



# International Journal of Innovative Research in Science Engineering and Technology (IJIRSET)

*(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)*



**Impact Factor: 8.699**

**Volume 14, Issue 7, July 2025**

# **RideLync: A System for Analyzing and Matching Regular Vehicle Routes**

**Jitha K<sup>1</sup>, Femina B<sup>2</sup>, Muhammed Sinan A K<sup>3</sup>, Nishal N M<sup>4</sup>, Shafin N K<sup>5</sup>, Unais M A<sup>6</sup>**

Assistant Professor, Department of Computer Science & Engineering, MEA Engineering College, Kerala, India<sup>1,2</sup>

Student, Department of Computer Science & Engineering, MEA Engineering College, Kerala, India<sup>3,4,5,6</sup>

**ABSTRACT:** RideLync presents an intelligent transportation solution targeting urban mobility through AI-driven ride-sharing. Using YOLOv8 object detection, the system identifies single rider vehicles and captures license plate data through strategically placed cameras. With SORT tracking, it monitors vehicle movements and analyzes recurring travel patterns to build a dynamic commuter database. This enables personalized ride-matching through user-friendly web and mobile interfaces. By focusing on underutilized vehicles and habitual routes, RideLync optimizes ride sharing, reduces traffic and emissions, and promotes a community-based sustainable transport model.

**KEYWORDS:** Ride-sharing, YOLOv8, Object detection, License plate recognition, Urban mobility, Traffic optimization, SORT tracking.

## **I. INTRODUCTION**

Rapid population growth strains urban transport systems, together with single-occupancy vehicles. Increasing traffic congestion wastes fuel and adds incremental damage to the environment. Existing typical ride-sharing applications have tried to solve this problem through carpooling but have relied on manual inputs, users have to actively coordinate rides. Due to the high dependency on users who do not like participating, ride-sharing is inadequately utilized.

RideLync brings the AI-powered solution that automates ride-sharing enabling YOLOv8 to detect solo-occupant vehicles as well as reading their license plates via strategically placed cameras where no manual matching is necessary. SORT tracking on trip patterns over time enables intelligent ride suggestions through a simple yet powerful web and mobile front end. This automation increases discovery of rides, hence increasing usage which reduces congestion and emissions.

The efficiency of current platforms is severely restricted due to lacking real-time tracking and requiring tedious manual inputs. Ride-sharing is not popular due to privacy and security issues as well. With RideLync's automated detection and route analysis, combined with secure and optimized match detection, these worries are addressed.

By minimizing user effort and facilitating smarter matching, RideLync contributes to a more scalable and sustainable transportation system by fostering collaborative transportation, reducing fuel usage, and lowering commuting costs. With its automation powered by AI and created for a better user experience, RideLync is building the future of overview, intelligent, eco-conscience urban mobility.

## **II. LITERATURE SURVEY**

As the population within cities increases, enormous transportation mechanisms are needed. While ride-sharing models serve to reduce traffic and pollution, recent concepts involve research to achieve efficiency for the system, passenger safety, and convenience in usage through technology. Numerous studies have attempted to analyze issues in urban ride-sharing problems such as seat availability detection and verification, route matching, and passenger safety assurance. This review of the literature addresses the methods and results prior to current research work, which is equivalent to both the accomplishments and the shortcomings relevant to the creation of an integrated ride-sharing platform.

**A. Real-Time Ride-Matching and Customer Engagement**

Efficient ride-matching is a fundamental aspect of RideLync. ROUTESENSE: A Solution to Car- pooling Systems highlights the importance of dynamic, AI-based route analysis, which improves user engagement and satisfaction compared to traditional static ride-sharing models [5]. Additionally, Mobile Application for Carpooling with Journey Mate Feature emphasizes that integrating user preferences enhances customer retention [9].

**B. Reducing Traffic Congestion and Environmental Impact**

Ride-sharing reduces vehicle density and carbon emissions. Investigating the Impact of Ride Sharing on One-way Car-sharing Systems shows that effective ride-matching significantly lowers congestion [12]. Meanwhile, studies demonstrate that increased ride-sharing adoption leads to measurable emission reductions, aligning with RideLync's goal of urban sustainability.

**C. Advanced Technology for Ride-Sharing**

Traditional ride-sharing apps rely on GPS and basic mapping, which lack accuracy in route optimization and safety verification. RideLync incorporates AI-powered vehicle detection (YOLOv8) and license plate recognition, as supported by Vehicle Detection Using Image Processing and Automatic Vehicle License Plate Recognition System based on Image Processing and Template Matching Approach [4]. These technologies enable precise vehicle identification and real-time tracking.

