A
Mini-Project Report on

Android based Carpooling Application

Submitted in complete fulfillment of the requirements
for the degree of
BACHELOR OF ENGINEERING
IN
Computer Science & Engineering
Artificial Intelligence & Machine Learning

by

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Parshvanath Charitable Trust's
A. P. SHAH INSTITUTE OF TECHNOLOGY
(Approved by AICTE New Delhi & Govt. of Maharashtra, Affiliated to University of Mumbai)
(Religious Jain Minority)

CERTIFICATE

This is to certify that the project entitled **"Android based Carpooling Application"** is a bonafide work of Manasi Patil (22106042), Ikra Sayyad (23206006), Pratiksha Pathak (22106127) submitted to the University of Mumbai in complete fulfillment of the requirement for the award of **Bachelor of Engineering** in **Computer Science & Engineering (Artificial Intelligence & Machine Learning).**

_____	_____
Prof. Bharti Khemani	Dr. Jaya Gupta
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PROJECT REPORT APPROVAL

This Mini project report entitled "**Android based Carpooling Application"** by **Manasi Patil, Ikra Sayyad, Pratiksha Pathak** is approved for the degree of ***Bachelor of Engineering*** in ***Computer Science &Engineering***, (AI&ML) ***2024-25***.

External Examiner: _____

Internal Examiner: _____

Place: APSIT, Thane

Date:

DECLARATION

We declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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ABSTRACT

This project focuses on the development of an Android-based carpooling app designed to provide a safe and efficient platform for users to offer or join carpool trips. The app allows users to sign up with basic information, such as their name, phone number, email, and student ID. After logging in, users can see their name and profile picture on the home screen. The main features include offering trips by specifying available seats, start and destination locations, and selecting the date and time. A payment option is also integrated. Users can rate drivers based on their experiences, and these ratings are displayed on the driver's profile. Additionally, users can access their profile, see their trip history, and view a chart of their journey history. Drivers must undergo document verification, and car details are mentioned. The app also provides live location tracking, search and filtering options for trips, an FAQ section, and a settings option. A logout feature is available for convenience. The app aims to make carpooling more accessible and reliable, helping users to connect and share rides easily while ensuring safety and user satisfaction.

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CHAPTER 1

INTRODUCTION

1. INTRODUCTION

In today's fast-paced and dynamic world, transportation efficiency has become a growing concern for daily commuters, students, and working professionals. Rising fuel costs, heavy traffic congestion, and increasing environmental concerns have driven the need for a sustainable and cost-effective alternative to traditional commuting. Our android based carpooling app is designed to bridge this gap, providing an innovative solution that makes ride-sharing seamless, secure, and highly convenient.

Developed using Kotlin in Android Studio (Lady Bug feature drop), the app delivers high performance, stability, and an intuitive user experience. User security is a top priority. To ensure a safe and hassle-free onboarding experience, the app integrates Firebase Authentication, enabling users to sign up and log in using their email, phone number, or third-party authentication services. This prevents unauthorized access and provides an added layer of protection, making ride-sharing safer and more trustworthy.

Additionally, the user profile section allows individuals to update personal details, view ride history, check verification status, and manage income reports (for drivers). Drivers are required to verify their identity and vehicle details, ensuring that only legitimate, background-checked users can offer rides. The app leverages Google Play Services for real-time location tracking and navigation, enabling users to accurately set their pickup and drop-off points. Whether a rider is looking to join an existing trip or create a new one, the app provides a list of available carpooling options based on location, route, and time preferences.

For those offering rides, the trip creation feature allows drivers **to** input details such as pickup and drop-off locations, available seats, date, and time. Once a trip is created, it becomes visible to other users searching for carpool options along the same route. Through Google Maps integration, users can track their ride status in real time, ensuring accurate arrival estimates and better coordination between drivers and passengers. This feature significantly reduces wait times and enhances the overall user experience.

To make ride-sharing even more transparent and equitable, our app introduces the RM (Refund for Extra Money) system. This feature ensures that users never overpay for their rides. If a passenger ends up paying more than the calculated fare, the system automatically processes a refund to their account. This helps maintain fairness and trust, making users more confident in using the app for daily commutes.

