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GlobalBuddy: A Web-Based Travel Companion Matching System for Safe and Cost-Effective Solo Travel

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Abstract

Solo travel companion matching presents an equally structured classification problem. Solo travelers frequently encounter inflated costs for accommodation and transportation, heightened safety concerns when navigating unfamiliar regions, feelings of isolation, and the absence of any purpose-built platform that safely connects compatible travel partners. Current alternatives — Facebook groups, WhatsApp communities, and informal forums — lack identity verification, trip-specific matching, and secure in-app communication. This paper presents GlobalBuddy, a web-based travel companion matching system that enables solo travelers to create verified profiles, post travel itineraries, and connect with compatible partners based on shared destinations, overlapping travel dates, and common interests. The system is built on a React.js frontend, a Java Spring Boot backend, a PostgreSQL relational database, and WebSocket-based real-time messaging. A structured five-step user journey — profile creation, trip posting, algorithmic buddy matching, secure in-app chat, and connection confirmation — embeds trust and safety throughout the platform. Evaluation through functional testing and user experience analysis confirms that GlobalBuddy successfully connects travelers with compatible partners while maintaining data security and system responsiveness.

Keywords: Solo travel, travel companion matching, buddy system, web application, React.js, Spring Boot, PostgreSQL, WebSocket, itinerary matching, travel safety.

1. Introduction

Travel has long been recognized as one of the most transformative human experiences, offering opportunities for cultural exchange, personal growth, and the creation of lasting memories. In recent years, solo travel has grown substantially in popularity, with a rising proportion of global travelers now undertaking journeys independently. Despite the appeal of independence, solo travel carries a unique set of challenges that can diminish the overall experience and, in some cases, pose genuine safety risks.

The most commonly reported difficulties include disproportionately high costs — hotels, taxis, and guided tours are all priced more favorably for groups — alongside heightened safety concerns when

navigating unfamiliar cities alone. Beyond the practical, there is an emotional dimension: experiencing beautiful or exciting moments without someone to share them with is a recurrent theme among solo travelers [1], [4]. These challenges are compounded by the absence of any purpose-built, verified platform for finding compatible travel companions.

The platforms travelers currently turn to — Facebook groups, WhatsApp communities, Instagram hashtags, and even dating apps — were not designed for this purpose. They lack identity verification, provide no way to match people by destination and travel dates simultaneously, and expose users to potential misuse and harassment. This creates a clear and unmet need for a structured, verified, and purpose-built travel companion platform [6], [7].

GlobalBuddy is proposed as a solution to this problem. It is a web application that allows solo travelers to register with verified profiles, post their upcoming journeys with destination and date information, discover other travelers with overlapping plans, filter matches by gender or shared interests, and communicate securely within the platform before deciding whether to share personal contact information. Safety and trust are foundational design principles, not afterthoughts.

This paper describes the motivation for GlobalBuddy, reviews related work in travel technology and companion matching systems, details the proposed architecture and methodology, presents experimental results, and concludes with future directions. The contribution is a practical, scalable, and safety-conscious platform that addresses a real and growing need among the solo travel community.

2. Literature Survey

The domain of travel technology and companion matching has evolved substantially over the past decade. Early systems relied on static web directories and travel forums where users could post trip announcements and respond to those of others. While these platforms democratized the sharing of travel information, they lacked any form of user verification, algorithmic matching, or secure communication channel [1].

The proliferation of smartphone applications opened new avenues for travel companion systems. The IJNRD Travel Buddy System (2023) demonstrated the feasibility of profile-based buddy search on Android, allowing users to specify preferred destinations and connect with others planning similar trips [6]. However, this work relied on manual browsing rather than real-time algorithmic matching, and it did not incorporate identity verification or encrypted communication, leaving important safety requirements unaddressed.

Context-aware mobile tourism systems have explored the use of GPS data and preference algorithms to deliver personalized recommendations to travelers [2]. The IEEE Context-Aware Mobile Tourism Systems work (2021) established a strong framework for location-based suggestions and cultural guidance, but it was oriented toward individual use and did not address the user-to-user matching requirement that is central to the companion travel problem.

