iJRASET
International Journal For Research in
Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH
IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 13 Issue: IV Month of publication: April 2025

DOI: https://doi.org/10.22214/ijraset.2025.68741

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 13 Issue IV Apr 2025- Available at www.ijraset.com

Live Location Tracking

Mr. M. Prabu[1], Peram Sasi Kumar Reddy[2], Katakam Sai Teja[3], Nai Brahmana Mohan Kumar[4], Bodipati Durga Malleswari[5]

[1]*Assistant professor, Department of Computer Science and Engineering, J.N.N Institute of Engineering Kannigaipair, India*
[4]*Department of Artificial Intelligence and data science, J.N.N Institute of Engineering Kannigaipair, India*
[2, 3, 5]*Department of Computer Science and Engineering, J.N.N Institute of Engineering, Kannigaipair, India*

Abstract: Live Location Tracking System is an interactive web system that tracks users or assets on an interactive map with real or simulated GPS information. It provides real-time tracking with dynamic markers, direction guidance, and time-stamped movement history. It uses React.js for frontend, Tailwind CSS-styled for design, and Chart.js for data visualization. It uses API services handled by Python and Flask for backend with GPS data processed with Pandas. Axios takes care of API communication between backend and frontend for smooth data transmission. User and admin data with profiles and location history are saved securely in a MySQL database accessed with phpMyAdmin. Secure login, admin dashboard, trails for routes, and live display of coordinates are included in the system. For scalability, future upgrades such as integration of real GPS hardware, WebSocket-based real-time tracking, and predictive analysis are provided. It offers real-world applications such as logistics, transport tracking, personal protection, and asset tracking. Being an open-source platform, it offers a cost-efficient, flexible option for live location tracking systems.
Keywords: Live Location Tracking, Interactive Map Interface, Real-Time Monitoring, Geolocation Data, Admin Dashboard, Asset and User Tracking and Predictive Movement Analytics.

I. INTRODUCTION

In the present era of global connectivity where everyone is connected digitally, the aspect of tracking the live location of assets, vehicles, or individuals has become a top feature in almost every industry. From logistics management in supply chains to personal security and public transport networks, location tracing technology has become a central element. Increasing demands for openness, security, and efficiency have driven the innovations towards sophisticated systems that can deliver live tracing information in an understandable and actionable format.

This project specifies an internet-enabled Live Location Tracking System for real-time geographic location tracking with interactive map-based user interface. The system graphically represents movement using dynamic location indicators, direction routing, and time-stamped data to help users track the path and real-time location of objects of interest. The system further incorporates route trails that offer an efficient graphical representation of previous movement for situational awareness and traceability. Most significant to the system feature is probably its simulation mode, under which GPS data are read from a preloaded data set to simulate actual travel in real time.

This enables the platform to be made available for development, test, and demo usage without any need for direct connection to GPS hardware. Role-based access control with secure login functionality is also offered by the system, with users able to manage profiles and see their own activity and administrators see a central dashboard to see all user movement. To assist with the decision process, the interface also includes graphical analytics in the form of chart elements showing prior movement history and usage trends. Developed using modern web technology—such as Python with Flask on the back end, and React.js, Tailwind CSS, and Chart.js on the front end—the system provides a responsive, scalable, and user-friendly experience on devices. The platform provides a scalable and robust platform for many real-world applications such as fleet tracking, asset tracking, emergency response planning, and personal safety monitoring.

The system's open-source and modular architecture makes it easy to integrate with real GPS hardware, real-time data streaming, and future integration possibilities such as predictive analytics and mobile app deployment. This paper describes the design, development, and features of the Live Location Tracking System and illustrates its potential to be a cost-effective, flexible solution for real-time geolocation technologies.

II. LITERATURE REVIEW

The domain of live location tracking has evolved significantly over the past decade, integrating diverse technologies such as GPS, cloud computing, mobile sensors, and web-based interfaces. Numerous studies have proposed innovative frameworks and practical systems that laid the groundwork for modern tracking solutions.