Trust and accountability are essential in a carpooling service. To maintain high standards of service quality, the app includes a rating and review system where both drivers and riders can provide feedback after each trip. Users can rate their ride experience based on factors like punctuality, safety, behavior, and overall comfort. By collecting these ratings, the app ensures that only well-rated drivers and passengers continue to participate in the community, creating a safer and more reliable ride-sharing ecosystem.

Beyond convenience, our app contributes to a greener and more sustainable future. By encouraging carpooling, we help reduce traffic congestion, fuel consumption, and carbon emissions. Fewer cars on the road mean less pollution and a positive environmental impact. Additionally, splitting ride costs among multiple passengers significantly lowers travel expenses, making commuting more affordable for everyone.

CHAPTER 2

LITERATURE SURVEY

2. LITERATURE SURVEY

2.1 HISTORY

Carpooling has undergone significant evolution, from informal ride-sharing to advanced mobile applications powered by modern technology. Initially, before the 2000s, carpooling was mainly arranged through word-of-mouth, community boards, or employer-sponsored programs, relying solely on trust and personal networks. With the rise of the internet in the 2000s, early carpooling websites like BlaBlaCar provided a digital platform for ride-sharing, allowing drivers to post available seats and passengers to book rides, though these platforms lacked real-time tracking and security features. The development of smartphones in the 2010s revolutionized carpooling with apps like UberPool and Lyft Line, which introduced dynamic ride-sharing by leveraging GPS tracking, real-time ride matching, and digital payments, making carpooling more accessible and efficient. To cater to specific commuting needs, universities and companies introduced specialized carpooling solutions with security measures such as ID verification and restricted access, leading to platforms like Waze Carpool and RideAmigos that promote sustainable commuting. In the 2020s, AI and blockchain integration have further enhanced carpooling apps by improving route optimization, security, and transparency, while sustainability-focused solutions continue to grow in importance. Overall, carpooling apps have transformed from simple ride-sharing arrangements to highly efficient and secure transportation solutions, reducing commuting costs, traffic congestion, and environmental impact while providing a convenient and eco-friendly travel alternative.

2.2 LITERATURE REVIEW

[1] Carpooling Application Using Blockchain: *Mudunuri Lokesh Varma, Aditya Engineering College, Surampalem, IJRPR, Vol 4, April 2023.*

This paper proposes a blockchain-based carpooling application that eliminates the need for intermediaries, ensuring a decentralized, transparent, and secure ride-sharing experience. By using smart contracts, the system automates ride-matching, payments, and dispute resolution, enhancing trust and privacy while reducing costs. Unlike traditional centralized carpooling services, blockchain technology records transactions securely, improving efficiency, security, and fairness. The platform also promotes environmental benefits by encouraging carpooling and reducing traffic congestion. While challenges like adoption, scalability, and regulations exist, future advancements could integrate cryptocurrency payments, multi-modal transport, and smart city infrastructure, making carpooling more efficient and sustainable.

[2] GoToUni: A Mobile Application Suggestion for Carpooling: *Simay Alkan, Can Akgül, Special Issue 37, pp. 76-80, June 2022, EJOSAT.*

This study presents the development of the GoToUni mobile application, designed to facilitate carpooling for university students, staff, and faculty. The app allows users to view the live locations and schedules of drivers, send carpool requests, and communicate with drivers, ensuring security by limiting usage to university members. Developed using Android Studio, it integrates Google Maps for route planning and Firebase for real-time data storage. The app addresses transportation issues such as limited parking, public transport delays, and high commuting costs. It enables drivers and passengers to connect based on shared routes and schedules, promoting eco-friendly, efficient transportation. The study highlights the app's potential impact, especially during peak times like exam weeks, and suggests future enhancements such as automatic schedule matching and broader university usage.

