

Nooglers

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Problem Statement

Stop Losing Things, Stop Wasting Them

Every year, billions are lost due to misplaced items, unclaimed belongings, and unused resources resulting in

- Economic Loss
- Time Inefficiency
- Environmental Strain
- Operational Friction
- Theft & Non Verified users
- Disorganized Storage



Limitations of Existing Solutions

1. The "Vague Description" Gap

A log entry for a "blue water bottle" is useless when the lost-and-found bin contains fifteen different Milton or Cello bottles. Without visual proof, owners cannot identify their specific bottle, and staff are left guessing which one belongs to whom.

2. High Search Friction – "Needle in a Haystack"

A student who loses their keys must run between the library, the canteen, and the main gate to check separate paper registers. This "physical scavenger hunt" is so frustrating that students often give up, leading to the cost of changing entire door locks.

3. Verification & "Social Engineering" Theft

If a student sees a pair of AirPods in an open bin, they can easily walk to the desk and claim them by simply describing the "white case." Manual systems can't verify unique details, like a specific tiny dent or a custom sticker, allowing easy theft.

Limitations of Existing Solutions

4. Fragmented "Siloed" Storage

A lab coat found in the Chemistry wing stays in a cupboard there, while the student only checks the "Central Lost & Found" at the admin block. Because these locations aren't digitally linked, the item remains "lost" despite being safely recovered just 50 meters away.

