the increasing dependence on personal belongings such as mobile phones, wallets, identification documents, and electronic devices has made their loss a significant concern. With the rapid growth of cities and public spaces such as universities, transportation systems, and marketplaces, incidents of lost and misplaced items have become more frequent. However, one of the major challenges

faced by individuals is the absence of a structured and efficient system to report and recover lost items in a timely manner.

Existing methods for item recovery primarily rely on manual reporting through police stations, help desks, or informal platforms such as social media. These approaches lack real-time coordination, centralized data management, and proper verification mechanisms. As a result, users often experience delays, low recovery success rates, and difficulty in connecting with the rightful owner or finder of an item, leading to inefficiencies and frustration.

With advancements in web technologies, cloud computing, and smart city initiatives, there is a growing demand for intelligent and automated solutions that can address such real-world problems effectively. This research paper proposes a web-based Lost & Found Hub system that enables real-time reporting, centralized data storage, and automated matching of lost and found items. The system integrates features such as image-based identification, location-based filtering, and secure OTP-based authentication to enhance reliability, efficiency, and user trust in the recovery process.

II. Motivation and Objectives:

Motivation:

Firstly, one of the primary reasons for developing this project is the inefficiency of existing lost and found mechanisms, which are largely unstructured and depend heavily on manual processes. When individuals lose their belongings in public places such as campuses, transportation systems, or marketplaces, there is no centralized platform available to report and track such items. As a result, many lost items remain unrecovered, while people who may have found these items have no reliable way to connect with the rightful owners. This leads to inconvenience, loss of valuable assets, and reduced trust in existing systems.

In addition, current methods such as police reporting or social media posts are time-consuming, inconsistent, and lack verification mechanisms. These approaches do not provide real-time updates or efficient matching capabilities, making the recovery process slow and unreliable. The absence of automation and structured data handling further limits the effectiveness of these systems.

In this regard, modern web technologies and intelligent data processing techniques play a crucial role in addressing these challenges. The integration of centralized databases, location-based filtering, and image-based identification enables efficient and accurate matching of lost and found items. Furthermore, the use of OTP-based authentication ensures secure user interaction and minimizes fraudulent activities. By leveraging these technologies, an automated and scalable system can be developed to significantly improve the process of item recover.

Objectives

- To design and implement a centralized web-based platform for reporting and managing lost and found items in real time.
- To develop a hybrid matching system that combines text-based similarity, image comparison, and location-based filtering for accurate identification of items.
- To integrate secure OTP-based authentication to ensure verified user access and prevent unauthorized or fraudulent activities.
- To enable efficient storage and retrieval of data using a structured database system for improved accessibility and performance.
- To minimize manual effort and reduce recovery time through automated matching and notification mechanisms.

- To evaluate the system's performance in terms of accuracy, efficiency, and user experience, and explore future enhancements such as AI-based matching and mobile application integration.

III. Related Work:

Sr. No	Author(s) & Year	Title of Paper / Study	Journal / Conference	Objective of the Study	Methodology / Tools Used	Key Findings	Research Gap / Limitation
1.	Sharma et al., 2020	Digital Lost & Found System	IJCA	Digitize reporting; Faster recovery	Web platform; User data	Time efficient; Easy access	No city filter; No OTP
2.	Verma & Singh, 2021	Location-Based Web Platforms	IEEE Conference	Location filtering; Accuracy improvement	City-wise data; Search engine	Reduced clutter; Better search	No auto-match
3.	Patel et al., 2022	Image-Based Object Matching	Springer Journal	Object identification; Match accuracy	Image comparison; Feature extraction	Improved matching	Image quality dependent

Summary the above table represents:

1. **Sharma et al. (2020):** Developed a digital Lost & Found system to simplify reporting and improve recovery speed. → Efficient and easy to use, but lacks city-based filtering and secure authentication such as OTP.
2. **Verma & Singh (2021):** Proposed location-based web platforms to enhance search accuracy using city-wise data filtering. → Reduced data clutter and improved search results, but does not support automated matching between lost and found items.
3. **Patel et al. (2022):** Focused on image-based object matching techniques for improving identification accuracy. → Enhanced matching performance, but highly dependent on image quality and lacks integration with other matching methods.

IV. Research Gap:

Although existing studies highlight the use of digital platforms, image processing, and location-based systems for lost and found item management, several key gaps still remain in current solutions:

- **Absence of Centralized Data Management:** There is no unified platform that integrates lost and found item data across different locations, resulting in fragmented and unstructured information that reduces recovery efficiency.
- **Lack of Real-time Matching Mechanism:** Existing systems do not provide immediate or automated matching between lost and found items, leading to delays in identifying potential matches and reducing the chances of recovery.
- **Limited Integration of Hybrid Matching Techniques:** Most platforms rely on either text-based descriptions or image comparison alone, without combining multiple parameters such as text similarity, image features, and location proximity for accurate matching.
- **Security and Authentication Deficiencies:** Current systems often lack proper user verification mechanisms such as OTP-based authentication, increasing the risk of false claims and misuse of the

platform.

- **Dependence on Manual Processes:** Many existing approaches rely heavily on manual reporting and searching, which is time-consuming, inefficient, and prone to human errors.
- **Scalability and Accessibility Issues:** Existing solutions are not designed to scale across multiple cities or large user bases, limiting their applicability in real-world smart city environments.

