

CSE472 Final Report

Abstract:

The Lost Item Recovery Network addresses the common issue of losing and finding personal items by providing a centralized platform for users to report lost or found items. The project leverages Flutter for the frontend and Firebase for the backend to ensure real-time interaction and data integrity. Key outcomes include a user-friendly interface, real-time communication capabilities, and secure data handling. This project demonstrates significant advancements in mobile application development, offering a practical solution to a widespread problem.

1. Introduction:

Purpose:

The Lost Item Recovery Network is a Flutter-based mobile application designed to address the problem of losing and finding personal items. It provides a platform where users can post about lost or found items, search for announcements, and communicate directly with other users. The application aims to simplify the process of recovering lost items through efficient and effective communication.

Significance in Computer Engineering:

This project showcases the integration of modern mobile development frameworks and cloud services, highlighting the practical application of these technologies in solving real-world problems. It also demonstrates the importance of data integrity and real-time communication in mobile applications.

2. Background:

Application Domain and Significance:

Losing personal items is a frequent problem, and existing solutions often lack efficiency and centralized communication. This application addresses these gaps by providing a dedicated platform for reporting and finding lost items.

Existing Solutions:

Current solutions include social media posts, community bulletin boards, and generic lost-and-found services. These methods are often disorganized and inefficient.

Relevance:

The Lost Item Recovery Network offers a structured and reliable solution, leveraging modern technologies to enhance user experience and improve the chances of recovering lost items.

3. Methodology and Design:

Development Approach:

- **Tools and Technologies:** Flutter for the frontend, Firebase Authentication, Firestore, and Firebase Storage for the backend.
- **Software Design Principles:** The application follows a clean and intuitive design, ensuring ease of use.

Dataset:

Although the Lost Item Recovery Network does not rely on a predefined dataset, it generates and manages user-generated data crucial for its functionality. Here is an overview of the user-generated datasets used within the application:

Description of the Dataset:

- **Source:** The data is generated by users of the Lost Item Recovery Network when they create posts about lost or found items and register their accounts.
- **Scope:** The dataset includes details about lost and found items, user information, and interaction timestamps.

- **Size and Nature:** The data includes textual descriptions, image URLs, timestamps, and user-related information. The dataset grows dynamically as more users interact with the application.

Data Collection:

- **Collection Method:** Data is collected directly from users through the application interface when they post about lost or found items, register, or update their profiles. The data is stored in Firebase Firestore and Firebase Storage.
- **Source:** Data originates from user inputs within the Lost Item Recovery Network application.

Preprocessing Steps:

- **Validation:** User inputs are validated to ensure completeness and correctness. For instance, ensuring that descriptions are not empty and image URLs are valid.
- **Normalization:** Data is normalized to maintain consistency in format, such as standardized timestamp formats and consistent user identifiers.

Variables/Features:

1. Lost Items:

- **Field:** description
 - **Type:** String
 - **Purpose:** Provides details about the lost or found item.
- **Field:** imageUrl
 - **Type:** String (URL)
 - **Purpose:** Links to images of the lost or found items stored in Firebase Storage.
- **Field:** timestamp
 - **Type:** Timestamp
 - **Purpose:** Records the date and time when the post was created.
- **Field:** userId
 - **Type:** String
 - **Purpose:** Unique identifier for each user, linking posts to users.