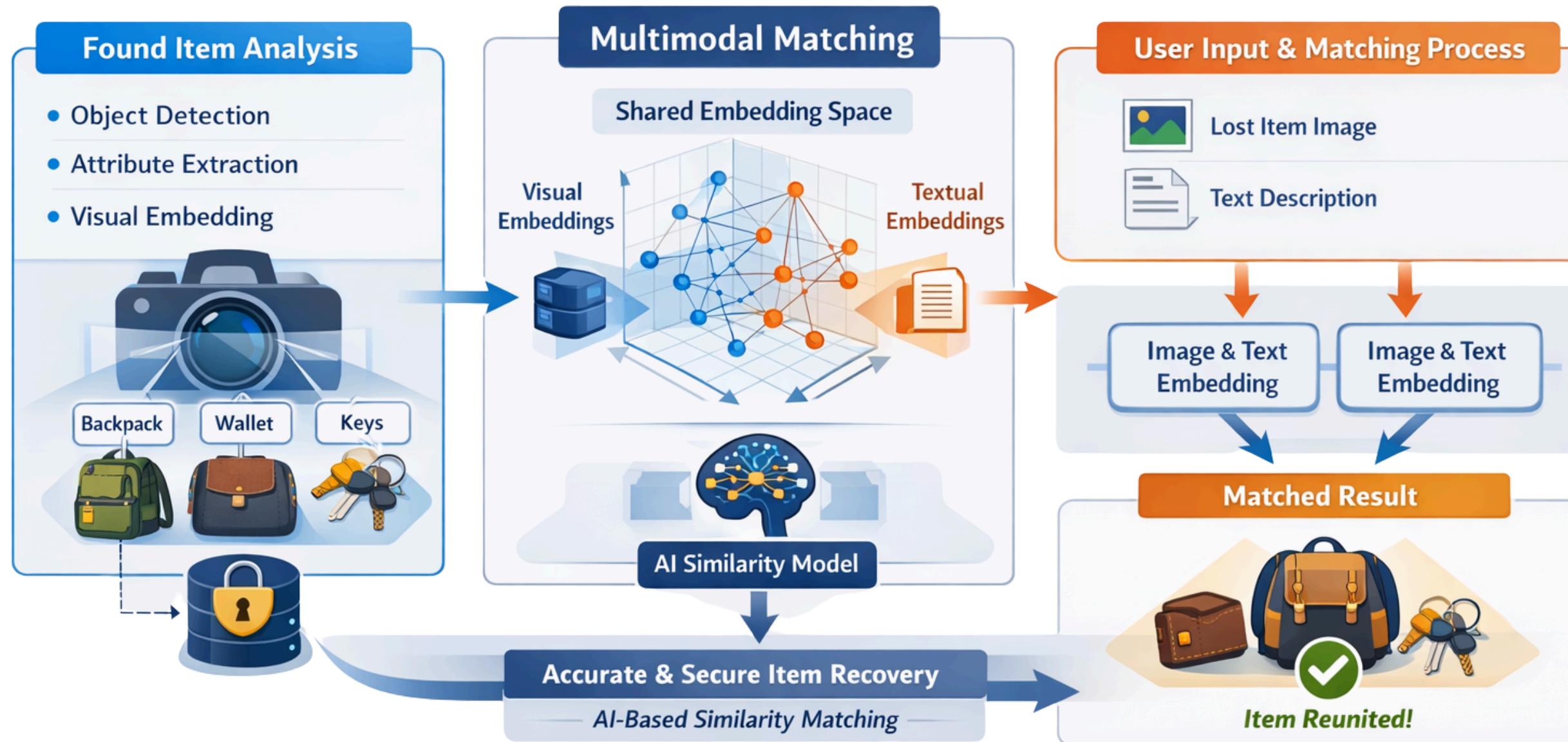
5. Data Decay & "Ghost" Items

WhatsApp groups often show a "Scientific Calculator Found" message from three weeks ago that was claimed within ten minutes. New students join the group and waste hours calling the finder for an item that was handed back weeks earlier.

6. Illegible & Error-Prone Records

A PE teacher might quickly scribble "found near goal" on a muddy tag that becomes unreadable by the time it reaches the office. If "Goal Post" is misread as "Gold Post" or "Gate," the item is logged in the wrong category and will never be found in a search.

Proposed AI Architecture



We propose a privacy-preserving, AI-driven Lost & Found system that leverages computer vision, multimodal embeddings, and semantic similarity matching to reconnect lost items with their rightful owners while preventing fraudulent claims.

AI-Powered Lost & Found System
Privacy-Preserving & Fraud-Resistant

Proposed AI-Based Solution

AI-Centric Design



AI-Centric Design

- Computer Vision models automatically analyze found-item images to extract:
 - Object category (e.g., backpack, wallet)
 - Visual attributes (color, shape, size, texture)
 - Discriminative visual patterns
- Each image is transformed into a high-dimensional visual embedding vector that acts as a unique visual fingerprint of the item.
- Found-item images are stored securely and never exposed publicly, ensuring privacy and scam resistance.

Multimodal Matching Capability

- Lost users can submit:
 - An image of the lost item, or
 - A textual description if an image is unavailable
- Text inputs are converted into semantic embeddings using NLP models.
- Image and text embeddings are mapped into a shared embedding space, enabling cross-modal matching.

System Workflow



Privacy-Preserving, Multimodal AI Matching

Images Never Visible Publicly

Matches Shown Only When High Confidence

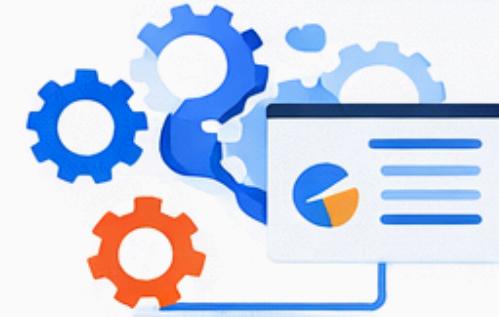
Innovation Highlights

Privacy-Preserving Visual Matching



- Found-item images never publicly visible
- Prevents fake ownership claims

Automatic AI-Driven Tag Generation



- Auto-extracts color, size, and object type from images

Backpack Blue Medium

Multimodal AI Matching (Image + Text)



- Allows text-based search alongside image search

Threshold-Based Confidence Filtering



- Only high-confidence matches revealed
- Increases system trustworthiness

Combining Vision Embeddings & Natural Language

allows for Scam-Resistant Reconnection

This page showcases the innovative use of Google technologies through cloud-inspired visuals. The interconnected shapes represent the powerful infrastructure supporting our solutions, emphasizing API integration and machine learning nodes that facilitate seamless operations and scalability across diverse applications and environments.

Architectural & AI-Level Uniqueness

Multimodal AI Matching (Image + Text)

- The system supports cross-modal retrieval, allowing text-to-image and image-to-image matching.
- Enables participation even when users lack item photos.