**D. Data Collection and Privacy**

Accurate data is essential for ride-matching and security. Vehicle Seat Vacancy Identification Using Image Processing explores AI-based passenger counting, a feature integrated into RideLync [3]. Additionally, VOMA: A Privacy-Preserving Matching Mechanism Design for Community Ride-Sharing highlights the importance of data encryption and anonymized processing, ensuring ethical data management in RideLync [11].

**E. Security and Safety Features**

Passenger safety is a key concern in ride-sharing. An Innovative Mobile Application Providing Passenger Safety Checks underscores the necessity of route validation, emergency support, and real-time vehicle tracking features incorporated into RideLync to enhance trust and reliability [8].

**F. Scalability and Cost Efficiency**

As user adoption grows, ride-sharing platforms must handle increasing data loads efficiently. License Plate and Owner Recognition of Overspeeding Vehicles Using LabVIEW provides insights into scalable vehicle identification, guiding RideLync's approach to expanding urban coverage [10]. Furthermore, studies suggest that optimized routes and cost-sharing mechanisms encourage wider adoption, making RideLync a financially viable alternative for commuters.

**III. METHODOLOGY**

RideLync is a smart transportation system that combines computer vision, deep learning, and database integration to enable efficient ride-sharing. It follows a structured pipeline detecting single-occupant vehicles, tracking routes, and recommending shared rides. The system begins with video data collection from surveillance cameras, followed by AI-based processing to extract vehicle and license plate details, culminating in a user-accessible interface for ride coordination.



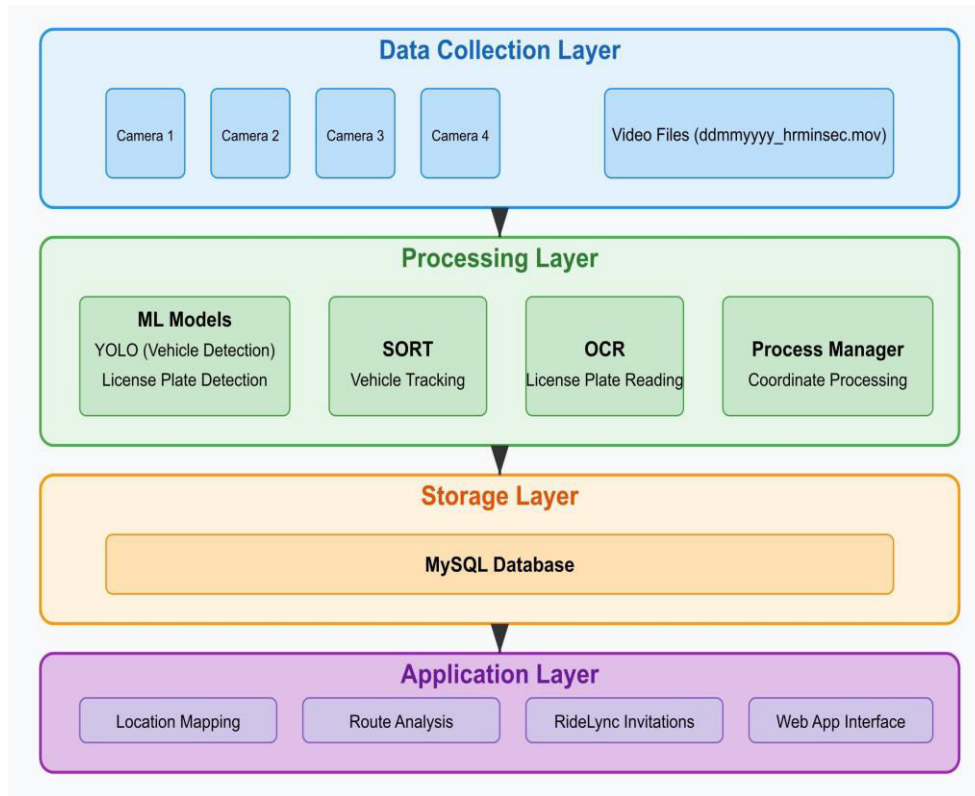


Figure 1: System Architecture

The architecture comprises four layers: Data Collection Layer which Captures real-time footage, Processing Layer applies YOLOv8 for vehicle detection and OCR for license plate reading, Storage Layer stores vehicle data and travel history in a MySQL database and Application Layer Provides web/mobile access for ride discovery and matching.