Schargel et al. [1] presented an early smartphone-based live tracking system that utilized native GPS and internet connectivity to track real-time user locations, establishing the groundwork for location-aware applications and emphasizing the significance of mobile integration. Karkare et al. [2] and Ganorkar [3] presented simple tracking systems intended for individual or vehicle tracking, proving the viability of utilizing mobile applications and server-side technologies to process and visualize geolocation information. Their frameworks provided real-time coordinate updates and direction visualization, which are mandatory features in today's system. Chaudhary and Nagpal [4] proposed a web-based tracker that could generate dynamic location updates and path history, focusing on route visualization. This is made more comprehensive in our system through simulated GPS data and interactive dashboards, providing a stronger user experience. Human-oriented, Thomas et al. [5] conducted research on how older adults perceived continuous location tracking, highlighting requirements for easy-to-use interfaces and open data treatment practices. The findings have been integrated into the design of our system through easy-to-use UI and role-based access control. Nansen et al. [6] made a cross-platform analysis of the debates surrounding family-tracking apps with social and ethical issues like trust, autonomy, and over-surveillance in their focus. These aspects were addressed in our system by safe access and user sovereignty over information. Privacy issues in location tracking systems were also addressed by Baron and Musolesi [7], who pointed out the possible dangers of chronic location sharing exposing sensitive user activity. These issues substantiate the presence of secure login and limited admin access in our system to protect data privacy.

Morton et al. [8] investigated cloud technologies for activity and location tracking and showed a system architecture consistent with our implementation of cloud-based backend and modular frontend components. This supports our selection of Flask (Python) and React.js as primary technologies for system development. Okoniewska et al. [9] tested a Wi-Fi and RFID-based tracking system in a hospital setting, showing the significance of integrating multi-source data towards greater tracking accuracy. This led to the implementation of the simulation mode in our system, where testing and development can be conducted without live sensors. Behzadan et al. [10] took on the challenge of providing context information by using ubiquitous location tracking in construction environments. Their context-sensitive delivery mechanism aids the concept of a dynamic dashboard, which has been adopted in our system through the use of Chart.js for visualizing movement data. Finally, Gauglitz et al. [11] helped facilitate real-time tracking and mapping in augmented reality (AR) and virtual reality (VR) scenarios, with focus given to efficient data streaming and update mechanisms. These concepts are also aligned with our future improvements, especially our plans for integrating WebSocket-based real-time tracking.

In conclusion, the literature that is reviewed presents an array of tracking methods, issues of privacy, and field-tested deployment examples. Based on these building block researches, the system to be proposed utilizes simulation, real-time, and prediction analytics within an extensible user-friendly web application.

III. PROPOSED METHODOLOGY

The study suggests a web-based, intelligent Live Location Tracking System with the objective of providing real-time movement visibility and administrative monitoring through interactive interfaces. The system is scalable, modular, and deployable on different devices. The methodology involves the integration of geolocation data simulation, secure user management, and analytical visualization using cutting-edge web technologies.

1) *System Concept*: The application is designed to support dynamic monitoring of user locations via emulated GPS information and display on an interactive map. It is suitable to be deployed for applications such as fleet monitoring, personal security, or tracking of logistics.
2) *User and Admin Modules*: The app also supports admin and user interfaces that are separate. Users can view their location history, while admins can view to initiate global tracking, user management, and route inspection from dashboards.
3) *Smart Data Flow Pipeline*: The backend has been planned such that it processes, ingests, and stores geospatial data in such a way that it will be feasible to know the location in real-time and historic paths. Timestamp location points are utilized when computing movement trends and speed trends.
4) *Visualization and Insight Generation*: The system transforms raw locational data into meaningful information in graphical presentation style of charts. The information aids in interpretation of movement habits, coverage of routes, and spotting of deviances from normal routes.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 13 Issue IV Apr 2025- Available at www.ijraset.com

5) *Security and Scalability*:Factors Role-based access, secure authentication, and horizontally deployable architecture through light-weight frontend- backend framework for future support in order to support integration with actual GPS devices and IoT sensors belong to the system.