Privacy-Preserving Visual Matching

- Unlike conventional systems, found-item images are never publicly visible.
- Matching occurs entirely within the AI system, minimizing exposure and misuse.

Automatic AI-Driven Tag Generation

- Tags and labels are produced through vision-based feature extraction, not manual input.
- This improves consistency, accuracy, and scalability.
- Faster and Reliable Search and with less compute.

Threshold-Based Confidence Filtering

- Only matches exceeding a calibrated similarity threshold are revealed.
- Reduces false positives and increases trust in the system.

Use of Google Technologies



Cloud Infrastructure Layer

Google Cloud Platform (GCP) – Hosts the overall backend infrastructure and APIs.



AI & Machine Learning

Vertex AI – Handles image inference and embedding generation



Data Storage Layer

Firebase Storage – stores images securely & Firestore – Manages item metadata and claim states.



Location Context

Google Maps – enables basic location tagging and proximity-based ranking.



Event Handling & Notifications

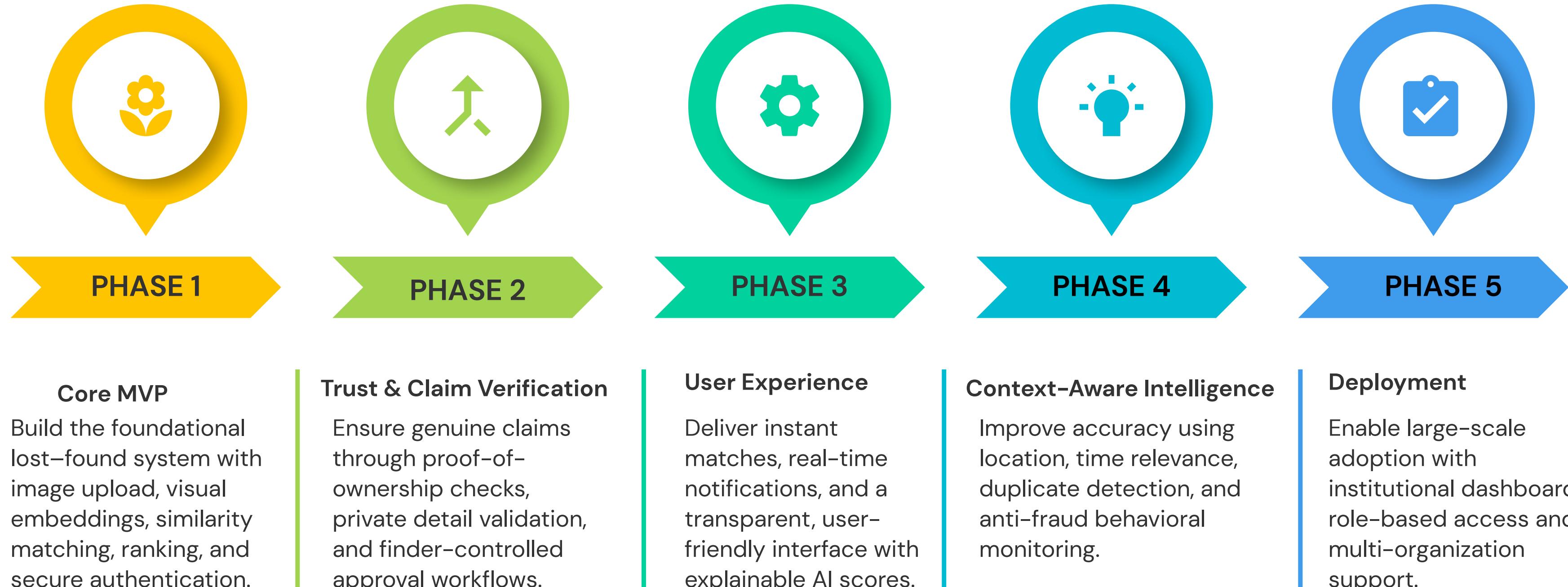
Cloud Functions triggers automated match workflows & FCM sends real-time notifications



Security & Identity Layer

Firebase – Authentication verifies users & Cloud IAM manages role-based access control.

Implementation Plan



Feasibility

01

Technical Feasibility



- Uses proven AI primitives: embeddings, cosine similarity, vector databases
- No real-time training required; inference-only for MVP
- Works with limited data initially, improves as data grows.