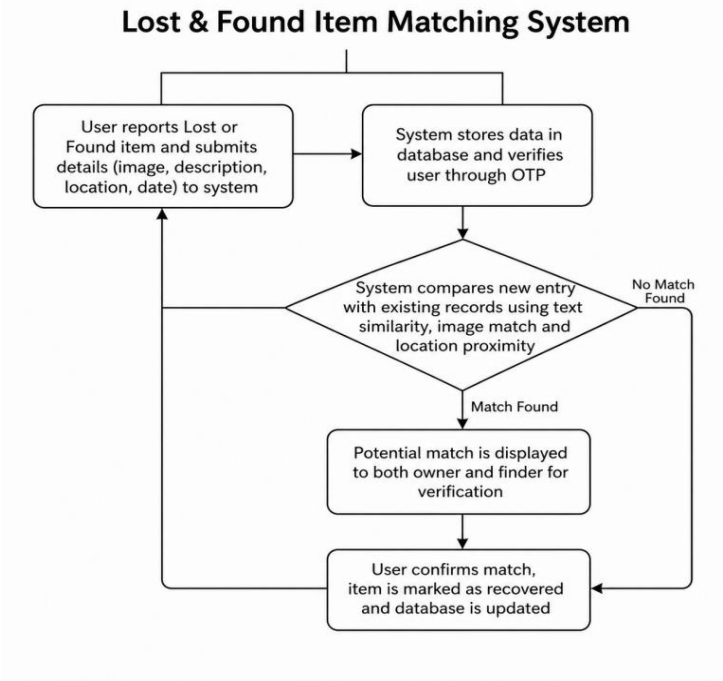
V. Proposed Approched:

The system combines multiple layers designed to efficiently manage, store, and match lost and found items in a centralized platform. The architecture ensures smooth data flow, secure user interaction, and accurate matching of items. The Input Layer performs data collection where users submit details of lost or found items, including item name, description, images, location, and date. The Processing Layer handles data validation, cleaning, and storage using a structured database system such as Firebase or other cloud-based solutions, ensuring consistency and accessibility of information. The Matching Layer applies a hybrid matching approach by analyzing text similarity, image features, and location proximity to identify potential matches between lost and found entries. The Application Layer consists of a responsive web-based interface built using HTML/CSS/React for the frontend and Node.js/Python for the backend, allowing users to log in using OTP authentication, submit item details, and view matched results in real time.

System Operation Flow:

- **Item Submission:** Users register/login into the system and submit details of lost or found items along with images and location data, which are then sent to the backend server for processing.
- **Data Processing and Storage:** The system validates the submitted data, organizes it into structured format, and stores it in a centralized database for efficient retrieval and matching.
- **Matching Process:** The system continuously compares new entries with existing records using hybrid matching techniques based on text, image, and location similarity.
- **Match Notification:** If a potential match is found, both the finder and the owner are notified through the platform for further communication and verification.
- **No Match Handling:** If no match is found, the data remains stored in the database and is re-evaluated whenever new entries are added to the system.

Flowchart:



VI. Advantages and Disadvantages:

Advantages:

Efficient Item Recovery:
The system enables faster recovery of lost items through automated matching, reducing the time and effort required compared to traditional methods.

Centralized Platform:
All lost and found data is stored in a single structured system, improving accessibility and making it easier to search and manage items.

Enhanced Security:
OTP-based authentication ensures secure user access and helps prevent unauthorized or fraudulent claims.

Reduced Manual Effort:
Automation of reporting and matching minimizes human intervention, reducing errors and improving overall efficiency.

Disadvantages:

Dependence on User Input:
The system relies on users to provide accurate details; incorrect or incomplete data may affect matching results.

Internet Dependency:
A stable internet connection is required for accessing the system, which may limit usability in certain areas.

Matching Accuracy Limitations:
The effectiveness of matching depends on the quality of images and descriptions provided by users.

Security Concerns:
Despite authentication, there remains a risk of misuse or false claims, requiring additional safeguards.

VII. Applications:

The proposed system offers several key applications, leading to significant benefits:

Smart Lost & Found Management:
The system enables users to report and track lost or found items in real time through a centralized platform. It improves recovery efficiency by automatically matching items based on description, image, and location data, reducing dependency on manual search methods.

Scalability:
This system can be extended to various real-world environments such as university campuses, public transport systems, shopping malls, airports, and large public events. The platform can also be scaled across multiple cities using cloud-based infrastructure, making it suitable for smart city implementations.

Foundation for Future Innovations:
The system can act as a base for future advancements such as AI-based image recognition, predictive matching using machine learning, and mobile application integration. It can further evolve into a fully automated smart recovery system with enhanced accuracy and efficiency.

VIII. Conclusion

In this paper, we proposed an innovative web-based Lost & Found Hub system designed to address the common problem of lost and misplaced items in modern environments. The solution is built using centralized database management, hybrid matching techniques, and secure OTP-based authentication to ensure efficient and reliable item recovery. By enabling real-time reporting, structured data handling, and automated matching, the system significantly improves the effectiveness of traditional lost and found methods.

The potential of the proposed system extends beyond basic item recovery, as it enhances user experience through improved accessibility, transparency, and reduced manual effort. It also supports scalability for deployment in smart city environments, making it a practical and future-ready solution.

Some future development prospects include the development of a mobile application, integration of AI/ML models for improved matching accuracy, enhanced security mechanisms, and large-scale deployment across multiple domains through seamless system integration.

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