[3] Travelling Buddy: A Carpooling App: *Aakash Choudhary, Inderprastha Engineering College, Ghaziabad, IJARCCE Vol. 11, Issue 3, March 2022.*

The paper discusses a carpooling app called "Traveling Buddy," designed to address transportation problems in India, such as traffic congestion, pollution, and high transportation costs. The app connects drivers and passengers who share similar routes, allowing them to save money, reduce pollution, and improve travel efficiency. It includes features like car condition images, chat for communication, and the ability for people without cars to post trips. The app ensures user authenticity through identity verification, and it encourages people to share trips for both environmental and economic benefits. The overall goal is to make commuting more affordable and sustainable while fostering connections between users.

[4] A Survey on: Real time Smart Car Pooling and Ride Sharing System using Android Application: *Rushikesh Bhosale, D. Y. Patil College of Engineering, Pune, IJRAR, Volume 7, Issue 1, March 2020.*

This paper presents a survey and proposed implementation of a mobile-based carpooling system aimed at reducing traffic congestion, fuel consumption, and environmental pollution by encouraging ride-sharing. It highlights the benefits of carpooling, such as cost savings and sustainability, while addressing security and trust concerns. The literature review discusses existing carpooling solutions, including SMS-based alerts, GPS tracking, and real-time security measures. The proposed system includes features like user authentication (rider, passenger, and admin), ride scheduling (regular and frequent rides), GPS-based check-in, payment processing, and admin monitoring of trips and transactions. Unlike existing platforms that focus mainly on inter-city travel, this system aims to offer both inter-city and intra-city ride-sharing options. The paper concludes by emphasizing the environmental and social benefits of carpooling while acknowledging the challenges related to security, platform limitations, and adoption.

[5] Research on Development of Android Applications: Mrs. Prachi Sasankar and Mrs. Usha Kosarkar, National Conference on Recent Trends in Computer Science and Information Technology, 2016.

Android is an open-source mobile operating system developed by Google, built on the Linux kernel, and designed for mobile devices with limited resources. It provides an application framework that includes essential tools like Views for UI design, Content Providers for data sharing, and a Notification Manager for alerts. Android apps run on the Dalvik Virtual Machine (DVM), which optimizes Java code for mobile performance. The system consists of multiple layers, including the applications layer, application framework, libraries, Android runtime, and Linux kernel. Apps are structured using four main components: Activities (user interfaces), Services (background tasks), Content Providers (data management), and Broadcast Receivers (system-wide event listeners), all of which communicate through Intents. Permissions and resources are managed separately to improve security and adaptability. A simple music player app demonstrates how these components interact, showing how Android enables developers to create efficient and feature-rich applications.

CHAPTER 3

PROBLEM STATEMENT

3. PROBLEM STATEMENT

Traffic congestion, high fuel costs, environmental pollution, overcrowded public transport, parking shortages, and safety concerns have made daily commuting difficult, especially for students and professionals. To address these challenges, our Android-based carpooling app offers a convenient and affordable ride-sharing solution. The app allows users to offer or join rides, reducing traffic and travel expenses while promoting an eco-friendly approach. Features like verified profiles, ride ratings, document verification, live tracking, and trip history enhance security and convenience. By integrating these functionalities, the app provides a sustainable and efficient alternative to modern commuting issues.

CHAPTER 4

EXPERIMENTAL SETUP

4. EXPERIMENTAL SETUP

4.1 HARDWARE SETUP

Development Machine (For Android Studio & Firebase Integration)

- **Processor:** Intel Core i5 (8th Gen or later) or better
- **RAM:** 8GB (Recommended: 16GB for faster build times)
- **Storage:** SSD (256GB minimum, 512GB or more recommended)
- **Display:** Full HD (1920x1080) resolution for better UI design experience
- **Operating System: Windows:** Windows 10/11 (64-bit)
- **Internet Connection:** Required for Firebase Authentication, Google Maps API, and Android Studio updates

Mobile Testing Setup (For Real-World Testing)

- **Android Smartphones**
- **Internet Connection: 4G/5G with GPS enabled** to test real-time location updates