02

Operational Feasibility



- Minimal learning curve, making it easy for users and institutions to adopt
- Eliminates the need for manual tagging, moderation, classification.
- Automates the entire matching, ranking, and claim-handling workflow end to end.

03

Scalability



- Vector-based similarity search scales efficiently.
- Modular architecture separates metadata, and verification components for independent scaling
- Supports deployment across multiple institutions such as airports and cities.

04

Risk Mitigation



- Applies confidence thresholds to filter and surface only reliable matches
- Introduces human-in-the-loop review for low-confidence or disputed cases
- Enforces strong anti-fraud measures and privacy-preserving access controls.

Use Cases



Public Institutions

Single platform to manage lost items across large public spaces.



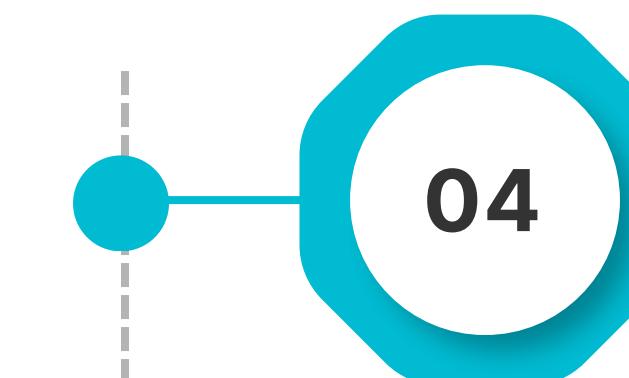
Corporate Campuses & Offices

Automated recovery process for employee belongings.



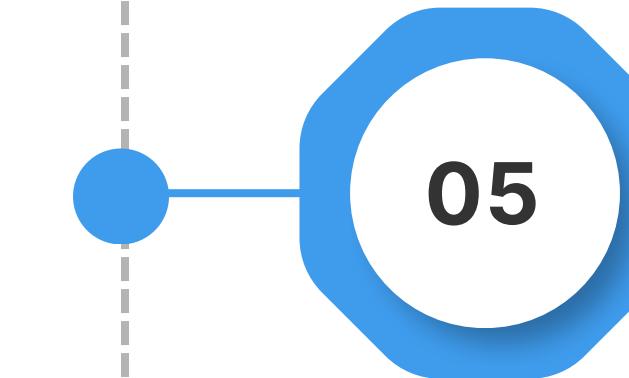
Malls, Events & Stadiums

Handles massive lost-item inflow with fast matching.



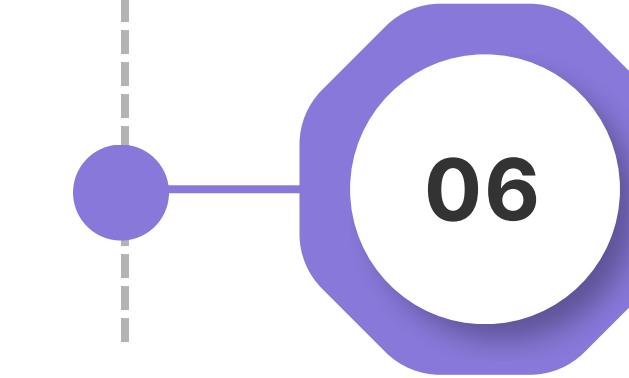
Smart Cities

Connects citizens and authorities through a unified recovery network.



Individuals

Visual search-based recovery without manual descriptions.



Transport Services

Quick passenger item recovery across buses, cabs, and railways.

Operational Impact

- Reduces recovery time by automating item matching with AI similarity scoring
- Eliminates manual effort through intelligent, image-driven search workflows



Social Impact

- Improves recovery rates of lost personal and valuable belongings
- Reduces stress and financial loss for individuals through faster resolution.



Trust & Safety Impact

- Prevents false claims using multi-step AI-based ownership verification
- Protects user privacy with secure, non-public image handling



IMPACT



Environmental Impact

- Decreases waste by enabling recovery of otherwise unclaimed items
- Supports reuse and donation through smart handling of unrecovered items.



Thank You!