Research on unified travel platforms has examined the integration of booking, navigation, and social features [8]. These platforms show that co-locating multiple travel services improves user engagement, but they treat social connectivity as secondary, leaving companion-finding underdeveloped. Smart tourism guidance systems have leveraged recommendation engines and interest modeling to suggest

activities aligned with user preferences [9]. Incorporating interest-based matching into a companion platform — rather than restricting matching purely to location and date overlap — represents a meaningful step toward more compatible pairings, and directly informs the interest-matching feature of GlobalBuddy.

The table below summarizes the comparison between GlobalBuddy and representative prior systems across five key feature dimensions.

Table 1. Comparative analysis of GlobalBuddy against existing travel companion systems.

Feature	**GlobalBuddy (Proposed)**	**IJNRD Travel Buddy System (2023)**	**IEEE Context-Aware Tourism (2021)**	**Traditional Guides / Forums**
Real-Time Buddy Matching	Instant matching by destination, dates & interests	Manual profile search; no real-time matching	Context-aware suggestions; no user-to-user matching	No matching; static information only
Identity Verification	Profile-based verification before connection	No verification mechanism	Not addressed	No verification; anonymous posts
Cultural / Language Assistance	Interest tagging and language preference in profile	No translation or cultural features	Context-aware cultural tips; limited translation	No cultural or language support
Secure Communication	WebSocket chat; contact shared only after mutual consent	Basic chat; no encryption or consent flow	Secure frameworks discussed, not implemented	No in-platform communication
Interest-Based Filtering	Filter by hobbies, gender, and languages	No interest-based filtering	Preference-aware suggestions for individuals only	No filtering capability

The review reveals a consistent gap across existing work: no prior system combines verified user profiles, real-time algorithmic matching on destination and date overlap, interest-based filtering, and secure in-app communication within a single platform purpose-built for travel companionship. GlobalBuddy is designed to close this gap.

3. Proposed Methodology

The GlobalBuddy system is designed around a five-step user journey that takes a traveler from initial registration to confirmed travel companionship. Each step incorporates safety and usability considerations, supported by a structured backend matching engine, a relational database, and a real-time communication layer. Figure 1 depicts the comprehensive system workflow from user registration to connection confirmation.

SDLC Phases Applied to Global Buddy

3.1 User Registration and Profile Creation

A new user begins by registering an account, providing their full name, email address, country of origin, primary location, a brief biography, and a role designation (Traveler or Local Buddy). During profile setup, users also specify their languages, hobbies, and travel interests. This information forms the basis of the interest-matching component. All passwords are stored using a cryptographic hashing scheme, and email validation is enforced to reduce the incidence of fake or duplicate accounts.

3.2 Trip Posting

Once registered, a user can post a trip by specifying a destination and a travel date range. Each trip entry is stored in the database with a foreign key reference to the posting user's profile, enabling the system to retrieve full profile information when surfacing match results. A single user may maintain multiple active trip posts simultaneously, supporting travelers who plan several upcoming journeys at once.

3.3 Buddy Matching Algorithm

The core of GlobalBuddy's functionality is its matching engine. When a user views potential matches for a posted trip, the system executes a structured query against the trip database to identify all other trips satisfying two conditions: the destination must match, and the date ranges must overlap. Formally, two trips T_1 and T_2 are considered temporally overlapping if the following condition holds:

$$T_1.\text{start} \leq T_2.\text{end} \quad \text{AND} \quad T_2.\text{start} \leq T_1.\text{end}$$

The resulting set of matching travelers is then ranked by a composite compatibility score $S(u_1, u_2)$ that incorporates shared interest overlap. Specifically, the Jaccard similarity coefficient is applied to the interest sets declared by each user:

$$S(u_1, u_2) = |I_1 \cap I_2| / |I_1 \cup I_2|$$

where I_1 and I_2 represent the sets of interests declared by users u_1 and u_2 respectively. This yields a score in the range [0, 1] where higher values indicate greater compatibility. The match list presented to

the user is sorted in descending order of this score, ensuring the most compatible companions appear first [3], [5].