4.2 SOFTWARE SETUP

- **Android Studio (Latest Version)** – The official IDE for Android development
- **Kotlin SDK** – Primary programming language for the app logic and UI interactions
- **Java Development Kit (JDK 11 or later)** – Required for backend processes in Android Studio
- **Gradle Build System** – Manages project dependencies and builds the app efficiently
- **Kotlin**: App logic & UI interactions. Recommended by Google for Android development.
- **Jetpack ViewBinding**: UI handling and binding views to Kotlin code.
- **Firebase Authentication:** Secure user sign-in/signup. Provides easy integration with Firebase and ensures secure authentication.
- **Firebase Realtime Database:** Stores user and ride details. Enables real-time data synchronization and is highly scalable.
- **Firebase Cloud Messaging (FCM):** Push notifications. Sends background alerts for ride updates and trip-related messages.
- **Google Play Services:** Maps and location tracking. Enables real-time GPS tracking and navigation support
- **Android Emulator (AVD in Android Studio)** – To test the app on virtual devices
- **Android Debug Bridge (ADB)** – For debugging app behavior on real devices
- **Firebase Analytics** – To track user engagement and app performance

CHAPTER 5

PROPOSED SYSTEM & IMPLEMENTATION

5. PROPOSED SYSTER & IMPLEMENTATION

5.1 BLOCK DIAGRAM OF PROPOSED SYSTEM

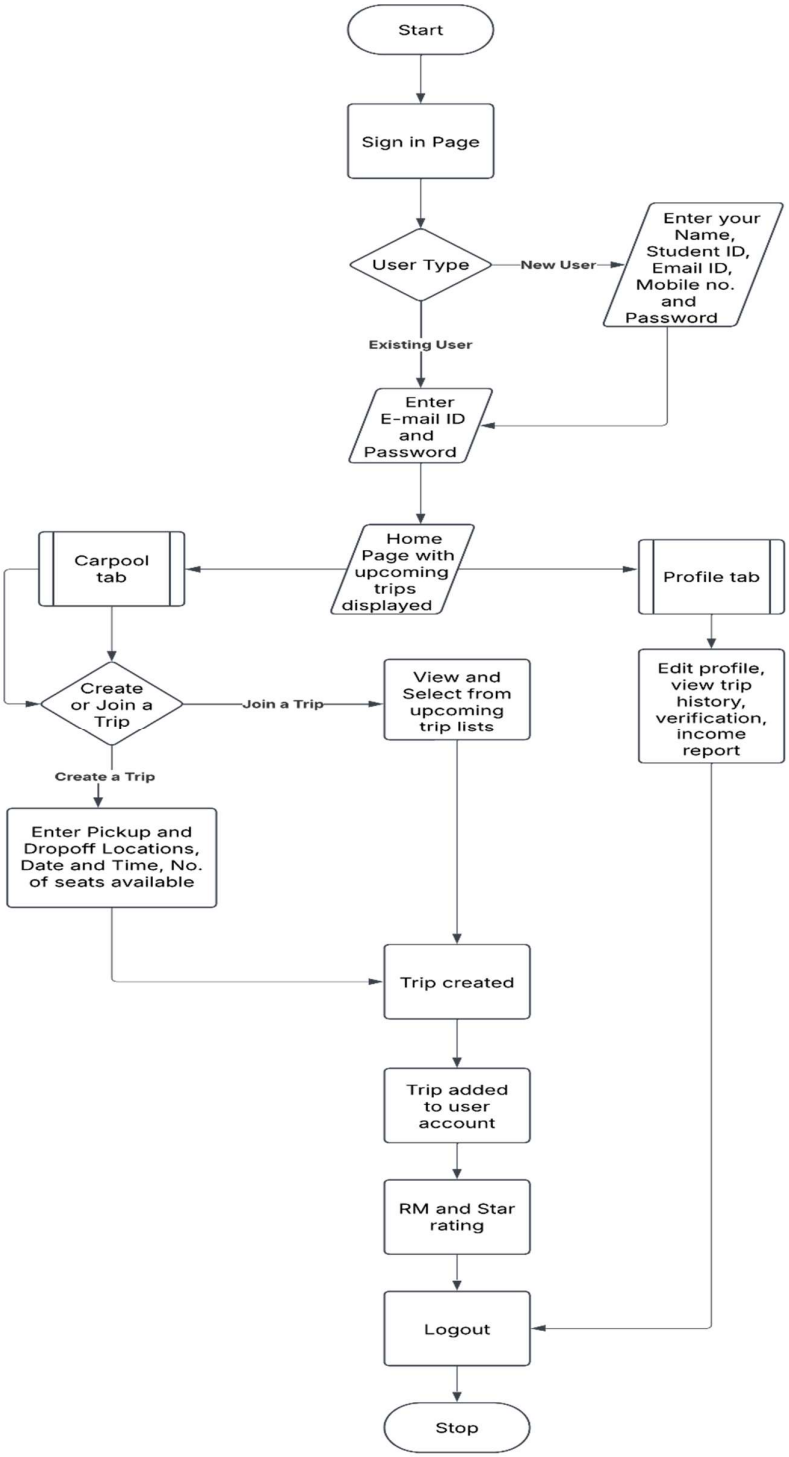

Fig 1: Block Diagram of Carpooling App

5.2 DESCRIPTION OF BLOCK DIAGRAM

Fig 1 represents the flow of the carpooling app, showing how users interact with different features step by step.

1. **Start**: The user opens the app.
2. **Sign-in Page**: The user is asked to log in or sign up.
3. **User Type**:
    - **New User**: If they are new, they need to enter details like name, student ID, email, phone number, and password.
    - **Existing User**: If they already have an account, they enter their email and password to log in.
4. **Home Page**: After logging in, users see a list of upcoming trips.
5. **Navigation**: Users can switch between two main tabs:
    - **Carpool Tab**: Users can either **create a trip** (by entering pickup and drop-off locations, date, time, and available seats) or **join a trip** (by selecting from upcoming trips).
    - **Profile Tab**: Users can edit their profile, view their trip history, complete verification, and check their earnings.
6. **Trip Management**: If a user creates or joins a trip, it is added to their account.
7. **RM and Rating System:**
    - After trip completion, if a user has extra money left from the fare, the app provides a way to return the excess amount to them through the RM System.
    - Users can rate their ride experience using a star rating system, helping maintain service quality.
8. **Logout**: Once done, users can log out.
9. **Stop**: The app session ends.

This flowchart simplifies how a user can navigate the carpooling app from sign-in to trip management.

5.3 IMPLEMENTATION

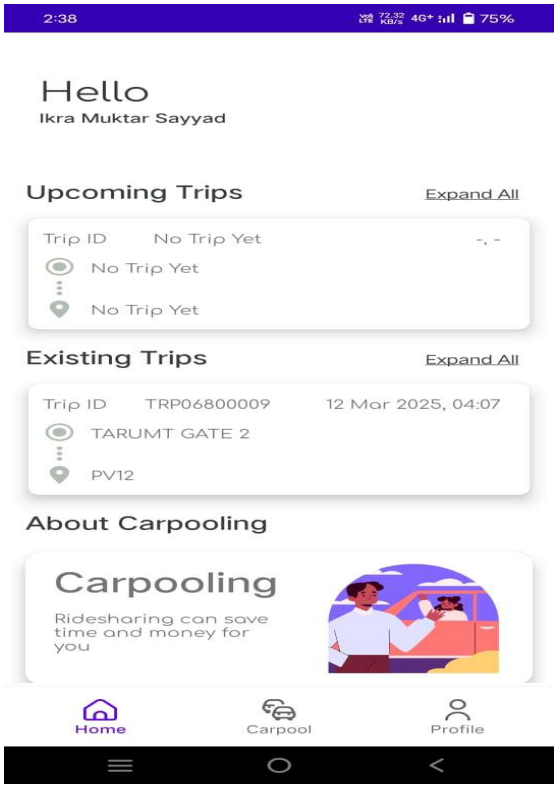

Fig 2: Home Page displaying upcoming and existing trips

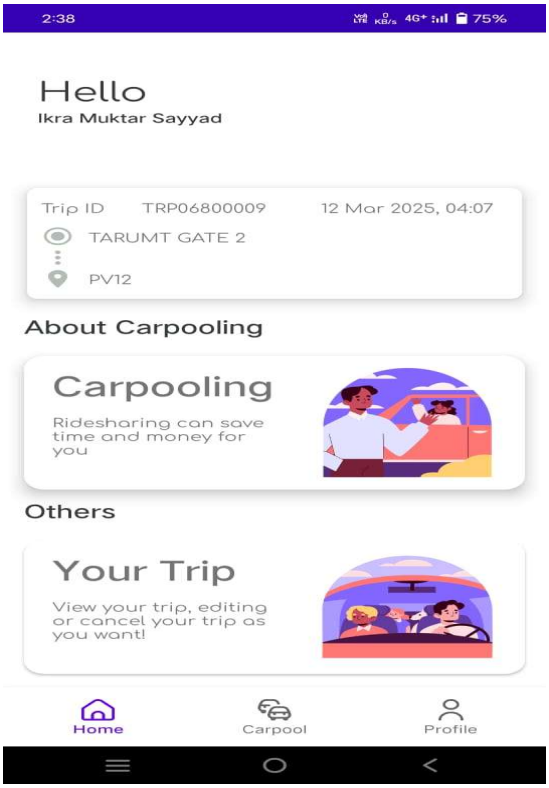

Fig 3: Home Page displaying information about our app

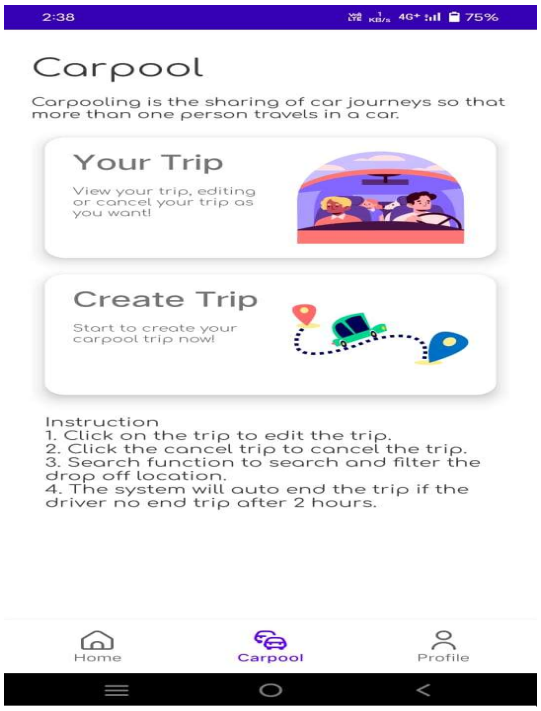

Fig 4: Carpool Tab

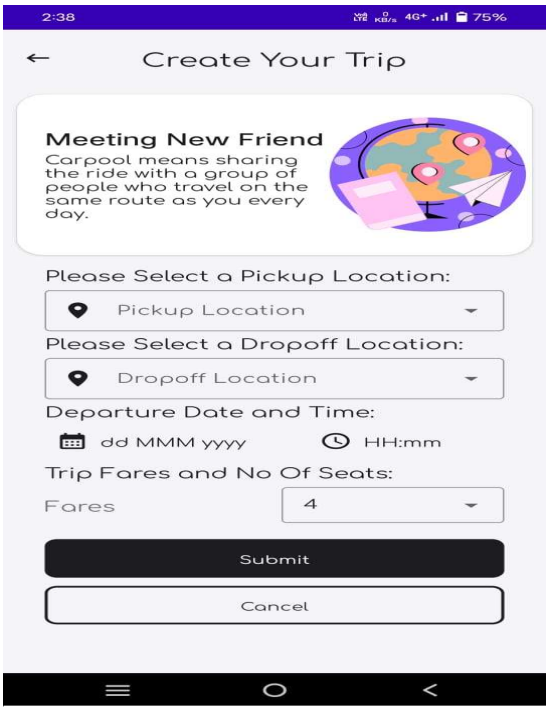

Fig 5: Details required for creating a trip

Fig 6: Profile Tab

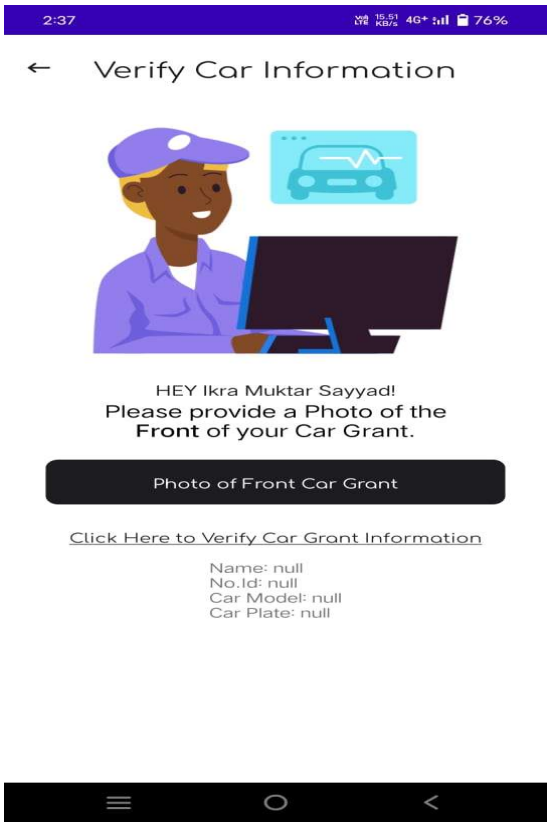

Fig 7: Verification of Car Information

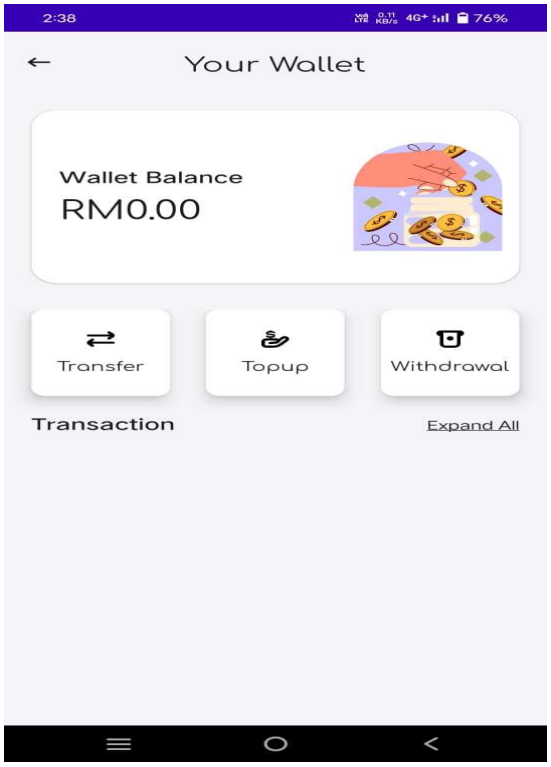

Fig 8: Your Wallet

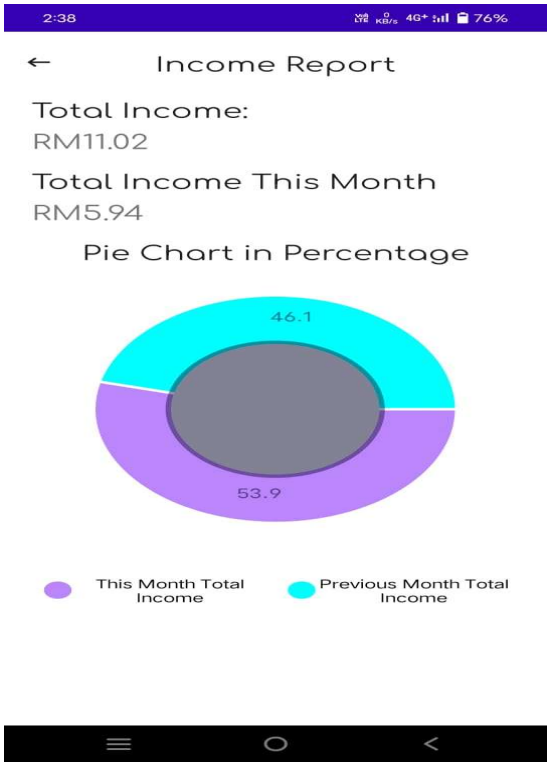

Fig 9: Total Income Report per Month

5.4 ADVANTAGES

- Splitting the fare among multiple passengers significantly reduces the cost per person, making travel much more affordable than using taxis or private vehicles.
- The RM (Refund for Extra Money) system ensures fair pricing by refunding users if they overpay, creating a transparent and reliable payment structure.
- Helps drivers earn extra income by sharing their ride with fellow commuters.
- Encourages fewer cars on the road, leading to a reduction in traffic congestion and air pollution.
- Contributes to lower fuel consumption, making it an environmentally responsible commuting option.
- Google Play Services integration allows users to track rides in real-time, ensuring better coordination between passengers and drivers.
- Provides accurate pickup and drop-off locations, reducing waiting time and confusion.
- Enhances user safety by keeping them informed about their trip progress and estimated arrival time.
- Firebase Authentication ensures secure user logins, protecting personal data and preventing unauthorized access.
- Verified driver profiles with identity and vehicle documentation create a safer ride-sharing environment.
- User reviews and ratings allow passengers and drivers to choose reliable ride partners.
- Built using Kotlin in Android Studio (Lady Bug feature drop), ensuring a smooth, responsive, and crash-free app performance.
- The Material Design UI provides a modern and intuitive interface, making the app easy to navigate.
- Jetpack ViewBinding eliminates common UI handling issues, preventing errors like findViewById() crashes.
- Users can either create or join trips, providing flexibility based on their schedule and preferences.
- Customizable trip settings, such as choosing preferred routes, time slots, and available seats.
- Allows drivers to list their rides and passengers to select rides that best match their requirements.

CHAPTER 6

CONCLUSION

6. CONCLUSION

Our android based carpooling app emerges as a smart, efficient, and sustainable solution. Designed with modern technologies such as Kotlin in Android Studio (Lady Bug feature drop), Firebase Authentication, Google Play Services, and Material Design UI, the app ensures a seamless and secure ride-sharing experience for users.

By enabling real-time ride tracking, user authentication, and a transparent RM (Refund for Extra Money) system, our platform enhances both convenience and affordability. The app encourages eco-friendly commuting by reducing vehicle emissions and traffic congestion, ultimately contributing to a greener and more sustainable environment.

Moreover, security and reliability are at the core of our application, with user verification, trip ratings, and secure payment methods ensuring trust and safety for both passengers and drivers. The flexibility of creating or joining trips makes it ideal for students, employees, and daily commuters looking for a cost-effective and convenient way to travel.

In conclusion, our android based carpooling app is more than just a ride-sharing platform—it is a community-driven initiative that fosters affordability, sustainability, and user trust. With its innovative features and user-friendly interface, it has the potential to transform the way people commute, making travel smarter, safer, and more economical. As ride-sharing continues to gain popularity, this app stands as a powerful solution for a more connected and efficient transportation system.

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[1] Carpooling Application Using Blockchain: *Mudunuri Lokesh Varma, Aditya Engineering College, Surampalem, IJRPR, Vol 4, April 2023.*

[2] GoToUni: A Mobile Application Suggestion for Carpooling: *Simay Alkan, Can Akgül, Special Issue 37, pp. 76-80, June 2022, EJOSAT.*

[3] Travelling Buddy: A Carpooling App: *Aakash Choudhary, Inderprastha Engineering College, Ghaziabad, IJARCCE Vol. 11, Issue 3, March 2022.*

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