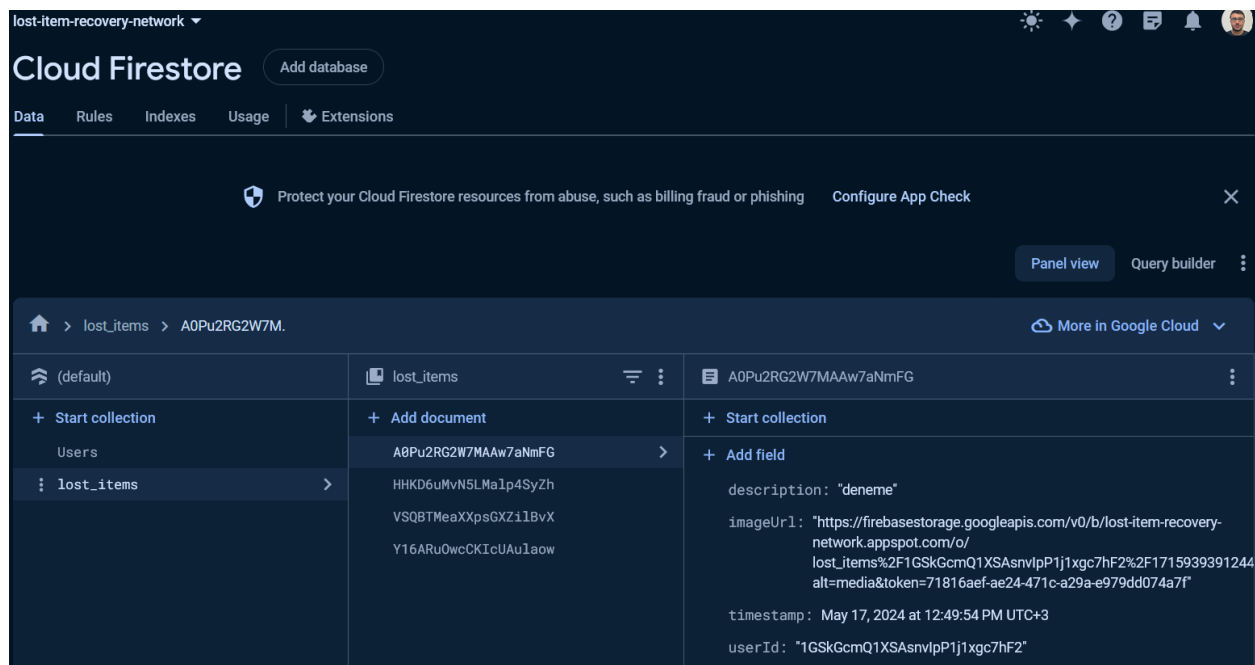
2. Users:

- **Field:** email
 - **Type:** String

- **Purpose:** Stores the email address of the user.
- **Field:** fullname
 - **Type:** String
 - **Purpose:** Stores the full name of the user.
- **Field:** posts
 - **Type:** Array
 - **Purpose:** Contains an array of post IDs or references associated with the user.
- **Field:** userId
 - **Type:** String
 - **Purpose:** Unique identifier for each user.
- **Field:** username
 - **Type:** String
 - **Purpose:** Stores the username of the user.

Limitations and Constraints:

- **Data Quality:** Since data is user-generated, it may vary in quality and detail. Incomplete or inaccurate descriptions can affect the effectiveness of the application.
- **Scalability:** As the dataset grows, maintaining performance and quick access times can be challenging. Efficient indexing and query optimization are essential.
- **Image Handling:** Storing and retrieving images efficiently while managing storage costs can be a challenge, particularly as the number of images increases.



This dataset is essential for the Lost Item Recovery Network's functionality, enabling users to post and search for lost and found items, facilitating effective communication, and ensuring data integrity and security.

4. Implementation and Application Development:

Development Process:

- **UI Design:** Simple layouts were sketched and translated into visual designs using basic colors and fonts.
- **Technology Selection:** Flutter for the frontend due to its cross-platform capabilities, and Firebase for the backend for its real-time database and cloud storage features.
- **User Authentication:** Implemented secure registration, login mechanisms, and account management.