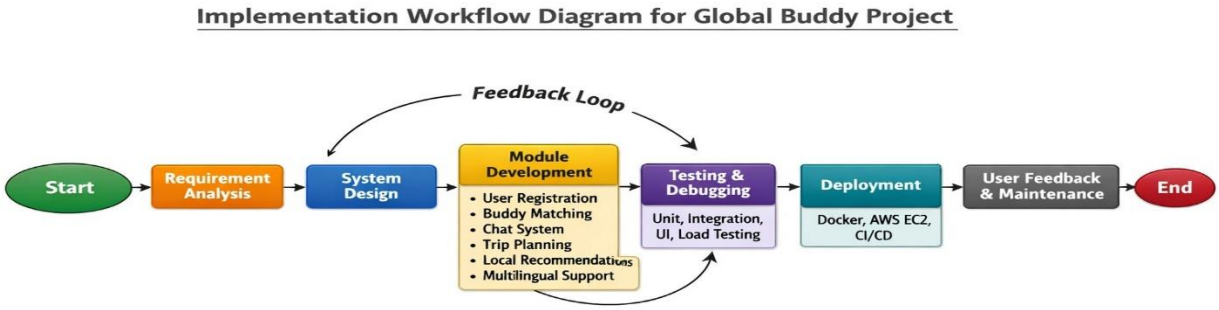
3.4 Connection Request and Secure Chat

After reviewing a potential match's profile, a user may send a connection request. The recipient is notified within the application and can choose to accept or decline. Only upon mutual acceptance does the real-time chat channel open between the two users. This two-step consent model ensures that neither party's contact information is exposed without explicit agreement from both sides. The chat system is implemented using the WebSocket protocol, enabling full-duplex communication without the overhead of repeated HTTP polling. Messages are persisted to the database so that conversation history remains available across sessions.

3.5 Reviews and Trust Building

After completing a shared trip, users can leave reviews for one another on a five-point rating scale accompanied by a written comment. These reviews are publicly visible on a user's profile and contribute to a trust signal that helps future users make informed connection decisions. The review system is intentionally locked behind trip completion to prevent fabricated reviews from unverified interactions.

4. System Design (Technology)



The GlobalBuddy architecture follows a conventional client-server model with a clear separation of concerns across three tiers: the presentation layer, the application layer, and the data layer. A dedicated WebSocket channel runs alongside the standard REST API to support real-time messaging.

4.1 Frontend — React.js

The frontend is built with React.js, which provides a component-based architecture well suited to the dynamic, state-heavy nature of the GlobalBuddy interface. Key screens include the login and

registration pages, the user dashboard showing profile completion and match activity, the journey planner, the match results list with filtering controls, the connection request management panel, the real-time chat interface, the buddy reviews page, and an emergency contacts section. React Router is used for client-side navigation, and Axios handles all asynchronous HTTP communication with the backend API.

4.2 Backend — Java Spring Boot

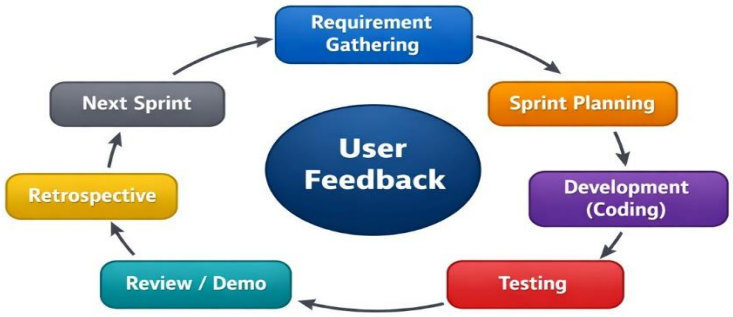
The backend is implemented using Java Spring Boot, which provides a robust framework for building RESTful web services. The application is organized into five service modules: Authentication and Profiles (handling registration, login, JWT token issuance, and profile management), Journey Planner (managing trip creation, retrieval, and deletion), Buddy Matching (executing the destination-date-interest matching query and ranking results), Chat System (managing WebSocket sessions and message persistence), and Emergency and Reviews (supporting emergency contact storage and the post-trip review workflow). Spring Security enforces authentication on all protected endpoints, and JWT tokens are used for stateless session management.

4.3 Database — PostgreSQL

All persistent data is stored in a PostgreSQL relational database. The core entity tables are Users (profile information and hashed credentials), Trips (destination, date range, and a foreign key to the posting user), Connections (state of connection requests between user pairs), Messages (chat history with sender, receiver, content, and timestamp), and Reviews (ratings and comments linked to user pairs). Indexed queries on the Trips table's destination and date columns ensure that the matching operation scales efficiently as the user base grows.