IV. BLOCK DIAGRAM

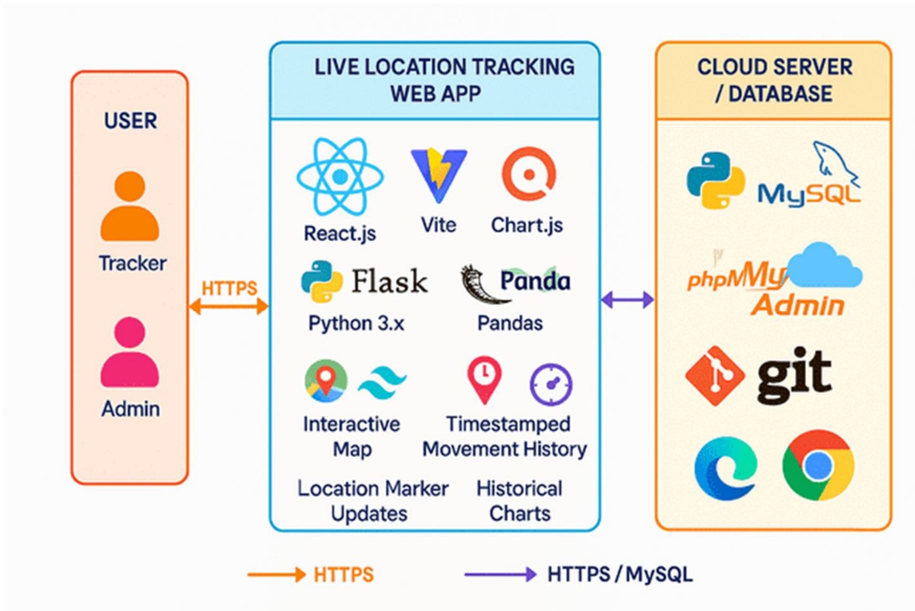


Fig 1.1 System Architecture

1) *Live Tracker – Real-Time Live Tracking Homepage*

This is the landing page of the LiveTracker app, which promises real-time tracking of assets, vehicles, or loved ones. The minimalist and clean design has a large blue banner with a "Get Started" button and a concise tagline highlighting precision and simplicity of tracking.

Under the Features section, the following are emphasized:

Real-Time Updates – Provides real-time location tracking.

Interactive Map – A basic map for navigation and tracking.

Secure Tracking – emphasizes secure and encrypted data handling.

Navigation links in the top-right give direct access to Home, Features, About, and Contact pages.

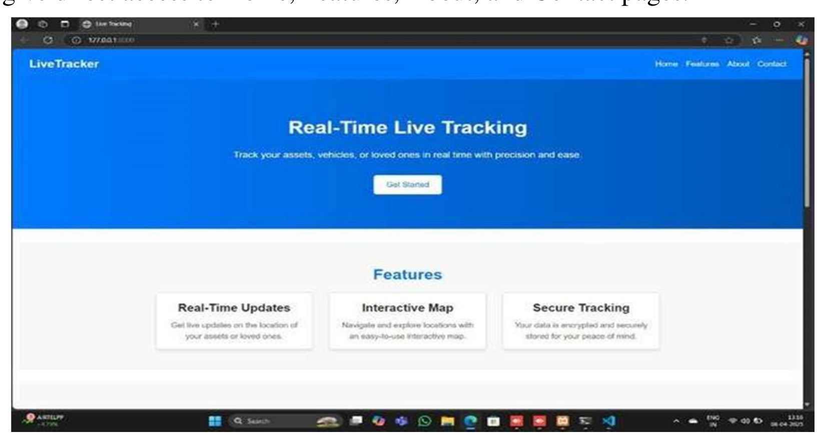


Fig.1.2

2) User Registration Page

This is the Registration Interface for new users to register. The form gathers important user information such as First Name, Last Name, Email, Password, and Password Confirmation. It includes input validation and password visibility switches. After filling, users can press the Register button to register an account. There is also a link provided for existing users to access the login page. The minimalist design with a gradient background provides a sleek and user-friendly experience.