#### A. Data Collection

RideLync collects video from strategically placed urban cameras under varying conditions. High- resolution footage with embedded timestamps and location tags is captured. Instead of processing entire recordings, periodic frames are extracted to optimize performance. Videos follow a naming format (ddmmyyyy\_hrminsec.mov) and undergo preprocessing for noise reduction and clarity before analysis.

#### B. Vehicle Detection and License Plate Extraction

YOLOv8 detects single-occupant vehicles like cars and bikes with high accuracy. Detected vehicle frames are passed through Google OCR APIs to extract license plate numbers. OCR output is filtered to eliminate duplicates and inaccuracies before storage.

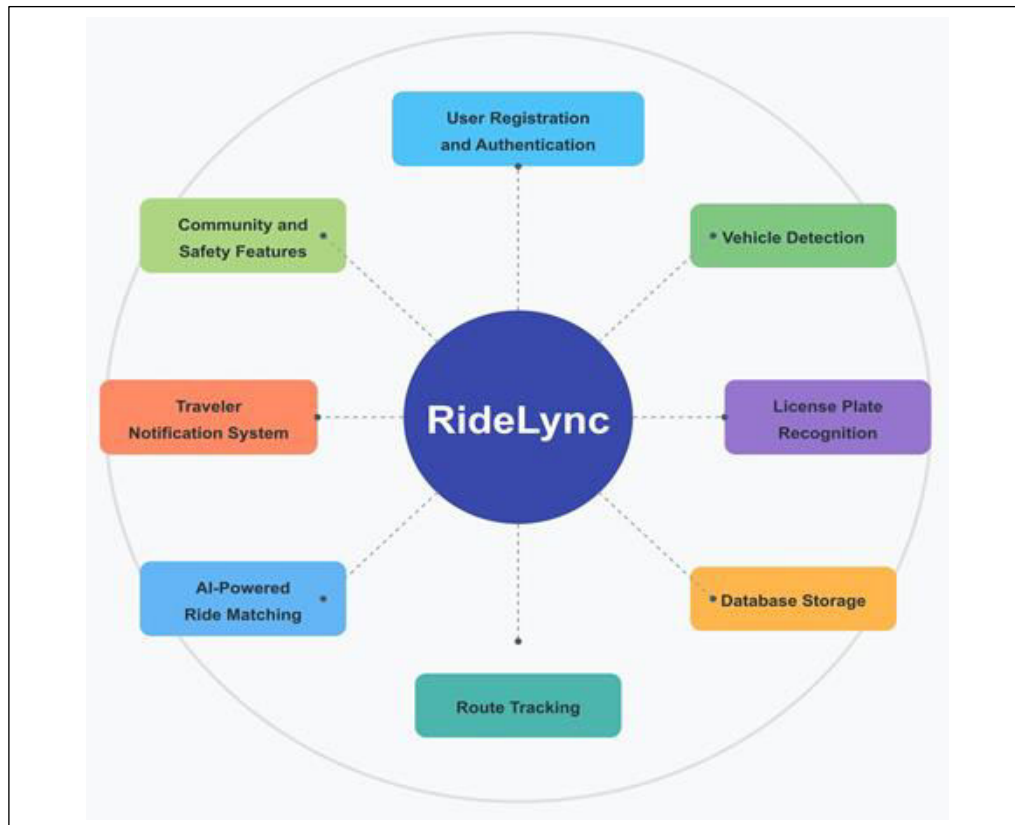


Figure 2: Methodology Flow Diagram

### C. Storage and Route Tracking

Extracted license plate data is stored in a MySQL database, along with timestamps and location metadata. When the same vehicle appears at multiple checkpoints, the system updates its record to build a dynamic map of routine routes for future ride-matching.

### D. Ride Matching and Traveler Coordination

Using recurring travel data, RideLync's clustering algorithm identifies compatible ride-sharing matches. Travelers with similar routes are grouped, and notifications are sent via SMTP-based email alerts to suggest ride opportunities. This enables timely, relevant ride coordination.

### E. User Interface

The RideLync platform allows users to post rides with route, time, and seat info. Others can browse, request, or join rides through a streamlined interface. Features include ride history, modification, and cancellation tools for flexible trip management.

The platform supports private and group chats for coordination. Media sharing enhances communication, while safety is ensured through an SOS button and OTP-based identity verification to confirm rider authenticity.

#### IV. EXPERIMENTAL SETUP AND RESULTS

##### A. Dataset and Model Performance

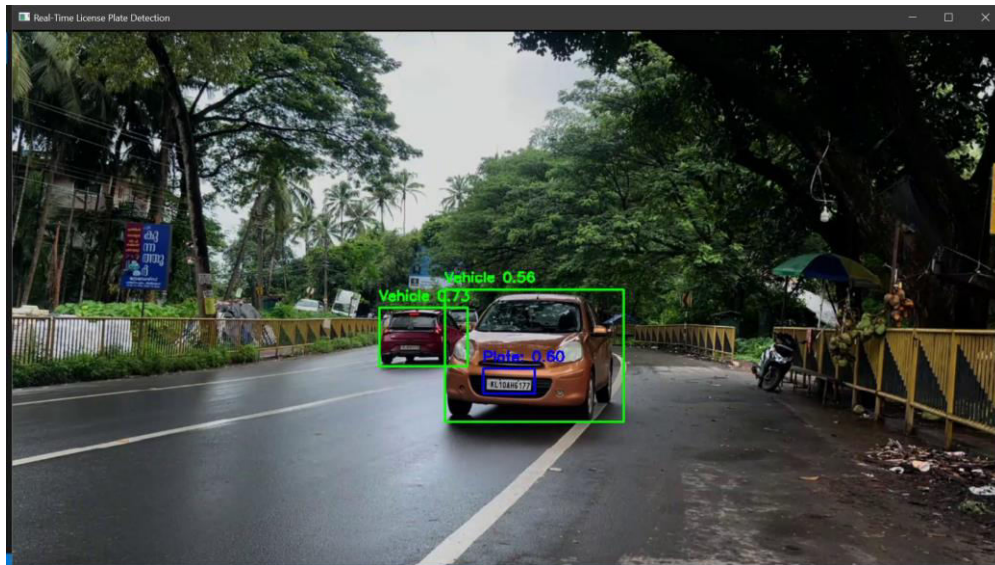


Figure 3: Real-Time Vehicle Detection

RideLync's detection system was evaluated using real-world data from urban environments under varied lighting, weather, and traffic conditions. YOLOv8 was used for vehicle detection, while license plate extraction utilized a Google OCR API. The system achieved an 81% license plate recognition accuracy, demonstrating strong suitability for real-time monitoring.

Metric	Score
Precision	0.972
Recall	0.965
F1 Score	0.968

Table 1: Performance Metrics of License Plate Detection

The results show excellent detection performance with minimal false positives and strong balance across precision and recall.

##### B. Real-World Deployment and Feasibility

RideLync was deployed in an urban setting to assess real-time performance and route mapping. The system effectively identified travel patterns and stored location-based data. Automated ride suggestions were tested via SMTP email alerts, which successfully notified users of potential ride matches.

```

===== Vehicles Grouped By Routes =====

Route: kozhikode → kannur
-----
Vehicle Number  Owner          Contact      Email
-----
KL10BB3966      Haneen         8589        21gcs36@gmail.com

Route: kozhikode → perinthalmanna
-----
Vehicle Number  Owner          Contact      Email
-----
KL10AH6177      Rahul          8589        mhdsinan1265@gmail.com
KL10AL3456      Sudeep         8589        shafinnk007@gmail.com

Route: malappuram → kannur
-----
Vehicle Number  Owner          Contact      Email
-----
KL10BE5060      Nifal          8589        nishalshalu17@gmail.com
KL71C8118       Irfan          8589        ensteph22@gmail.com

Route: perinthalmanna → kannur
-----
Vehicle Number  Owner          Contact      Email
-----
KL14AA1000      Joseph         8589        21gcs26@meaec.edu.in
KL57E7359       Manu           8589        21gcs20@meaec.edu.in
KL845509        Kavya          8589        21mcs27@meaec.edu.in

```

Figure 4: Location Mapping Interface

Deployment confirmed high success in route tracking and rider notifications, indicating the system's readiness for broader use.

**Hello Joseph,**

We've noticed you frequently travel from **perinthalmanna** to **kannur**.

Great news! **2** other commuters take the same route. By joining RideLync, you can:

- Find carpooling partners and share travel costs
- Reduce traffic congestion and your carbon footprint
- Build connections with people on your regular routes
- Schedule rides that fit your timetable

Our smart matching system will connect you with compatible travel partners, making your commute more affordable and enjoyable.

[Join RideLync Now](#)

If you have any questions, simply reply to this email or call our support team at 1-800-RIDELYN.

Happy carpooling!

The RideLync Team

Figure 5: Rider Notification System



### C. Impact on Urban Mobility

RideLync demonstrated clear benefits in reducing traffic and improving ride utilization. By detecting solo-occupancy vehicles and suggesting shared rides, it helps reduce fuel use, emissions, and road congestion.