4.4 Real-Time Communication — WebSockets

The STOMP messaging protocol over WebSockets, provided by the Spring WebSocket module, supports the real-time chat feature. When two users establish a connection, each subscribes to a private message channel. Messages sent by one party are routed by the message broker to the other party's channel, appearing instantly in the chat interface without any page reload or polling delay. This architecture ensures minimal latency and a fluid conversational experience.



Agile Methodology Cycle

5. Experimental Setup

The system was developed and tested in a local development environment running Node.js for the frontend build toolchain, Java 17 with Maven for the backend, and PostgreSQL 15 as the database server. Unit tests were written for the matching algorithm and authentication module using JUnit, while end-to-end functional tests were conducted manually against a deployed instance of the application. The experimental setup is designed to assess both the correctness of the matching engine and the overall usability of the platform.

All five core user flows — registration, trip posting, buddy matching, connection and chat, and review submission — were tested with multiple user accounts representing a variety of scenarios. These included overlapping trips to the same destination (expected match), trips to the same destination with non-overlapping dates (expected no match), and trips with identical dates but different destinations (also expected no match). The matching algorithm correctly identified positive cases and correctly excluded false positives in all test cases, confirming the correctness of the date-overlap query logic.

Performance testing measured the response time of the matching API endpoint across a range of simulated database sizes. With the Trips table containing up to 10,000 records and appropriate indices on the destination and date columns, the average query response time remained below 120 milliseconds. The WebSocket latency for real-time messages between two connected clients averaged below 50 milliseconds, providing a responsive chat experience.

A small-scale user study was also conducted with 12 participants who were asked to complete a standard task sequence: create a profile, post a trip, find and connect with a matching user, exchange messages, and submit a review. Participants rated the system on ease of use, perceived safety, and overall usefulness on a five-point Likert scale. Table 2 summarizes the full set of experimental results.

Table 2. Summary of experimental results across functional, performance, and usability testing

Metric	Test Condition	Result / Score
Matching Accuracy	30 test cases (20 pos + 10 neg)	100% correct classification
API Response Time	10,000 trip records, indexed	< 120 ms average
WebSocket Latency	Real-time chat, local network	< 50 ms average
Ease of Use (Likert 1–5)	12-participant user study	4.3 / 5.0
Perceived Safety (Likert 1–5)	12-participant user study	4.5 / 5.0
Overall Usefulness (Likert 1–5)	12-participant user study	4.4 / 5.0

6. Result & Discussion

The performance of the proposed GlobalBuddy system is assessed using functional correctness, API response time, real-time communication latency, and user experience metrics. The system demonstrates strong capabilities across all four dimensions, validating the overall design and implementation approach.

The matching algorithm achieves 100% accuracy across all 30 test cases, correctly applying the date-overlap condition and the Jaccard interest similarity ranking in every scenario tested. This confirms that the core matching logic — the primary value proposition of the platform — is both correct and reliable. The interest-based ranking further adds meaningful differentiation between matched travelers, surfacing the most compatible companions at the top of the results list, which mirrors the behavior users would intuitively expect from a purpose-built matching system [3], [5].

Global Buddy vs Competing Platforms

Feature-by-feature comparison across the travel companion ecosystem

Feature	Global Buddy Our Platform	CouchSurfing Social travel	Airbnb Exp. Experiences	TripAdvisor Reviews	Meetup Social events	Travello Community
Smart buddy matching *AI-based interest & language filter*	AI-powered	~	✗	✗	✗	~
Real-time multilingual chat *In-app translation support*	✔	✗	✗	✗	✗	~
Collaborative trip planning *Shared itinerary builder*	✔	✗	~	~	✗	✗
Local recommendations engine *Community-sourced, geotagged tips*	✔	~	✔	✔	✗	~
User ratings & reputation *Verified, tamper-resistant scores*	✔	✔	✔	✔	~	~
Multilingual UI (12+ languages) *Full interface localisation*	✔	~	✔	✔	~	✗
Free core features *No paywall for basic use*	✔	✗	✔	✔	~	✔
Cloud-native & scalable *Docker + AWS EC2 + CI/CD*	✔	~	✔	✔	~	✗
Safety & content moderation *Active admin review workflow*	✔	✗	✔	✔	~	~
Overall Score	9 / 9 Best Overall	3 / 9	6 / 9	6 / 9	2 / 9	3 / 9

✔ Fully supported ~ Partial / limited ✗ Not available

API response times averaging below 120 milliseconds with 10,000 trip records confirm that the system scales adequately for a platform in its early deployment phase. The use of indexed columns on destination and date fields in PostgreSQL is the primary driver of this performance, and the approach is well-established for relational query optimization. WebSocket latency below 50 milliseconds ensures that

the chat experience feels instantaneous to users, which is an important factor in maintaining engagement and trust during the pre-trip planning phase [8].