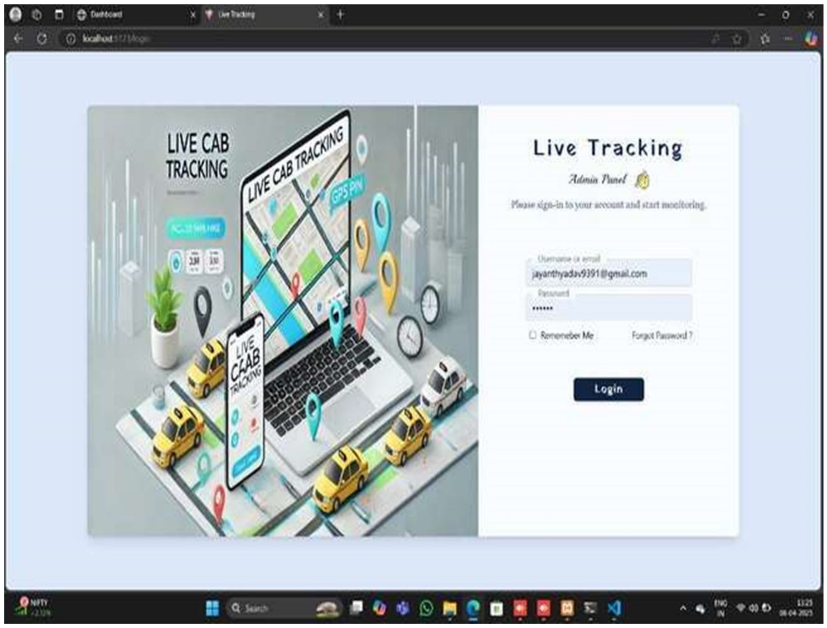


Fig 1.3

3) Admin Login – Live Tracking System

This is the safe login page of the Live Cab Tracking Admin Panel. Admins can log in with their registered email and password to access the site, administer users, and track live location tracking. A "Remember Me" feature and a password recovery link are available to provide easy and secure access.

4) Admin Dashboard Overview

This dashboard provides a summary of key metrics like total users, active users, and new users for the day. It also has a bar chart showing monthly user data for the selected year. The interactive design allows admins to monitor system growth and user activity in an effective manner.

5) User Management Dashboard

This admin interface allows admins to manage user accounts in the Live Location Tracking system. It provides user details such as email, status, and creation date, with edit and delete features. The integrated search facility and paging ensure improved navigation for large collections of users.

6) Admin Profile Interface

This page displays the Admin user's profile page in the Live Location Tracking system. It displays crucial information such as name, contact information, role, and location permissions. The user can change their profile or password from this interface itself for easy account management.

7) Live Location Map View

This screen shows the real-time location tracking feature with Google Maps integration. It displays precise coordinates and location points for the selected user. This feature is crucial to track movement and offer real-time tracking.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 13 Issue IV Apr 2025- Available at www.ijraset.com

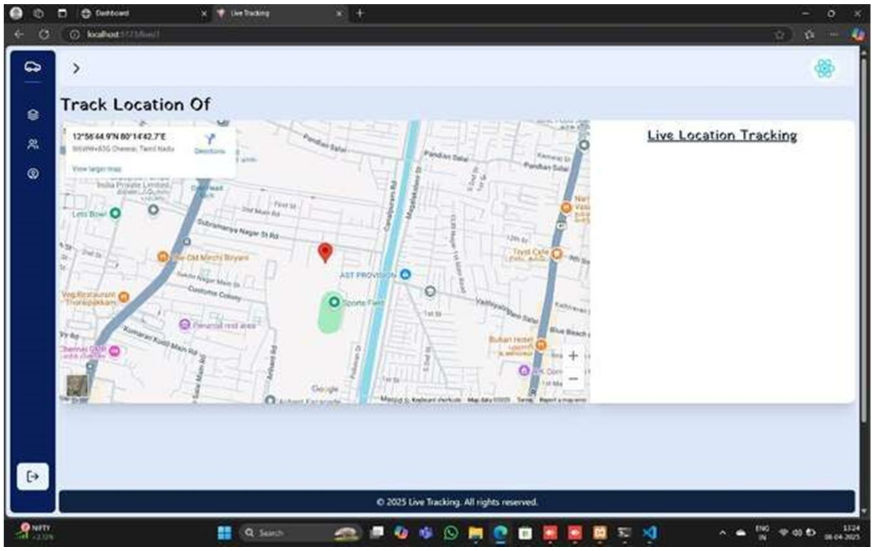


Fig 1.4

8) Location Tracking Dashboard

This dashboard provides facilities to the users to control their real-time location activity with "Check-In" and "Check-Out" buttons. It supports a Location History table with recorded information such as Latitude, Longitude, and Timestamp. At present, no location data are available. The interface is minimal and easy to use, facilitating effective tracking of movement over time.