lost-item-recovery-network

Authentication

Users | Sign-in method | Templates | Usage | Settings | Extensions

Search by email address, phone number, or user UID

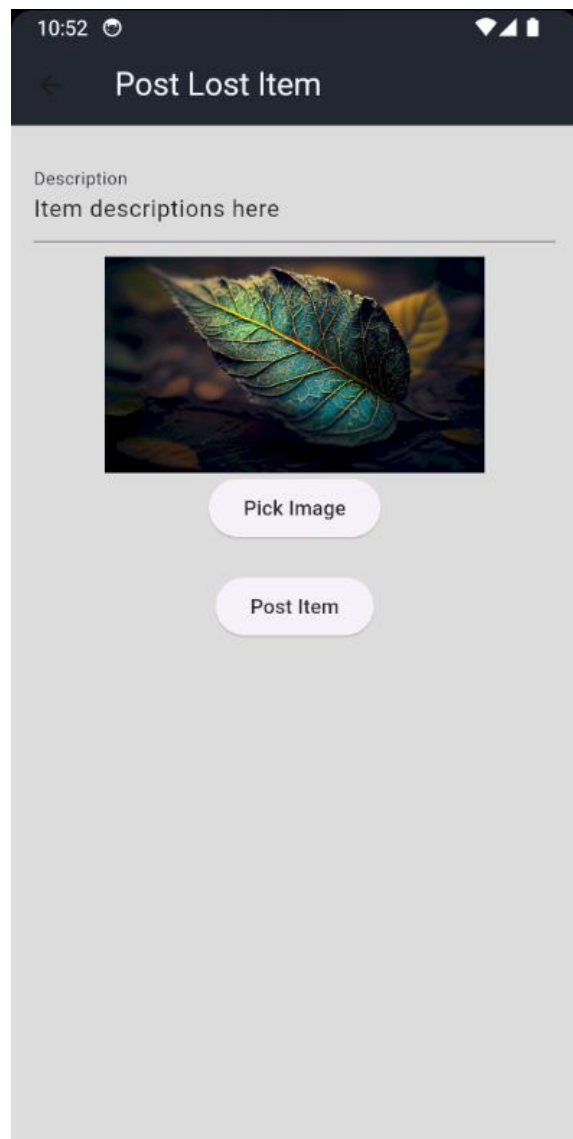
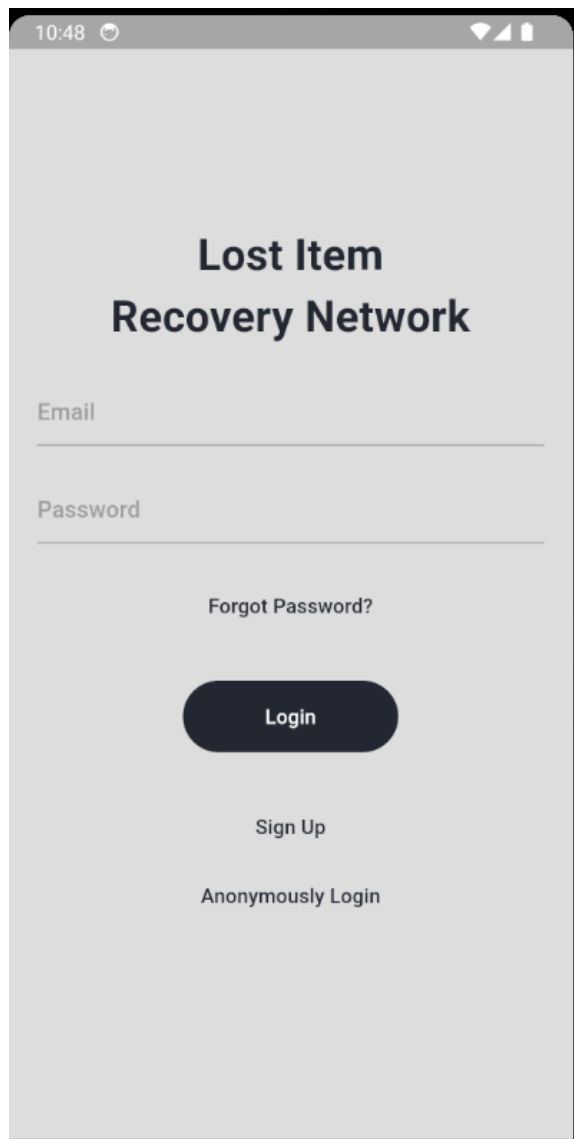
Add user

Identifier	Providers	Created	Signed In	User UID
abgm@gmail.com		May 16, 2024	May 16, 2024	ieH6rw5Z3Ygkxc5DxD8i1OqY...
esidemail@gmail.com		May 16, 2024	May 17, 2024	1GSKGcmQ1XSAsnvlpP1j1xgc...
example2@gmail.com		May 16, 2024	May 16, 2024	k5tp0qjuOPROtKAAqXVjBfAEJ...
example@gmail.com		May 16, 2024	May 16, 2024	dQ9XzEYXLQPmcnLChrJkPBT...

Rows per page: 50 | 1 - 4 of 4

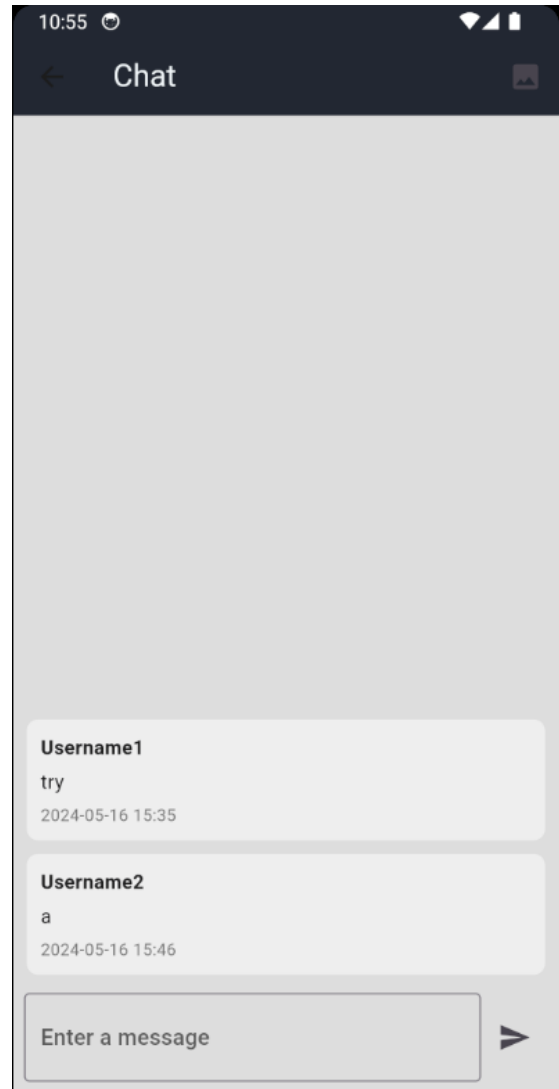
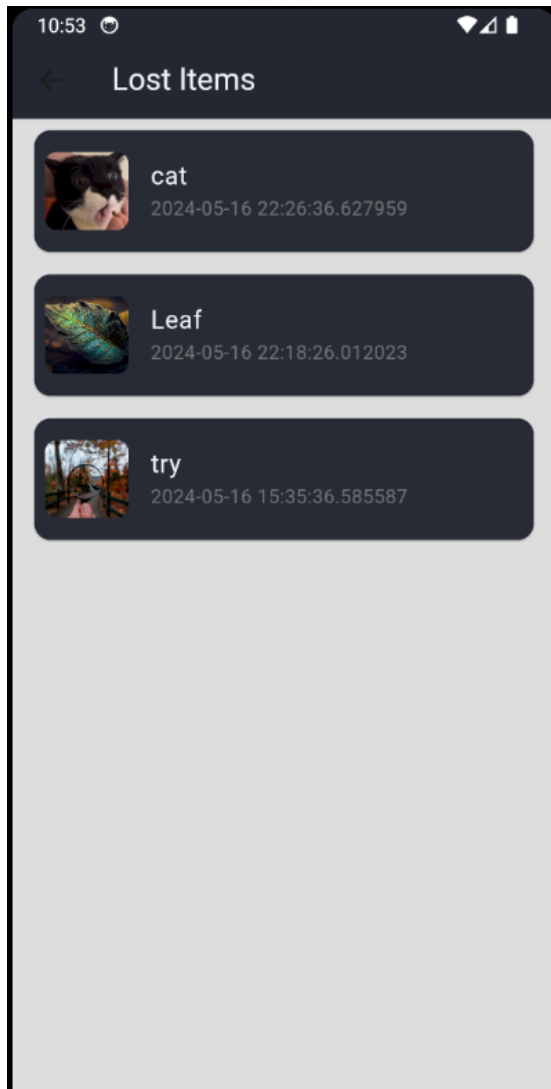
Functionalities:

- **Post Announcements:** Users can create posts for lost or found items, including descriptions and images.
- **Search and Filter:** Users can search for specific items and filter results based on criteria such as date and type.
- **Direct Messaging:** Facilitates direct communication between users.



Challenges and Solutions:

- **Real-time Communication:** Ensuring seamless real-time interactions required robust synchronization mechanisms and effective use of Firebase's capabilities.
- **Data Security:** Implemented SSL/TLS encryption and adhered to Firebase's security best practices.
- **Scalability:** Leveraged Firebase's scalable infrastructure and optimized data queries.



5. Results and Findings:

Performance Metrics:

The application was evaluated based on user feedback, real-time communication performance, and data security measures. Significant achievements include a user-friendly interface, reliable real-time interactions, and secure data handling.

Novel Findings:

The integration of Flutter and Firebase demonstrated effective real-time communication and data synchronization, providing insights into best practices for mobile application development.

6. Discussion and Analysis:

Significance:

The application offers a practical solution to a common problem, highlighting the potential of modern mobile development frameworks and cloud services in creating efficient and user-friendly applications.

Comparison with Existing Solutions:

Compared to existing solutions, the Lost Item Recovery Network provides a more structured, efficient, and secure platform for reporting and finding lost items.

Contributions, Strengths, and Weaknesses:

The project's strengths include its user-friendly interface, real-time communication capabilities, and secure data handling. Potential areas for improvement include expanding the application's functionality and enhancing scalability.

7. Conclusion:

Recap of Objectives and Achievements:

The Lost Item Recovery Network successfully addresses the problem of losing and finding personal items through a user-friendly and efficient mobile application.

Significance in Computer Engineering:

The project demonstrates the practical application of modern mobile development frameworks and cloud services in solving real-world problems, emphasizing the importance of data integrity and real-time communication.

Future Enhancements:

Future directions include expanding the application's functionality, improving scalability, and exploring additional features such as location-based services and advanced search capabilities.

8. References:

- <https://docs.flutter.dev/>
- <https://firebase.flutter.dev/docs/cli/>
- <https://pub.dev/packages/fireflutter>