The web platform enhances user participation with tools for ride posting, booking, and in-system communication.

Features like trip history, ratings, and verified profiles promote a trusted, community-driven experience.

### V. CONCLUSION

RideLync is a revolutionary urban transport solution built on AI-driven vehicle recognition and a strong ride-sharing platform. Through license plate recognition built into the system and real-time tracking, it effectively identifies idle rides and matches users riding in the same direction. Ride posting, joining, and direct ride requests are enabled through the simple web interface. Security features include an SOS button and OTP-based partner authentication.

With 81% accuracy in license plate recognition and robust precision, recall, and F1 scores, RideLync holds tremendous potential in optimizing urban travel and alleviating traffic congestion. While real-time processing, privacy, and regulatory concerns continue to pose challenges, the future of the system is bright.

### REFERENCES

- [1] J. Smith and A. Johnson, "The impact of ride-sharing and car-sharing services on urban transportation systems," *ICONIC RESEARCH AND ENGINEERING JOURNALS*, vol. 6, pp. 151–155, 2023.
- [2] S. S. Kalyan, V. Pratyusha, N. Nishitha, and T. Ramesh, "Vehicle detection using image processing," in *2020 IEEE International Conference for Innovation in Technology (INOCON)*, IEEE, 2020, pp. 1–5.
- [3] J. Wittayaprapakorn and T. Yooyativong, "Vehicle seat vacancy identification using image processing technique," in *2017 International Conference on Digital Arts, Media, and Technology (ICDAMT)*, IEEE, 2017, pp. 1–4.
- [4] H. Jaafar, K. Yogheedha, A. Nasir, and S. Mamduh, "Automatic vehicle license plate recognition system based on image processing and template matching approach," in *2018 International Conference on Computational Approach in Smart Systems Design and Applications (ICASSDA)*, 2018, pp. 1–8.
- [5] K. Poornimathi, A. Deepak Kumar, and A. Srinithi, "Routesense – an AI powered solution to car pooling systems," in *2024 10th International Conference on Communication and Signal Processing (ICCSP)*, 2024, pp. 1168–1174.
- [6] L. C. Kiew, A. J. M. Muzahid, and S. F. Kamarulzaman, "Vehicle route tracking system based on vehicle registration number recognition using template matching algorithms," in *2021 International Conference on Software Engineering & Computer Systems and 4th International Conference on Computational Science and Information Management (ICSECS-ICOCSIM)*, IEEE, 2021.
- [7] A. Kashevnik, N. Teslya, S. Mikhailov, M. Petrov, A. Shabaev, and A. Krasov, "Ridesharing for carsharing service provider: Driver and pedestrian route matching," in *2019 25th Conference of Open Innovations Association (FRUCT)*, IEEE, 2019, pp. 146–152.
- [8] M. Chowdhury and U. Dewan, "Privilege: An innovative mobile application featuring passengers transport riding safety checking, driver selection, and emergency assistance," in *2024 4th International Conference on Data Engineering and Communication Systems (ICDECS)*, 2024, pp. 1–6.
- [9] P. Bhatnagar, G. H. L., G. H. B., S. B. C., and S. J., "Mobile application for carpooling with journey mate feature," in *2024 16th International Conference on COMMunication Systems NETWORKS (COMSNETS)*, 2024, pp. 1088–1093.
- [10] T. C. Bernabe, R. M. Anacan, A. J. M. Pelobillo, S. C. C. Valondo, and J. L. Valdez, "License plate and owner recognition of overspeeding vehicles using LabVIEW," in *2022 ASU International Conference in Emerging Technologies for Sustainability and Intelligent Systems (ICETSIS)*, 2022, pp. 247–251.
- [11] J. Gao, T. Wong, B. Selim, and C. Wang, "VOMA: A privacy-preserving matching mechanism design for community ride-sharing," *IEEE Transactions on Intelligent Transportation Systems*, vol. 23, no. 12, pp. 23963–23975, 2022.
- [12] R. Iacobucci, R. Bruno, and J.-D. Schmoecker, "Investigating the impact of ride sharing on the performance of one-way car-sharing systems," in *2020 IEEE 23rd International Conference on Intelligent Transportation Systems (ITSC)*, 2020, pp. 1–7.





INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  [ijirset@gmail.com](mailto:ijirset@gmail.com)



[www.ijirset.com](http://www.ijirset.com)

Scan to save the contact details