V. METHODS

A. System Architecture and Technology Stack

Application software is developed on client-server, modular architecture in which frontend and backend exchange information through RESTful APIs. Benefit of this architecture is scalability, separation of concerns, and ease of debugging.

Frontend Technologies

React.js: Used to develop a dynamic GUI component-based. React dynamically renders maps, user location, and routing pins.

Vite: Used as the front-end build tool to accelerate development and performance through fast hot module replacement (HMR) and pre-bundling.

Tailwind CSS: Offers a utility-first CSS framework for responsive, maintainable, and mobile-responsive designs on maps and dashboards.

Chart.js: Used to display graphical objects such as line graphs and bar charts for demonstration of historical trends, covered distances, and observation frequencies.

Axios: Utilized to handle asynchronous HTTP requests processing so frontend can send location data, authenticate user, and receive live updates from backend without disruption.

Backend Technologies

Python 3.x: General-purpose back-end language simply because it's just so much fun to write in and it has these amazing data manipulation libraries to tap into.

Flask: Sanitized Python web application used as the main REST API server and for user logon processing, database interaction, and session management.

Flask-CORS: Practices secure cross-origin resource sharing to enable the React frontend (served on a different host or port) to exchange data with the Flask API.

Pandas: Used in structured coordinate data processing and continuous tracking simulation. It loads structured data sources (e.g., pre-formatted location sets) for testing real GPS tracking.

Database Management
MySQL: Large relational database storing ordered records of user profiles, location history, timestamps, and user permissions.
PhpMyAdmin: Graphical user interface application used throughout development and testing for schema management and examination of logs stored and for executing queries against tables.

Supporting Tools
Git: Version control, code base change tracking, branching, and parallel development.
Web Browsers (Chrome & Firefox): For running the front-end render tests, responsiveness verification, and browser compatibility testing.

B. Backend Flow and Simulated Location Data

A Python script using Pandas is employed to generate false location information (latitude, longitude, timestamp) mimicking real-time tracking without accessing GPS hardware. Data is transmitted to the backend Flask API after a certain time interval.
Backend receives location updates in the form of JSON objects.
The entry is made up of: user_id, latitude, longitude, and timestamp.
These are stored in MySQL database within a tracking table..

C. Real-Time Rendering in Frontend and Interact

A leaflet.js-React interface is utilized as part of admin interface to provide live locations of traced users.
Trail plots are rendered in real-time to display direction and distance.
Admins have the following functionalities:
To see current coordinates.
User switching.
Route traveled last observation.
Dynamic viewing of movement history.

D. Backend Algorithmic Logic and API Behavior

Flask backend performs several functions:
Authentication: Admin and user authentication with hashed credentials.
Data Routing: Handling POST requests from scripts that simulate data and GET requests from frontend dashboards.
Session Management: User session handling and role-based access control.
Historical Queries: API routes for retrieving route history, user logs, and session summaries.
All API routes are secured with middleware logic and coded with modularity.

E. Database Schema Design

Users Table: Saves the user login details, user type, and session ID.
Tracking Table: Stores location history with timestamps, accessed using foreign keys to all users.
Audit Logs Table: Stores user access, endpoint usage, and actions by admins for traceability and security audits.
Indexes are invoked on timestamp and user ID columns to enable improved query performance.

F. Data Visualization and Analytics

Statistics are displayed in Chart.js widgets including:
Distance traveled throughout the day.
Level of activity per hour.
Distribution of time spent on idleness vs. activity.
Visual cues enable the detection of anomalies (i.e., sudden stop or excessive idleness).
Visual alerts enhance situational awareness, particularly for logistics- or security-related use cases.
modules underway: AI-assisted counseling aide, student multilingual support.

G. Testing and Deployment

Unit Testing: Each Flask route was tested to produce correct HTTP status codes, verify data, and provide error messages.
Integration Testing: End-to-end testing was conducted to verify that there was proper data transfer between Flask backend and React frontend.
Browser Testing: Cross-browser testing was performed on Google Chrome and Mozilla Firefox with the aim to behave similarly.
Development: Run on local machine with assistance of XAMPP where Flask server and React app run concurrently.
Production: Hosted on LAMP stack with NGINX/Apache, cloud-hosted MySQL database, and Python virtual environment.