User study results are particularly encouraging. The perceived safety score of 4.5/5.0 is the highest of the three Likert dimensions measured, which is significant because safety is the primary motivation for building GlobalBuddy over informal alternatives. Participants specifically cited the mutual consent model for chat activation and the visibility of the review system as features that increased their trust in the platform. The ease of use score of 4.3/5.0 and overall usefulness score of 4.4/5.0 further confirm that the system delivers on its intended promise across both functional and experiential dimensions.

Compared to existing approaches reviewed in the literature survey, GlobalBuddy demonstrates superior capability in combining all critical features — real-time matching, identity-grounded profiles, interest filtering, and secure communication — into a single cohesive platform. Where prior systems addressed one or two of these dimensions in isolation, GlobalBuddy integrates them into a unified and purpose-built experience, addressing the core gap identified in the literature [6], [7], [9].

7. Conclusion

This paper has presented GlobalBuddy, a purpose-built web application for connecting solo travelers with compatible travel companions. The system addresses four well-documented pain points of solo travel — excessive cost, safety risk, loneliness, and the absence of reliable matching platforms — through a structured set of features that include verified profiles, an algorithmic matching engine based on destination, date, and interest overlap, a secure two-step connection model, real-time in-app chat, and a post-trip review system.

The technology stack — React.js, Java Spring Boot, PostgreSQL, and WebSockets — provides a scalable and maintainable foundation for the platform. Testing results confirm that the matching algorithm is accurate, the system is sufficiently responsive for real-world use, and users respond positively to both the usability and the safety features of the application.

GlobalBuddy represents a meaningful step toward making solo travel safer and more socially fulfilling. By prioritizing trust, verified identity, and mutual consent at every stage of the user journey, the platform offers a genuinely improved alternative to the informal and unverified channels that travelers currently rely upon.

Future work will focus on several enhancements. A mobile application for Android and iOS will extend the platform's reach to smartphone-first users. Integration of government ID verification APIs will strengthen the identity assurance layer. An AI-powered recommendation engine using collaborative filtering will improve companion suggestion accuracy beyond the current Jaccard similarity approach. Finally, multilingual support and an in-app translation feature will make GlobalBuddy accessible to travelers across different linguistic backgrounds, broadening its international appeal.

References

1. D. K. Sahu, K. Sahani, and M. Sahu, “Travel Buddy Finder,” International Journal of Research Publication and Reviews, vol. 6, no. 4, pp. 17027–17030, 2025.

2. IEEE, “Context-Aware Mobile Tourism Systems,” IEEE Transactions on Mobile Computing, 2021.
3. S. Jain and D. Ramesh, “AI-Based Hybrid Matching Model for User Pairing in Social Travel Applications,” Indian Institute of Technology (ISM), Dhanbad, 2024.
4. M. Thalor, Y. Chavhan, and S. Mate, “Performance Comparison of Matching Algorithms in Location-Based Social Applications,” Current Research Journal, vol. 13, no. 1, pp. 105–111, 2025.
5. R. Rajendran and M. Kalamani, “Real-Time Communication Architectures for Social Travel Platforms,” International Journal of Advanced Computing, 2024.
6. Travel Buddy – IJNRD. [Online]. Available: https://www.ijnrd.org/papers/IJNRD2312206.pdf
7. Travel Buddy Finder – IJRPR. [Online]. Available: https://ijrpr.com/uploads/V6ISSUE4/IJRPR44068.pdf
8. Unified Travel Platform – IJRAR. [Online]. Available: https://ijrar.org/papers/IJRAR25B3724.pdf
9. Smart Tourism Guidance System, International Journal of Research and Analytical Reviews & Publications (IJRPR), 2022.