VI. EXPECTED RESULT

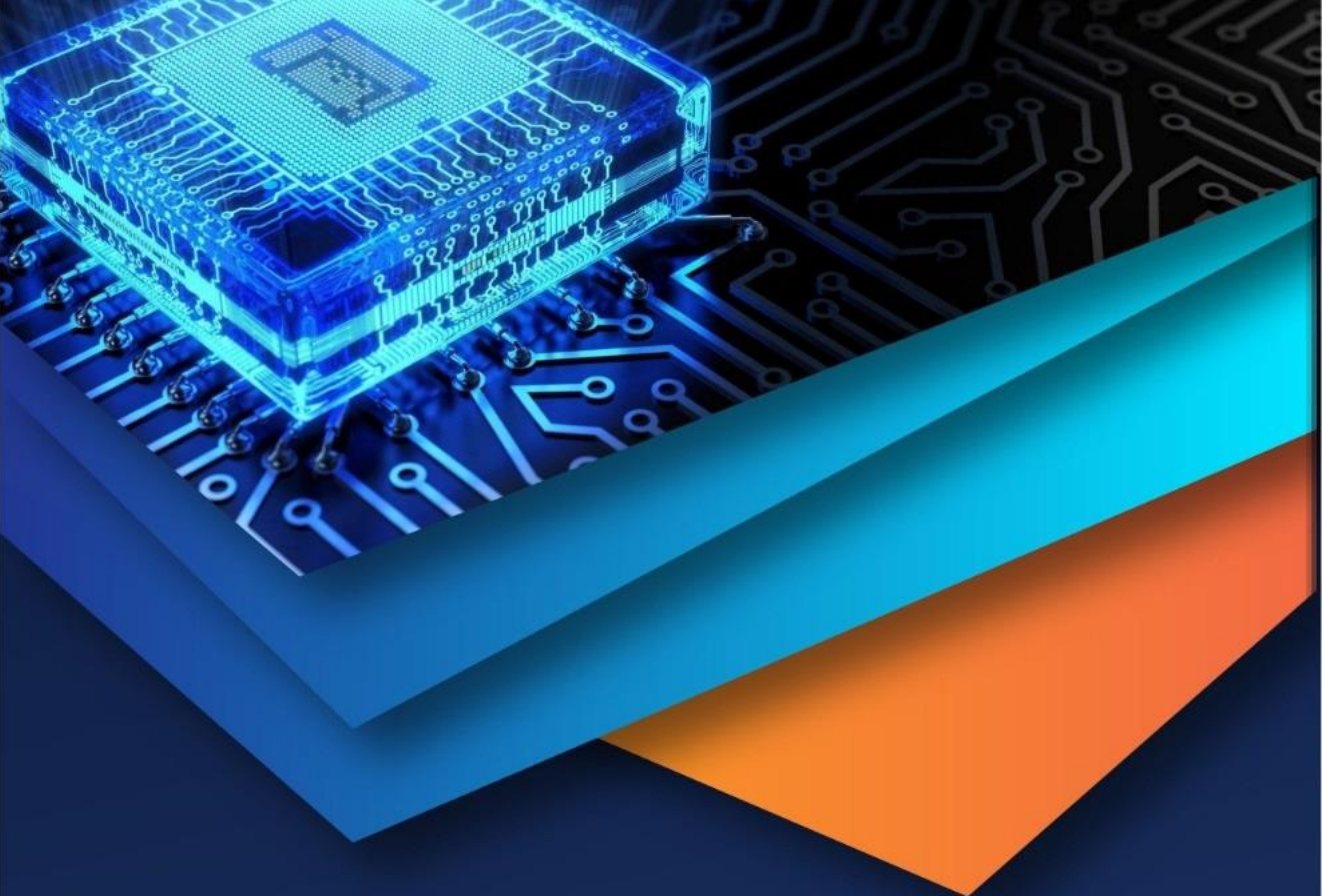
The Live Location Tracking System will provide real-time, accurate tracking of users via an interactive map interface. Dynamic updating of location coordinates should mimic movement with unperceived lag. Admin and user dashboards will include role-based differentiated access, as well as user profile management, activity logging, and Chart.js-based data analysis capabilities. Use of Axios for API communication and Tailwind CSS for system responsiveness provides a sleek and contemporary user experience. Live tables of data and coordinate logs are expected to complement the map interface. The system needs to be operated seamlessly on supported browsers, like Chrome and Firefox. Finally, the results aim to illustrate an effective, scalable, and efficient live location tracking solution with future use in logistics, security, and surveillance.

VII. CONCLUSION

This research successfully demonstrates the architecture and development of a real-time Live Location Tracking System using recent web technologies. With React.js, Tailwind CSS, Flask, MySQL, and Chart.js combined, the system ensures a data-driven and user-friendly interface for tracking, analyzing, and monitoring location data efficiently. The project has high feasibility in real-world usage such as logistics, safety, transportation, and asset tracking. Role-based dashboards and secure authentication enhance admin and user usability, while scalability guarantees that the system can adapt to different real-world environments. Use of open web standards, modular design, and data visualization enables intelligent decision-making. The system bridges the gap between static mapping and intelligent live tracking. In the future, the system may be integrated with actual GPS hardware, support mobile apps, and leverage predictive analytics for smart tracking.

REFERENCES

[1] Schargel, Dar, M. A., & Parvez, J. (2015, March). "A live-tracking framework for Smartphones". In 2015 International Conference on Innovations in Information, Embedded and Communication Systems (ICIIECS) (pp. 1-4). IEEE.DOI: 10.1109/ICIIECS.2015.7193066
[2] Karkare, S., Andhale, A., Rokade, P., Bansode, S., & Ganorkar, A. (2020). "Live Tracking System". Journal, 9(06).
[3] Ganorkar, Ankur. (2020). "Live Tracking System". International Journal of Engineering Research and. V9. DOI:1010.17577/IJERTV9IS060770.
[4] Chaudhary, S., & Nagpal, P. B. (2019). "Live location tracker". Global Research and Development Journal for Engineering, 4(10).
[5] Thomas, L., Little, L., Briggs, P., McInnes, L., Jones, E., & Nicholson, J. (2013). "Location tracking: views from the older adult population". Age and ageing, 42(6), 758-763.https://doi.org/10.1093/ageing/aft069
[6] Nansen, B., Mavoa, J., Coghlan, S., & Gibbs, M. (2024). "Public discussion of family location tracking apps: a cross-platform analysis of social media posts about Life360". New Review of Hypermedia and Multimedia, 1–21. https://doi.org/10.1080/13614568.2024.2437399
[7] Baron, B., & Musolesi, M. (2020). Where you go matters: A study on the privacy implications of continuous location tracking. Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, 4(4), 1-32.https://doi.org/10.1145/343269
[8] T. Morton, A. Weeks, S. House, P. Chiang and C. Scaffidi, "Location and activity tracking with the cloud," 2012 Annual International Conference of the IEEE Engineering in Medicine and Biology Society, San Diego, CA, USA, 2012, pp. 5846-5849, doi: 10.1109/EMBC.2012.6347323.
[9] Okoniewska, B., Graham, A., Gavrilova, M., Wah, D., Gilgen, J., Coke, J., ... & Ghali, W. A. (2012). Multidimensional evaluation of a radio frequency identification wi-fi location tracking system in an acute-care hospital setting. Journal of the American Medical Informatics Association, 19(4), 674-679.https://doi.org/10.1136/amiajnl-2011-000560
[10] Behzadan, A. H., Aziz, Z., Anumba, C. J., & Kamat, V. R. (2008). Ubiquitous location tracking for context-specific information delivery on construction sites. Automation in construction, 17(6), 737-748.https://doi.org/10.1016/j.autcon.2008.02.002
[11] S. Gauglitz, C. Sweeney, J. Ventura, M. Turk and T. Höllerer, "Live tracking and mapping from both general and rotation-only camera motion," 2012 IEEE International Symposium on Mixed and Augmented Reality (ISMAR), Atlanta, GA, USA, 2012, pp. 13-22, doi: 10.1109/ISMAR.2012.6402532.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY