



JK LAKSHMIPAT UNIVERSITY  
**Institute of Design**  
NAAC 'A' Grade Accredited

## **TSaavari:**

Your Digital Gateway to  
Hyderabad Metro

VOL. 2 of 2

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Student : **Taruni Vadlamudi**

Sponsor : **L&T Metro Rail Hyderabad**

Mentor : **Binil Mohan**

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Programme :

**Bachelor of Design (B.Des)**  
**Interdisciplinary Design**

THE   
**GRADUATION**  
**PROJECT 2024**

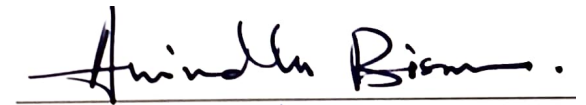


The Evaluation Jury has recommended **Taruni Vadlamudi**  
for graduation from **Institute of Design, JK LAKSHMIPAT UNIVERSITY**  
with specialization in Interdisciplinary design

Herewith, for the project titled "**T-Savaari : Your Digital Gateway to Hyderabad Metro**"  
on fulfillment of requirements by

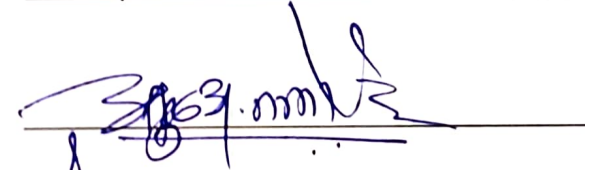
Jury Chairman

Anirudha Biswas



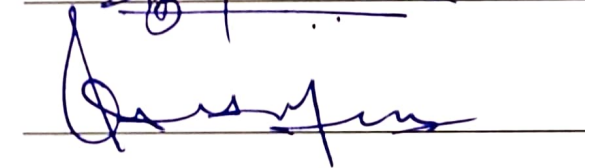
Jury Member

Atul Manohar



Jury Member

Abhishek Meena



Subsequent remarks regarding fulfillment of requirements

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## Originality Statement

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Student Name in Full: Taruni Vadlamudi

Signature: Ta V.

Date: 11/08/2025

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*“If I had an hour to solve a problem I’d spend 55 minutes thinking about the problem and five minutes thinking about solutions.”*

**Albert Einstein**

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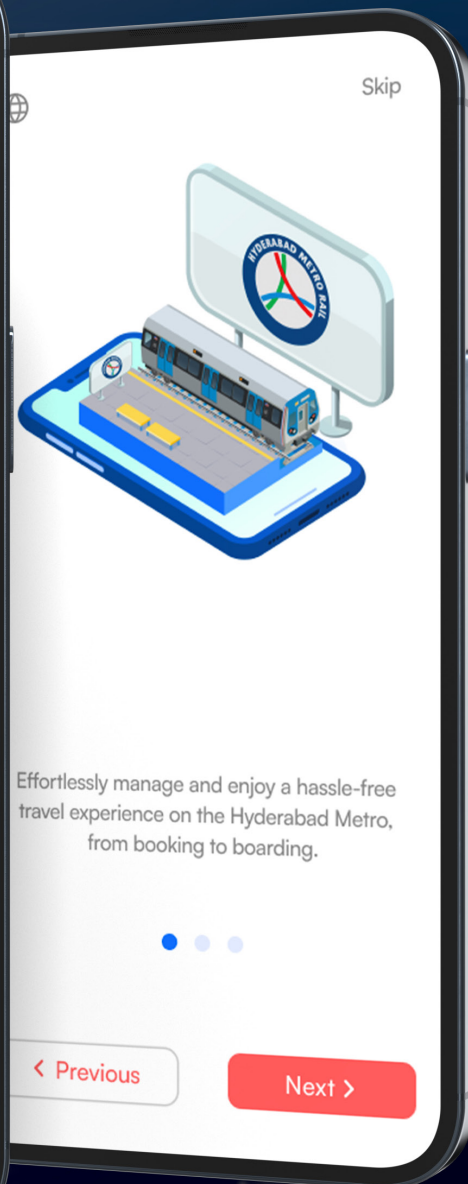
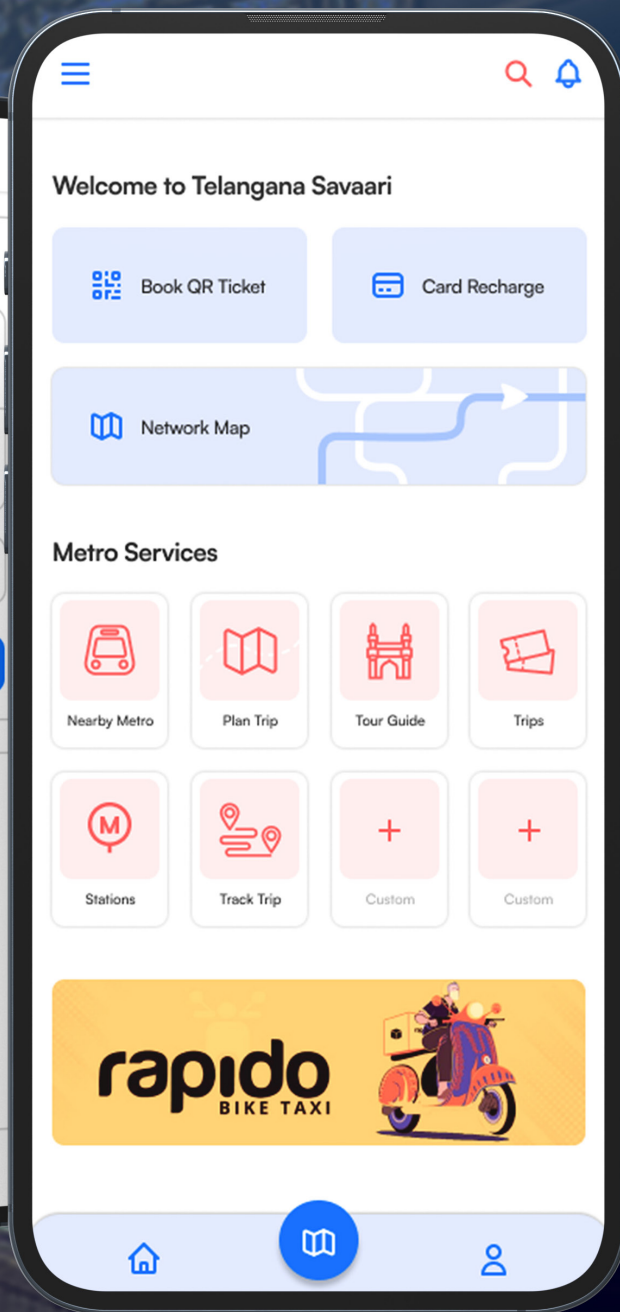
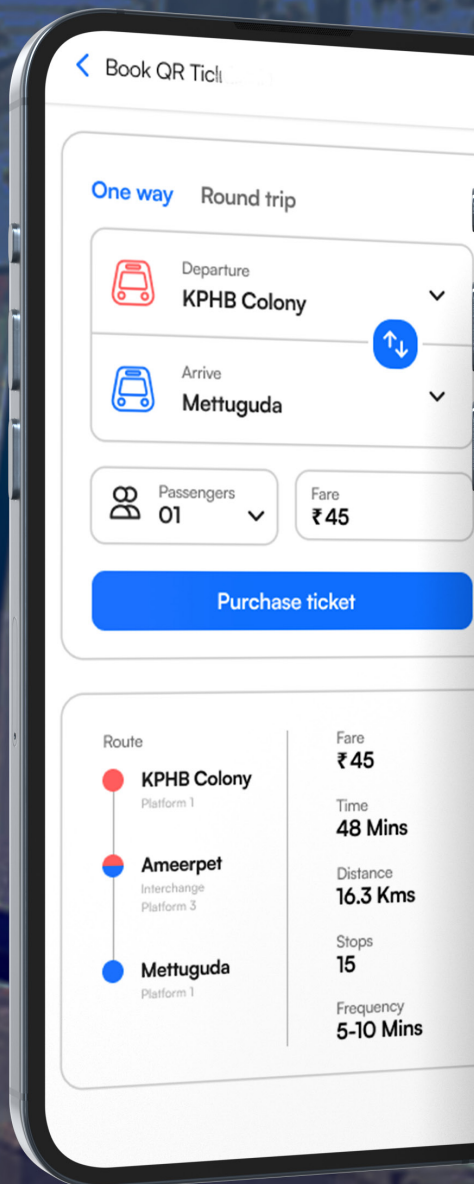
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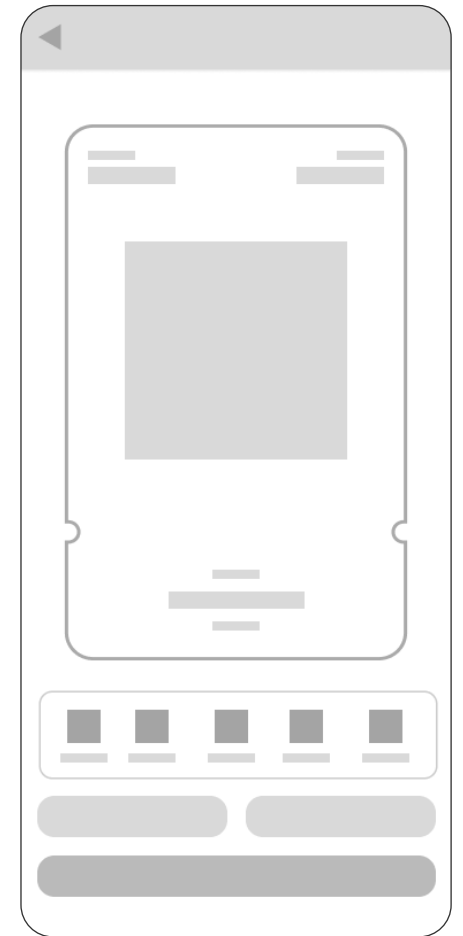
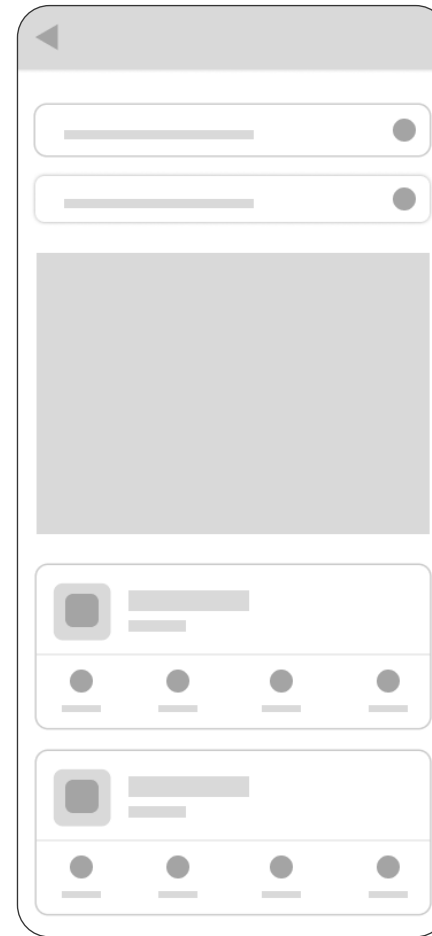
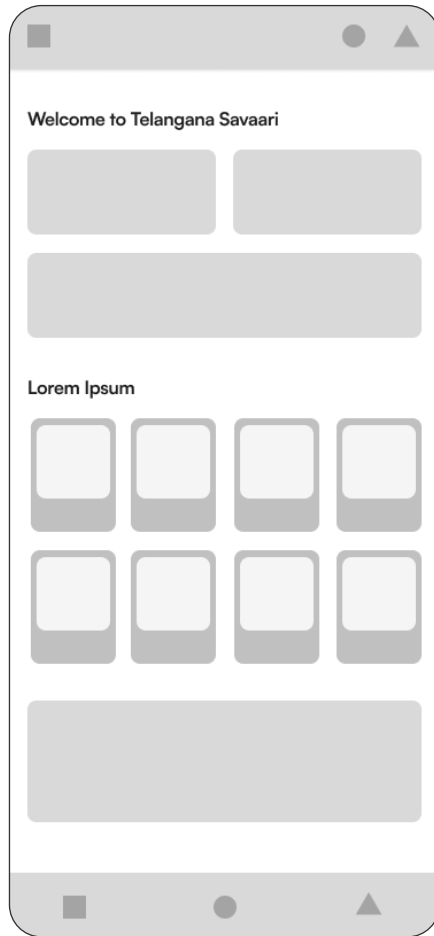


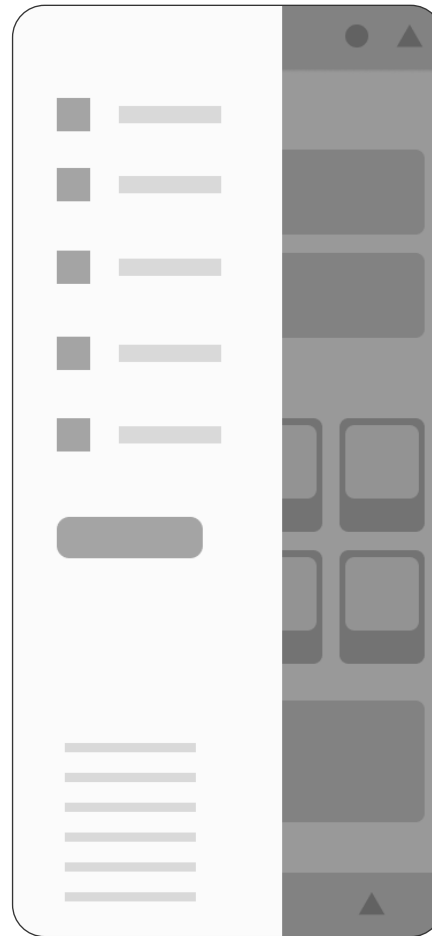
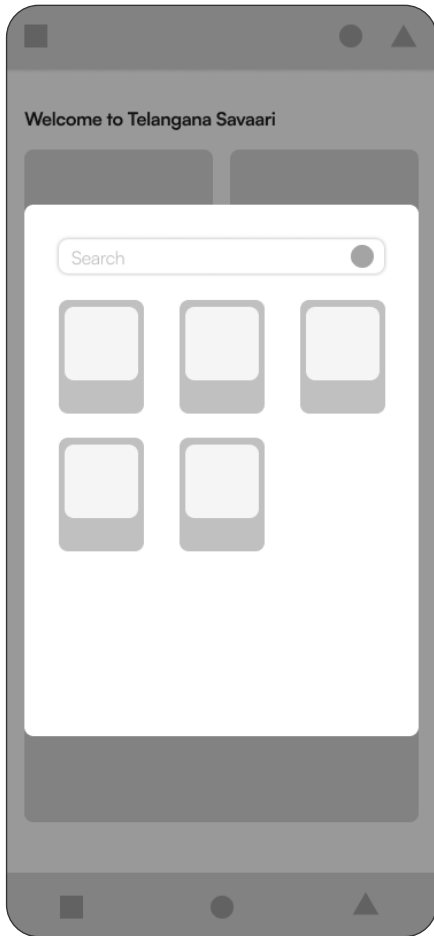
## 7. Final Design

- 7.1 Wireframes
- 7.2 Visual Design
- 7.3 Screens
- 7.4 Others

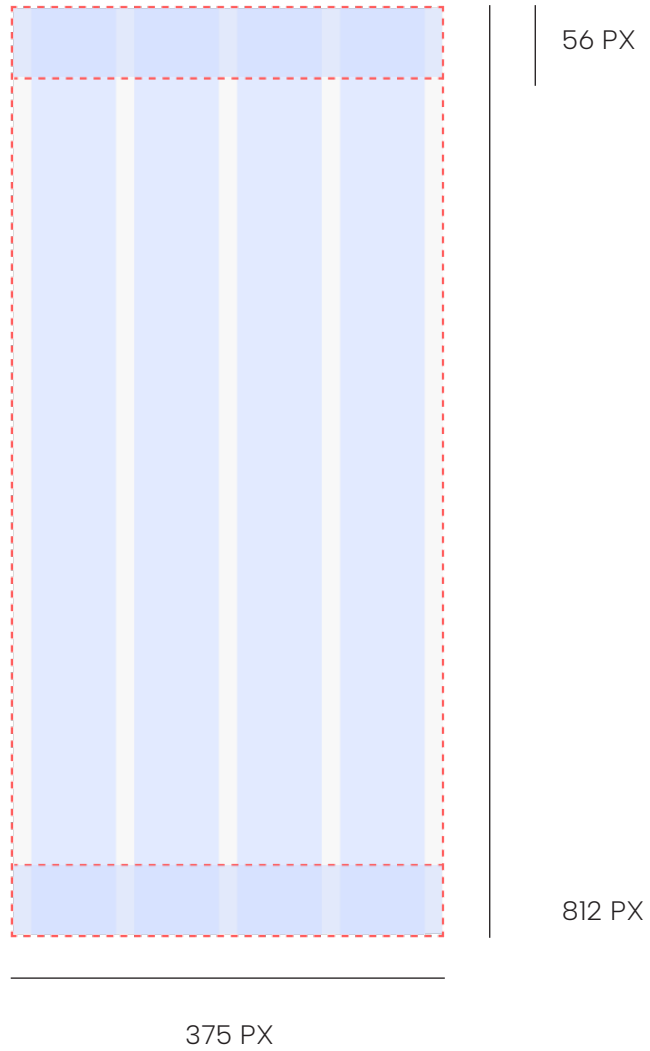
## 7.1 Wireframes

I created low-fidelity wireframes, which are basic, simplified visual representations of the user interface, used primarily in the early stages of the design process. These wireframes focus on layout and structure, avoiding detailed design elements like color, typography, or images. They serve as a blueprint, allowing me to communicate ideas, explore different layouts, and gather feedback efficiently.





## Layout



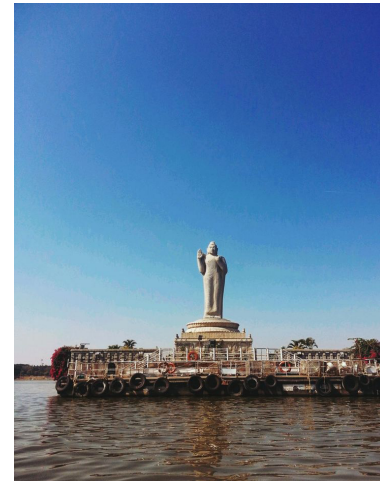
## 7.2 Visual Design

In designing the color scheme for the T-savaari app, I selected colors that resonate the essence of Hyderabad.

The vibrant blues represents the liveliness of Hyderabad and its ever-growing skyline, reflecting the modern, sky-high buildings that mark the city's progress.

The Red symbolizes the age-old, reliable RTC buses that have long been a part of the city's daily life, as well as the beautiful setting skies that define the city's evenings.

Yellow was chosen to embody the rich culture, heritage, and joy that are integral to Hyderabad's identity.



## Color Scheme

Additionally, I incorporated the existing color palette of the Hyderabad Metro into the design to maintain brand continuity. By refreshing these colors, I aimed to create a more modern and inviting experience while ensuring that users still feel a strong connection to the Hyderabad Metro brand.

These colors are part of a split complementary color scheme, known for its balance and versatility. The result is a harmonious yet dynamic palette that adds visual interest without overwhelming the user.

This approach ensures that the app's design is both aesthetically pleasing and functionally reliable, creating a user experience that feels intuitively aligned with the vibrant energy of Hyderabad.



**Azure**  
HEX 0070C0



**Sunset**  
HEX FF0000



**Arctic Blue**  
HEX A6C4FD



**Slate**  
HEX E2EAFF



**Marigold**  
HEX 58BD01



**Pure White**  
HEX FFFFFFFF



**Gray**  
HEX 3C3C3C



**Shadow**  
HEX 1F1F1F

## Type Face

Satoshi  
Satoshi

Designed by Indian Type Foundry

The Satoshi font is a modern sans-serif typeface known for its clean, minimalist design and excellent readability. It's widely used in digital interfaces due to its versatility.

A B C D E F  
G H I J K L M  
N O P Q R S  
T U V W X Y Z

a b c d e f  
g h i j k l m  
n o p q r s  
t u v w x y z

H1 **H1 Heading**

H2 **H2 Heading**

H3 **H3 Heading**

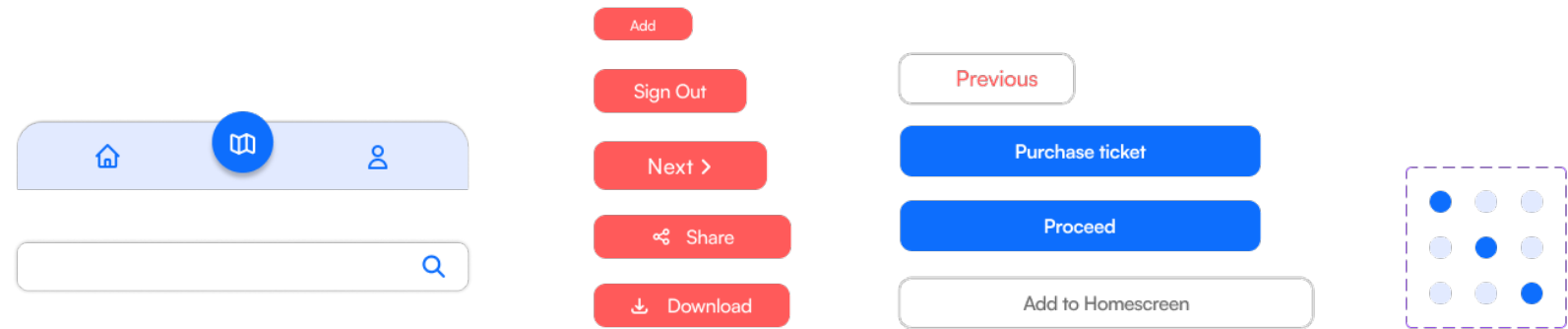
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Body **Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim.**

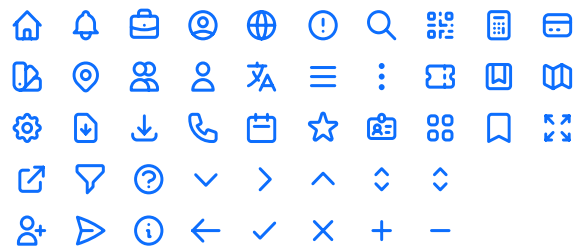
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# Components



## Icons



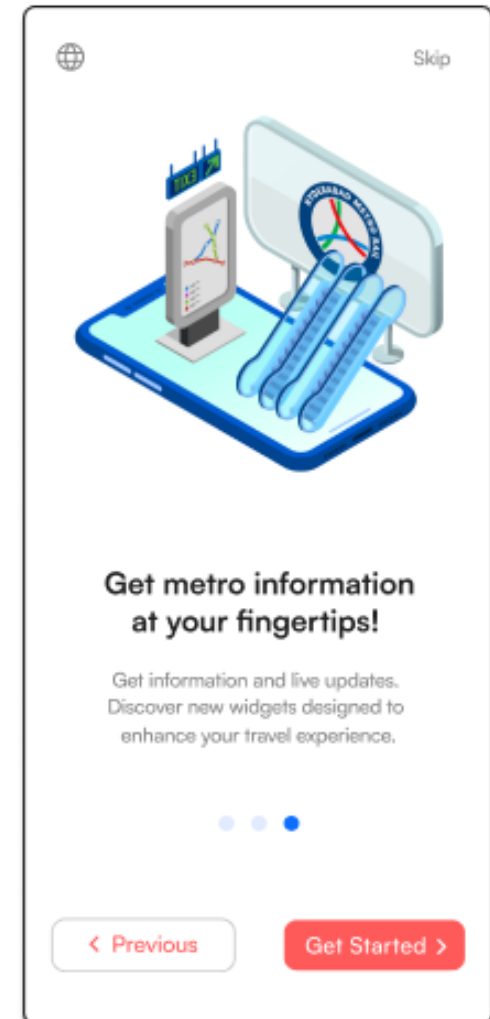
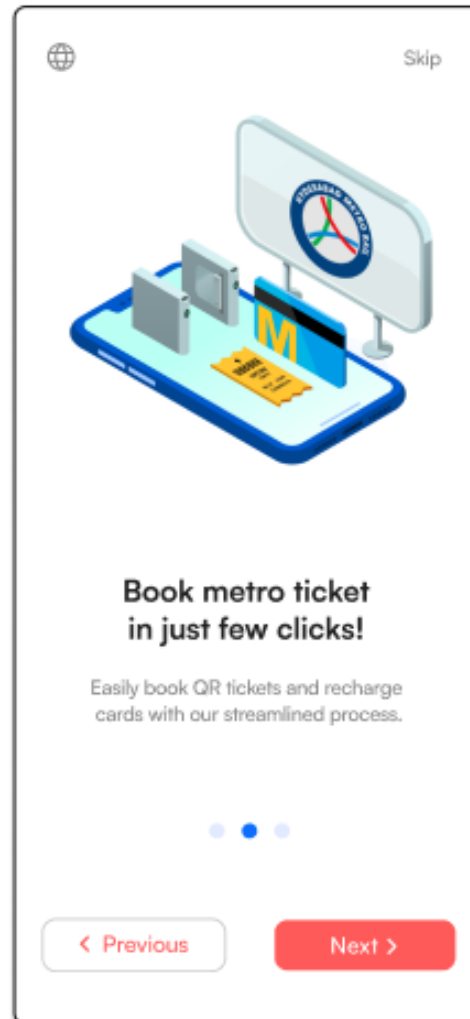
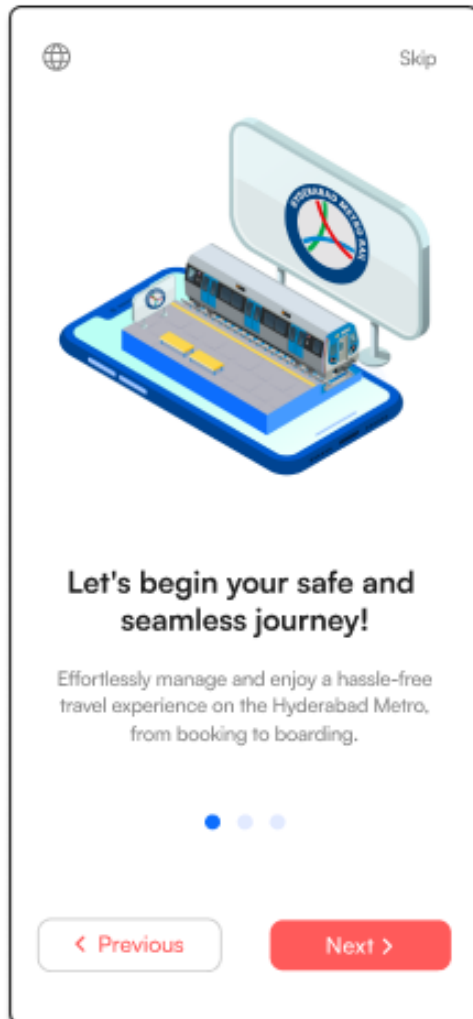
## 7.3 Screens

### Onboarding Screens

The redesigned onboarding screens were introduced to address a significant gap in the app's user experience. Previously, many metro apps, including the Hyderabad Metro's, lacked dedicated onboarding screens, which left new users without clear guidance on how to navigate the app's features. This absence often resulted in a steeper learning curve and reduced user satisfaction.

By integrating these onboarding screens, the app now offers a structured introduction to its functionalities, which were not available in earlier versions or in many similar metro apps. These screens provide a comprehensive tutorial, showcasing key features such as ticket purchasing, train tracking, and route planning. This ensures that users can quickly and easily understand and utilize the app's capabilities, enhancing their overall experience and encouraging more efficient use of the metro services.

The onboarding screens were designed with simple vector illustrations to provide a clean and intuitive visual experience for users. Recognizing Hyderabad's cultural diversity, where multiple languages are widely spoken, the redesign also includes a multilingual feature. This allows users to switch between four prominent languages, ensuring that the app is accessible and user-friendly for a broader audience.

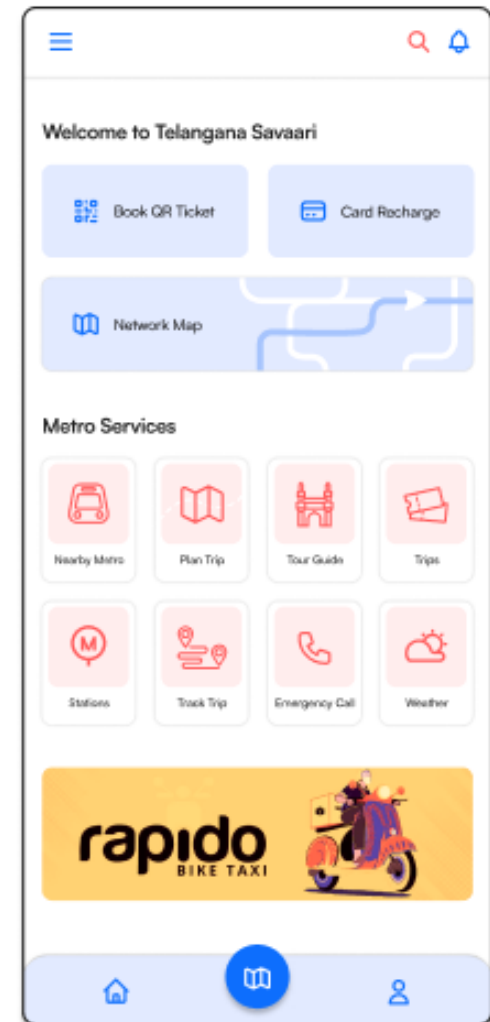
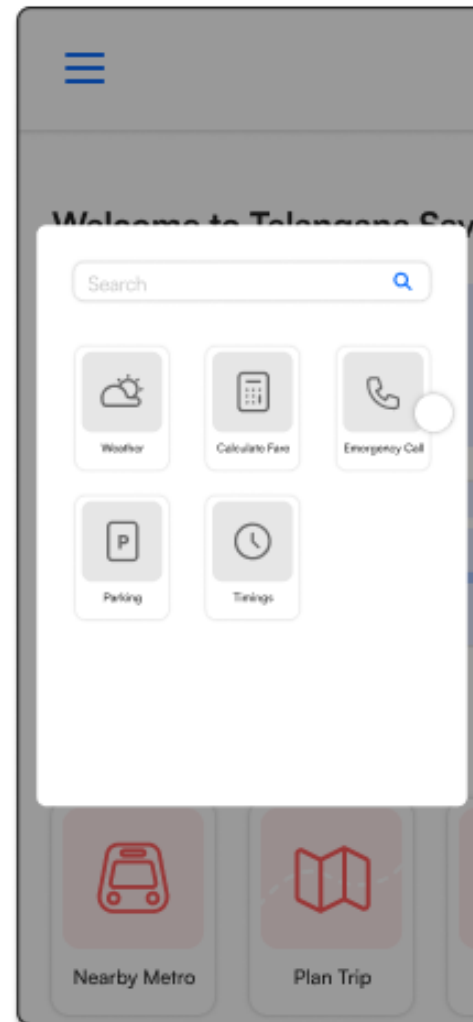
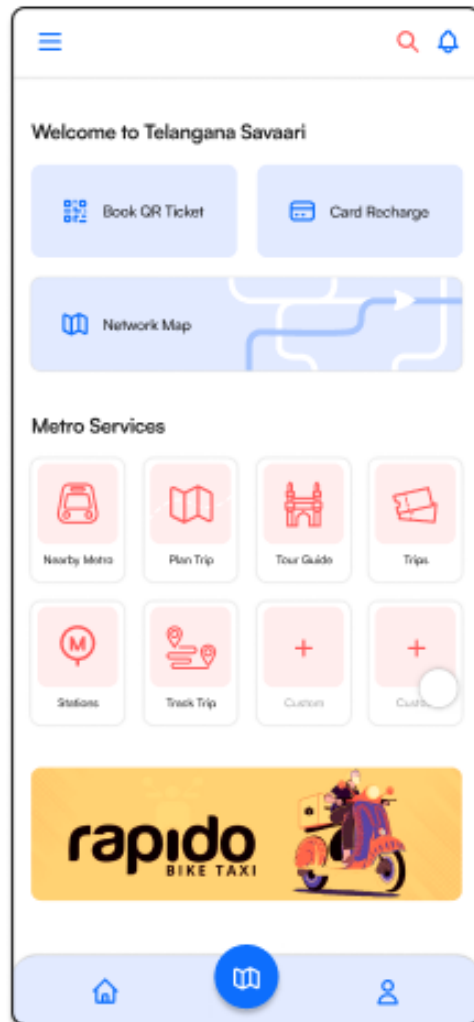


## Home screen

The redesigned homescreen features a calm and user-friendly interface, with a strong emphasis on addressing users' needs and preferences. The home screen has been thoughtfully revamped to present a clear hierarchy of important features based on user priorities. This approach ensures that essential functions are prominently displayed, making it easier for users to navigate and access the features they value most.

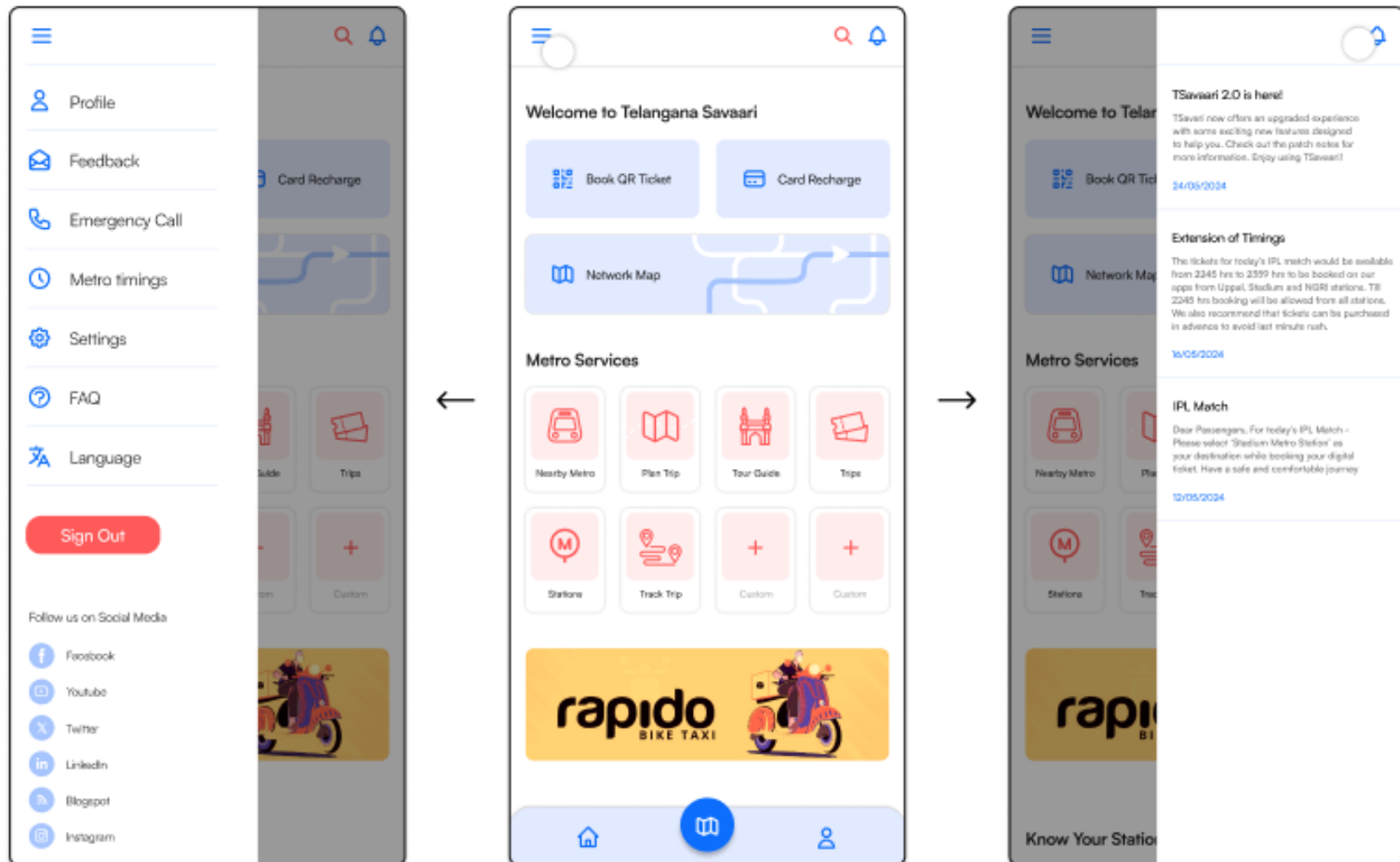
In addition to this improved hierarchy, the new design introduces a customizable quick menu, allowing users to personalize their interface according to their specific needs and frequently used features. This customization enhances user convenience by providing quick access to their preferred functions. Furthermore, the interface now supports the placement of retail ads, a strategic move to boost revenue while offering users relevant promotions. By aligning the design with user priorities and integrating these features, the app not only improves usability but also supports its business objectives effectively.

For instance, a woman traveling late at night can customize the app to place the emergency button prominently on the main menu screen, ensuring quick access when needed. Similarly, a user who drives their own vehicle for the first mile of their commute might prioritize the parking feature, making it more easily accessible than other options.



## Hamburger list and Notifications panel

Well-organized hamburger menu that houses secondary actions, providing users with easy access to additional features without cluttering the main interface. A notification panel has been integrated for alerts and updates, ensuring that users stay informed about important information. Additionally, the app offers quick access to essential functions such as the emergency call feature and language settings, enhancing user convenience and safety.

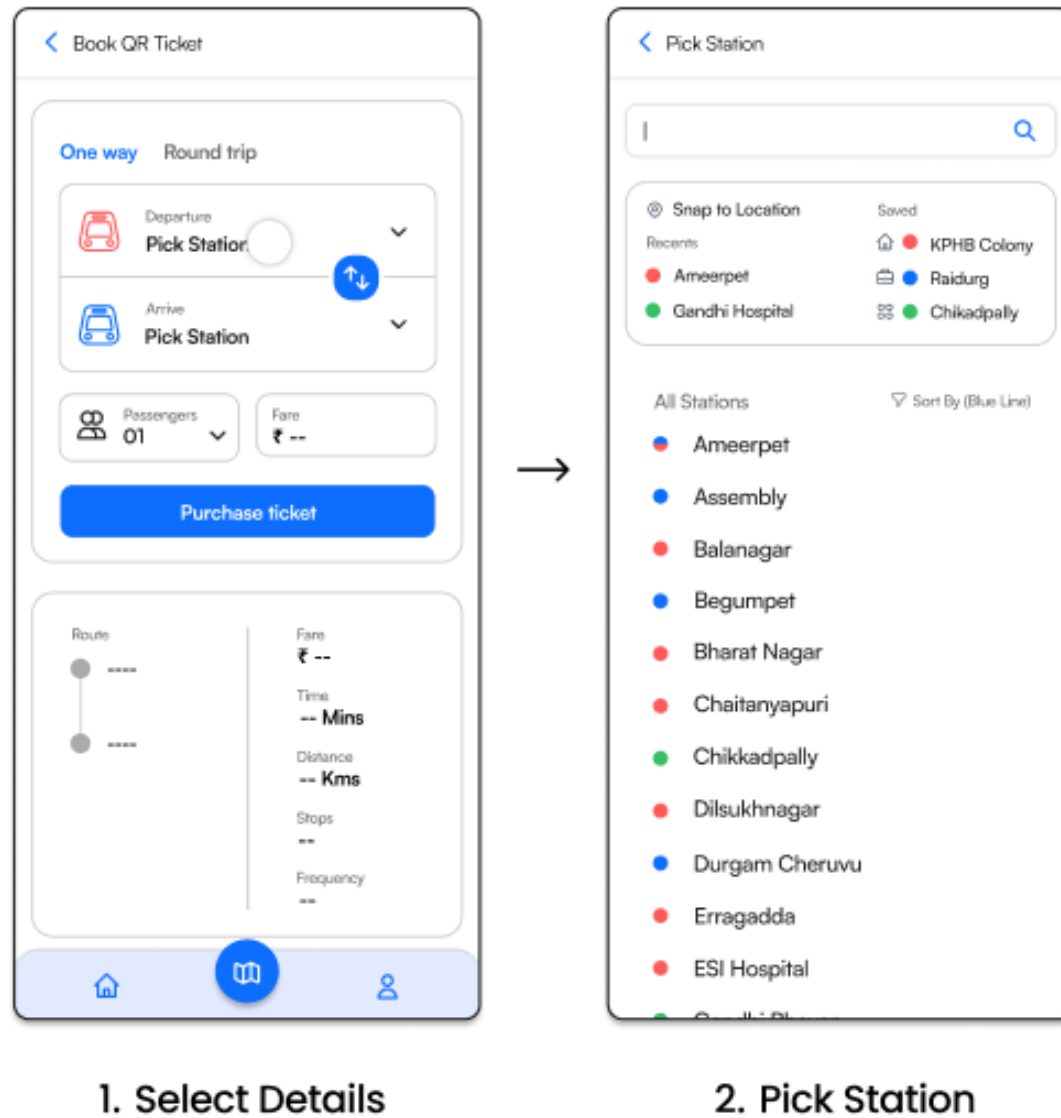


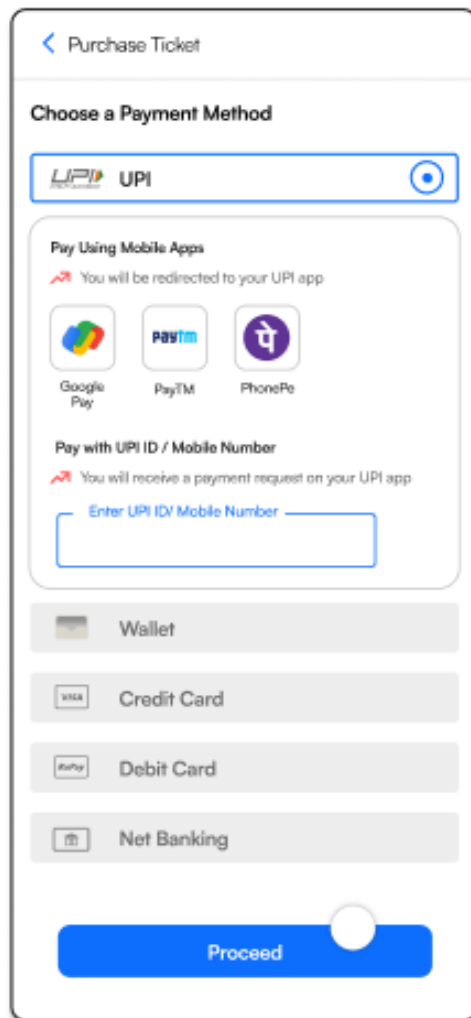
## Purchase QR Ticket

The QR ticket purchase flow in the app is streamlined for user convenience. It begins with selecting the necessary travel details, such as the number of tickets and travel type. Users then pick their starting and destination stations, ensuring accurate route planning. Following this, they proceed to make the payment, which is handled securely within the app. Once the payment is completed, a QR ticket is generated, ready to be scanned at the station gates for quick and easy access to the metro. This flow is designed to be intuitive and efficient, minimizing the time and effort required to purchase a ticket.

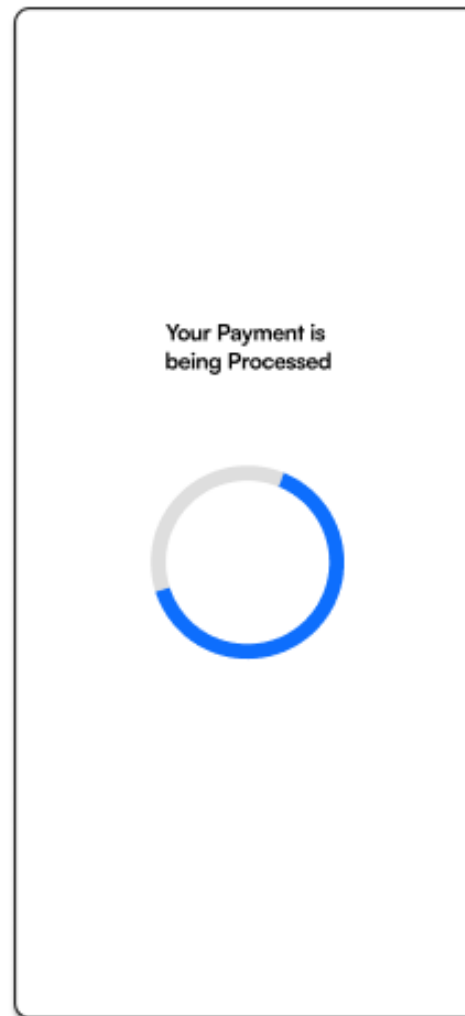
The UI for the QR ticket purchase flow has been simplified to enhance user experience, incorporating familiar terms like “One Way” or “Round Trip,” similar to those used in flight bookings. This familiarity helps users quickly understand their options and make selections with ease.

Additionally, a new payment processing screen has been introduced to display the status of the transaction, a feature that was previously missing. This screen ensures that users are informed throughout the payment process, adding clarity and reducing uncertainty.





3. Make Payment



4. Make Payment

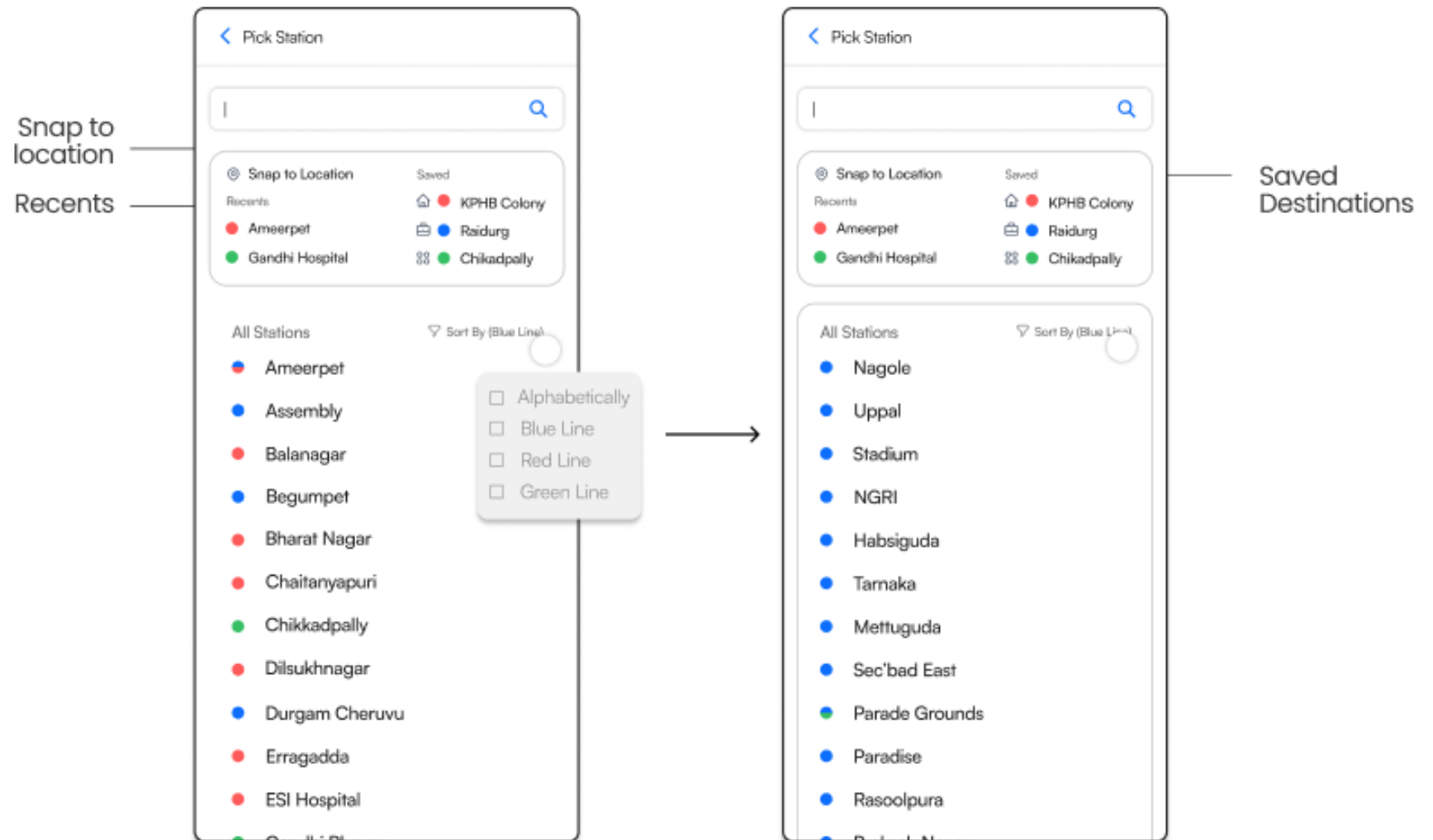


5. QR Ticket

## Pick Station

The station search functionality has been significantly improved to offer a more intuitive and user-friendly experience. Users now have the ability to snap to their current location, enabling the app to automatically identify and display the nearest metro station, made possible through the integration of Google Maps API. This feature greatly simplifies the process of finding the closest station, eliminating the need for manual input. Additionally, the app allows users to save commonly used stations, such as "Home Metro," "Office Metro," or "Cousin's Place," providing quick access to frequently visited locations.

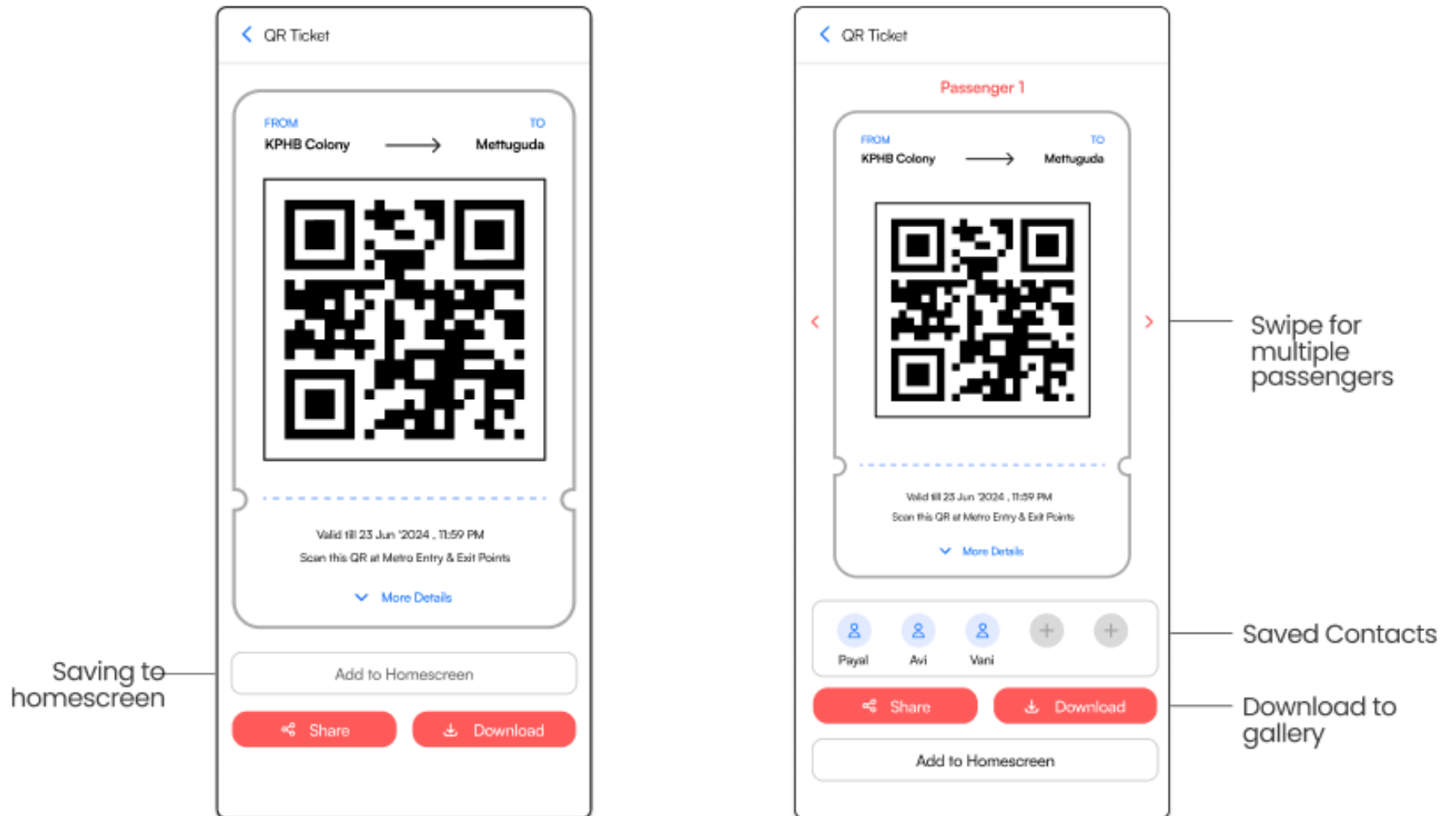
To further enhance the search experience, stations can be sorted either by metro line or in alphabetical order, offering users multiple ways to organize and locate their desired station with ease.



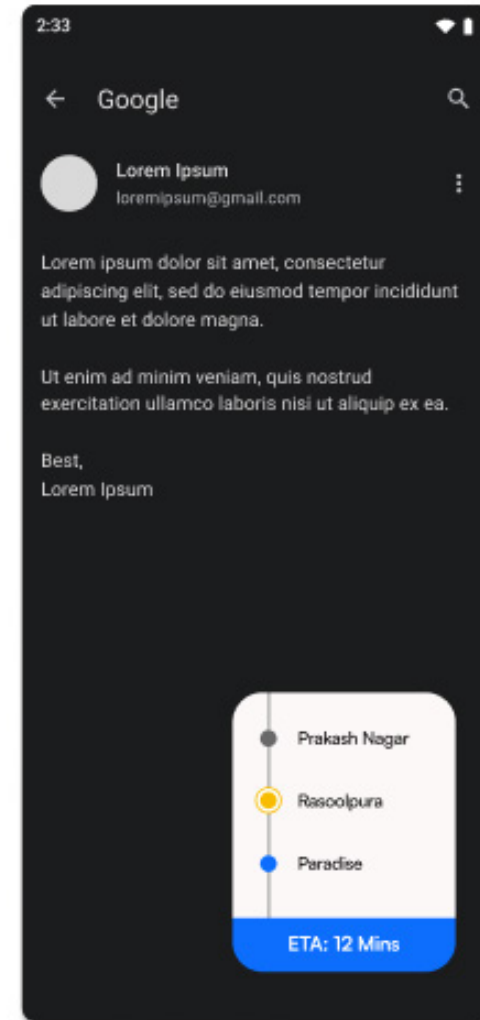
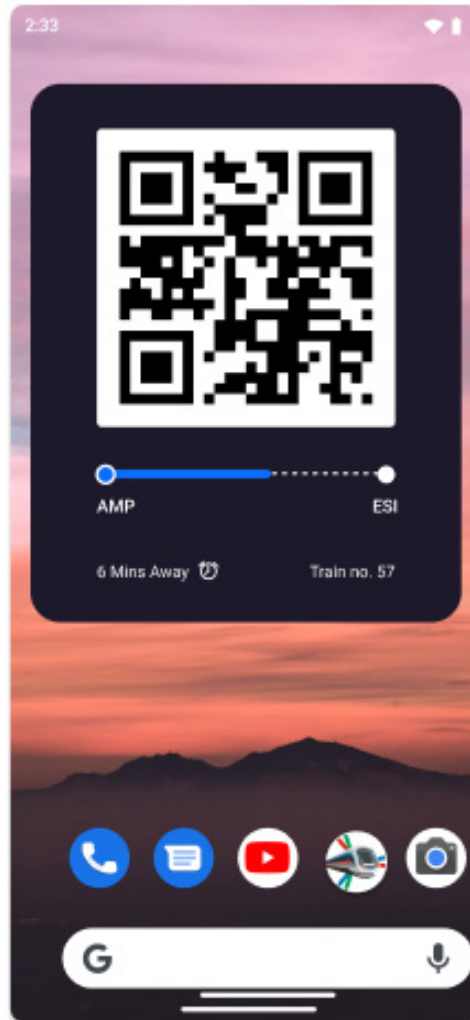
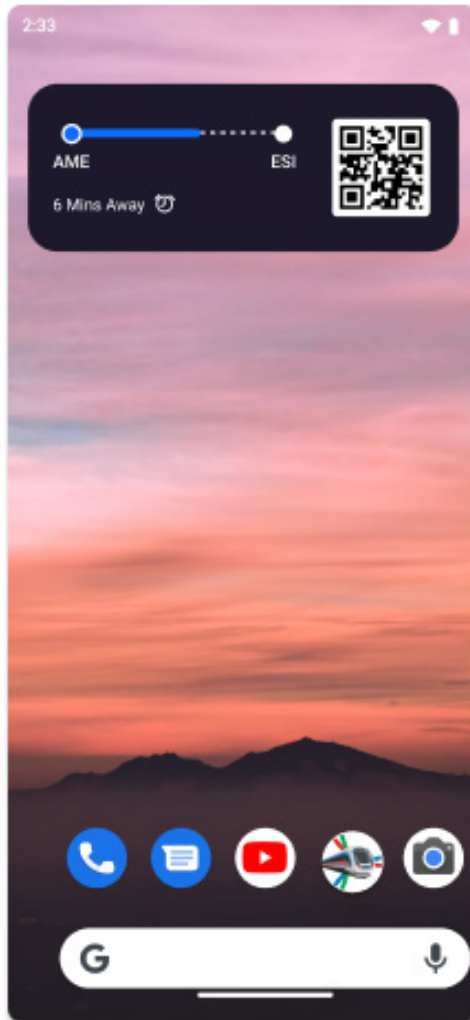
## QR Ticket

The redesigned QR ticket interface now features a light mode, which not only enhances the user experience but also facilitates faster scanning at metro stations. Recognizing common user concerns, the app has introduced the ability to download the QR ticket directly to the phone's gallery. This feature addresses the issue where users often took screenshots of their tickets due to concerns about third-party apps like PhonePe or Paytm not reliably saving them. In addition to this, the app now offers an option to save the ticket as a widget on the home screen, ensuring quick and easy access without needing to open the app each time.

Moreover, the process of booking QR tickets for multiple passengers has been significantly streamlined. The app now allows users to send tickets directly to their most frequently traveled companions or to saved contacts with just a single tap. This improvement eliminates the need for the cumbersome process of sharing links, which was previously required. Users can now purchase and distribute tickets for others effortlessly, making group travel more convenient and user-friendly. These enhancements collectively contribute to a smoother and more reliable ticketing experience, addressing user needs and improving overall satisfaction with the app.





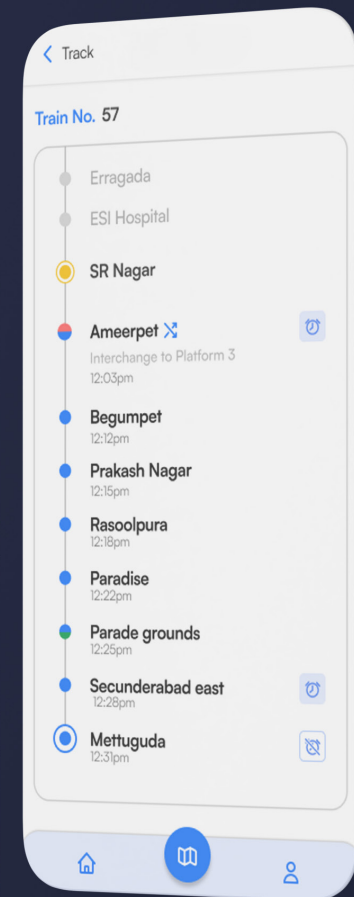
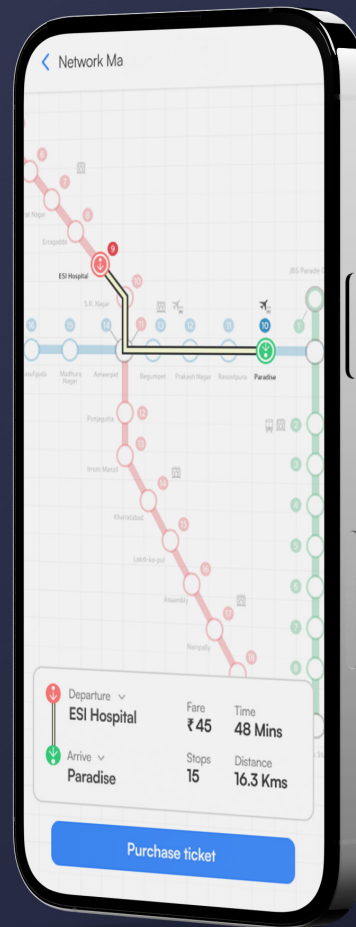


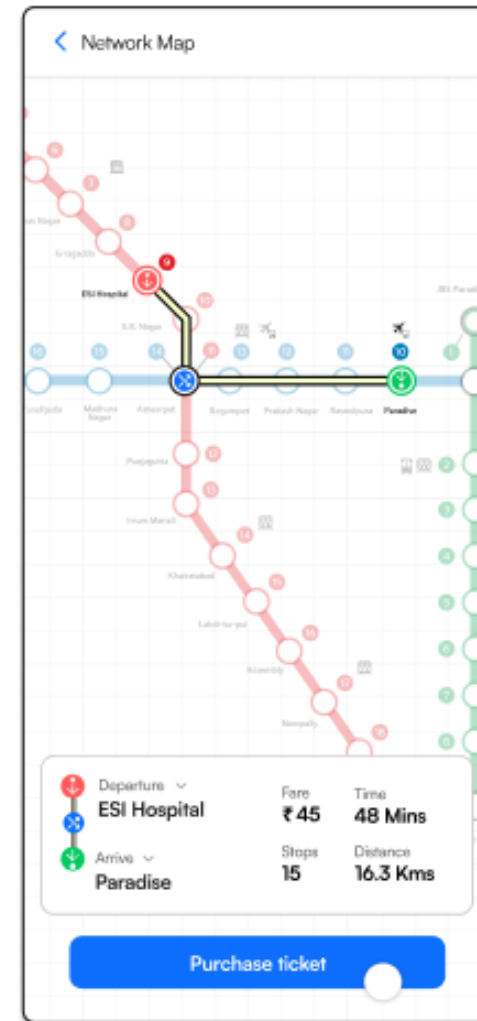
## Widgets

Designed phone widgets for quick access to QR tickets, saving time at AFC gates.

Added a windowed map view for passengers to stay aware during their journey.

Passengers no longer need to take screenshots of their tickets and do not have to navigate through UPI app to find their ticket.





## Network Map

Added an interactive map feature for zooming in and out on the network map.

Users can click on stations to book tickets and view important information.

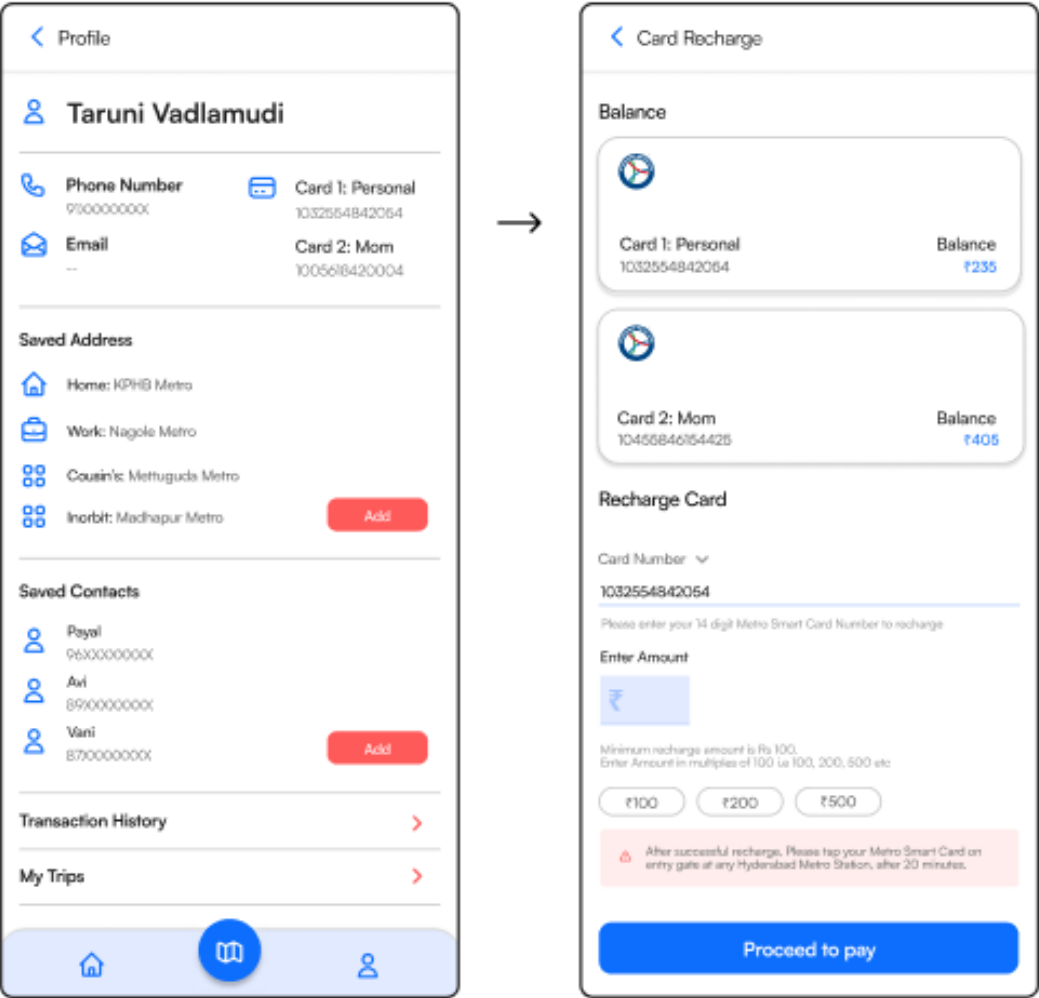
The interactive map feature is especially helpful for visual learners.

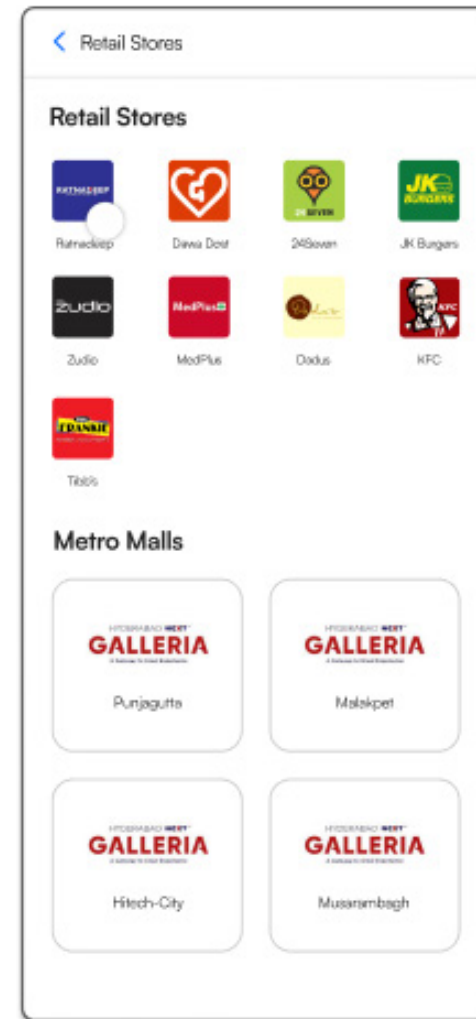
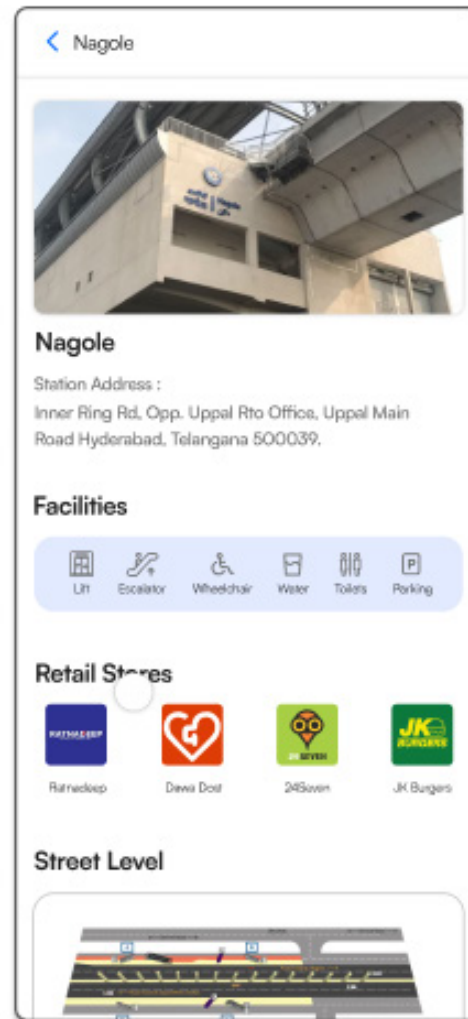
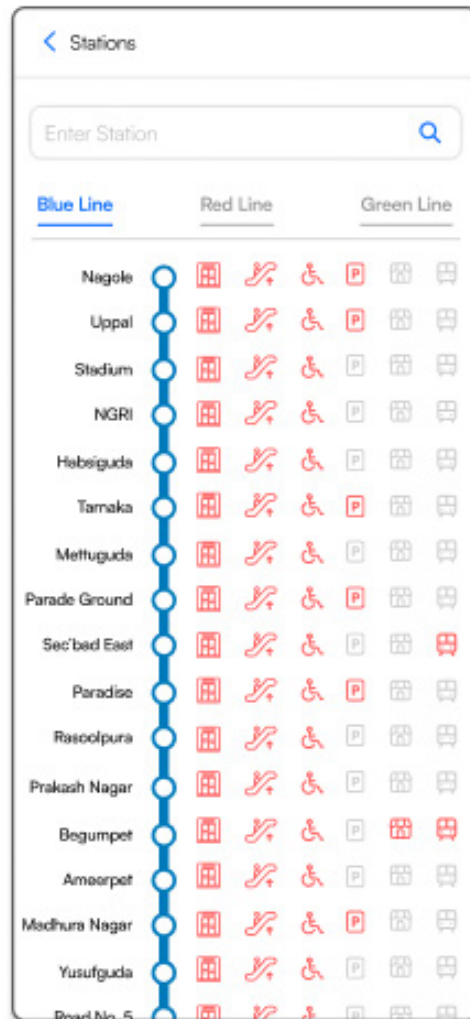
## Profile

The profile page offers enhanced functionality, allowing users to save personal details such as work and home addresses.

For added convenience, users can save and rename multiple cards to simplify management.

Additionally, the platform enables users to recharge multiple cards from a single device, saving time and effort. To facilitate seamless communication, users can save important contacts to share tickets directly with them. Lastly, the transaction history and past trips can be easily tracked, providing users with a clear overview of their activities.





## Station Information

Access comprehensive station information, including available facilities and amenities, and view a street view diagram to plan your exit strategy. Additionally, discover retail stores present at each station and find details on

MMTS connections and parking facilities. For a complete travel experience, get information on nearby metro malls to enhance your journey.

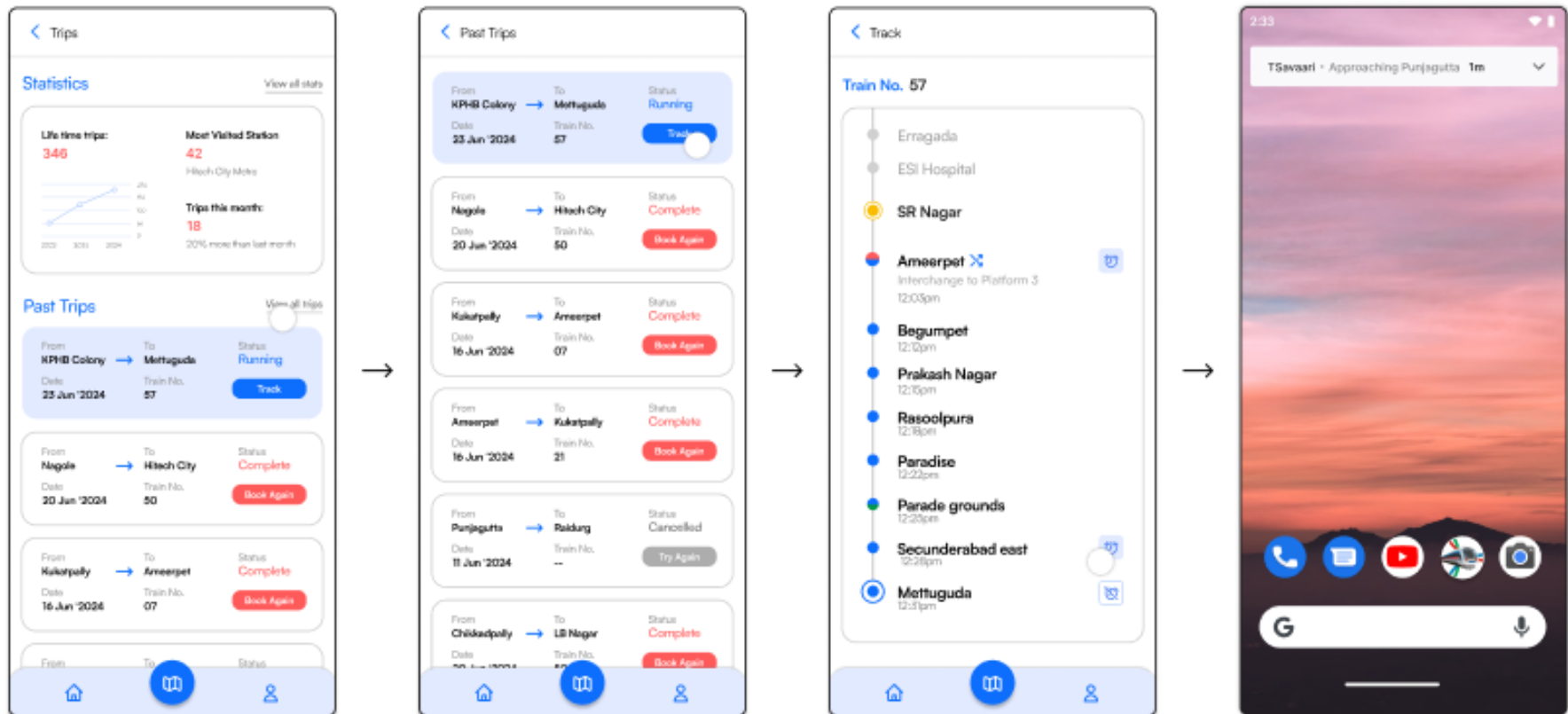
## Track trip

Keep track of your previous trips and statistics to monitor your travel patterns. Most people lose track of time travelling hours in metro, this could be a tool that helps them manage time.

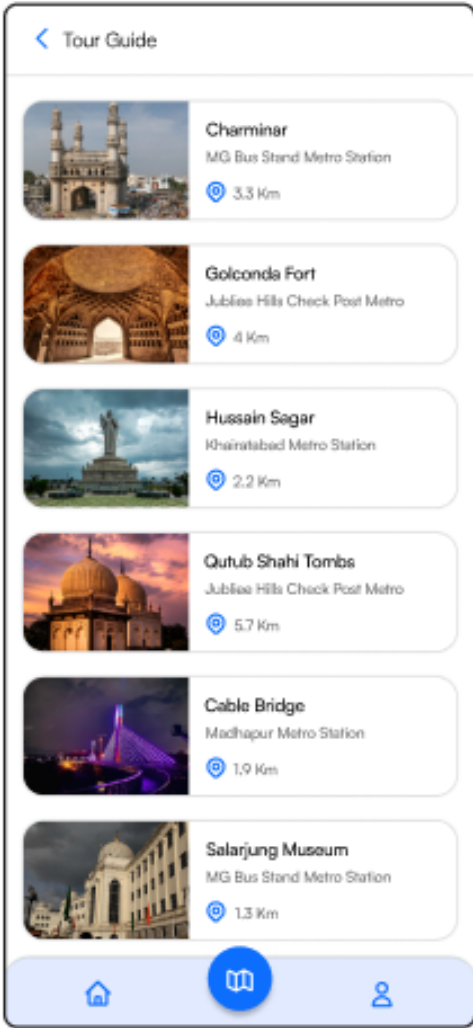
Easily book the same ticket again for convenience and efficiently track your rides in real time.

Track your current trip in windowed view to be able to know which station you are approaching at all times, in case you cannot listen to the announcements or cannot view the sign board

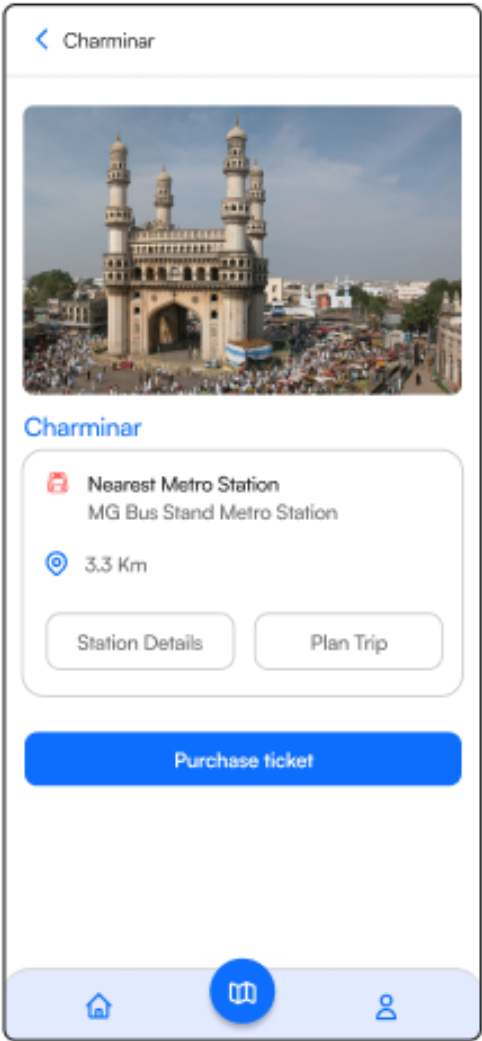
Set alarms and notifications to ensure you never miss important updates or changes during your journey. Set alarms for destination station or penultimate station or for an interchange station!



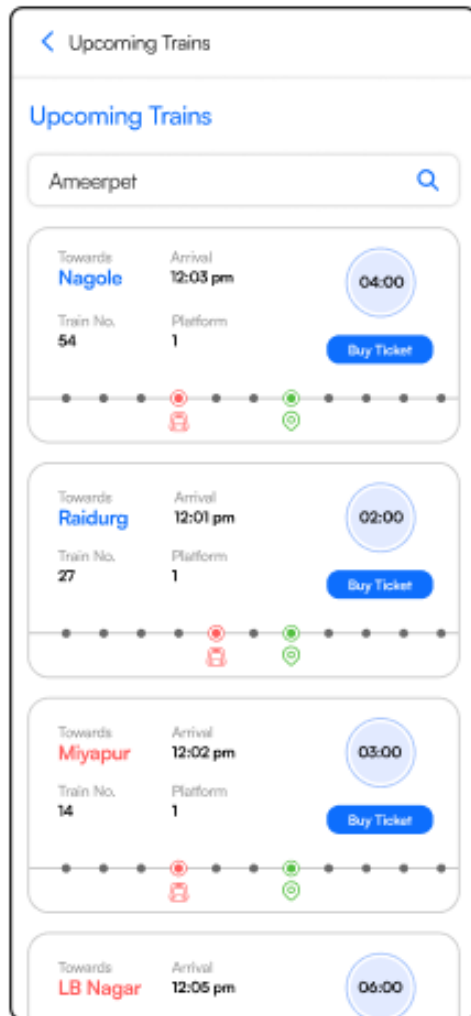
Other screens



Tour Guide



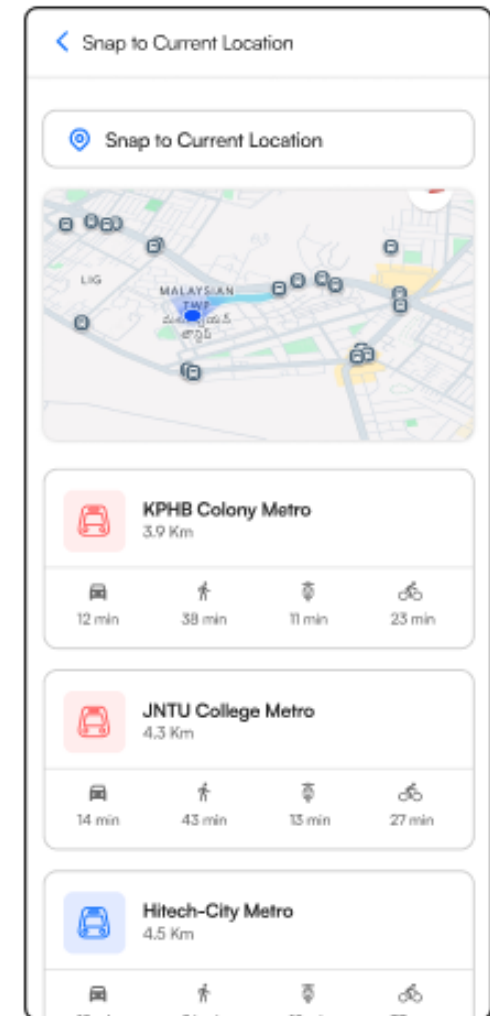
Weather Forecast



Metro Headway



Trip Statistics



Nearby Metro

## 7.4 Other

### Promotional Poster

I created a promotional poster for T-savaari, designed for display on the digital advertisement boards inside Hyderabad Metro trains. The poster highlights the key features and benefits of the app and also includes a scannable QR code that passengers can easily scan during their metro journey. This is intended to increase awareness and encourage more commuters to download and use T-savaari, enhancing their overall metro experience.



# Download T-Savaari

Upgrade to Tsavaari 2.0 and discover a whole new way to navigate your city! Our revamped app is designed to provide passengers with the ultimate travel experience, all at your fingertips.

Download Now!!



## App Logo

I designed the logo for the T-savaari app, carefully considering how it would appear on users' phone screens once installed. During the design process, I experimented with different styles but focused on maintaining the recognizable colors of Hyderabad Metro as the main color scheme. The goal was to create a logo that would be instantly recognizable, reinforcing the app's connection to the metro system.





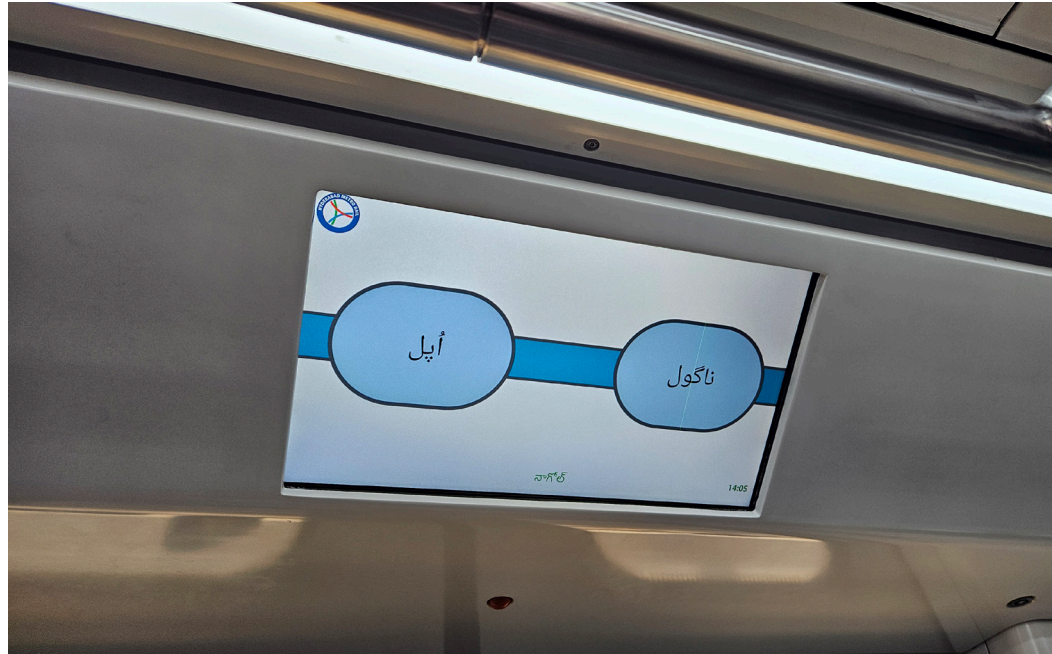
Current logo



Selected Redesigned Logo

## Digital Signboards

I redesigned the digital signboard inside the Hyderabad Metro trains that indicate the upcoming station. Passengers were experiencing issues because the signboard often displayed information only in Urdu or a language they did not understand right when the doors were opening. To address this, I revamped the design to display multiple languages simultaneously, with English as the primary language and two additional languages visible at the same time, ensuring that all passengers can easily understand their destination.



Current Digital signboard design



11:45 AM

AMEERPET



ఎస్ ఆర్ నగర్  
**S.R NAGAR**  
एस आर नगर

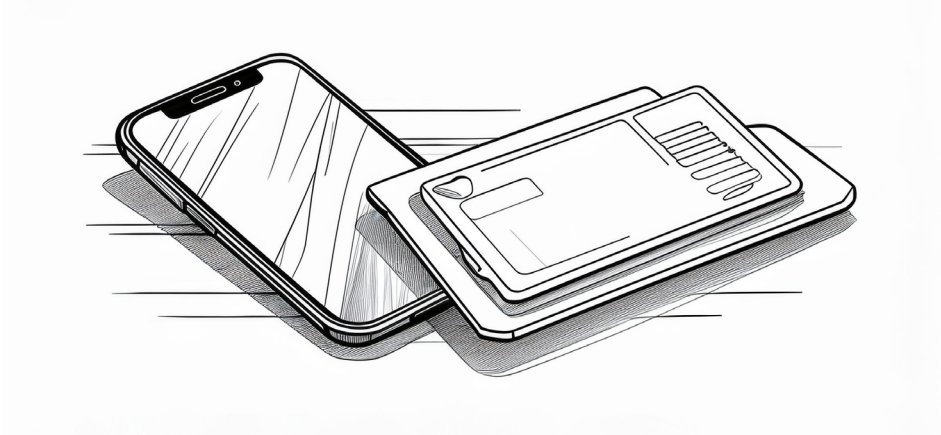


ESI HOSPITAL

Towards LB Nagar

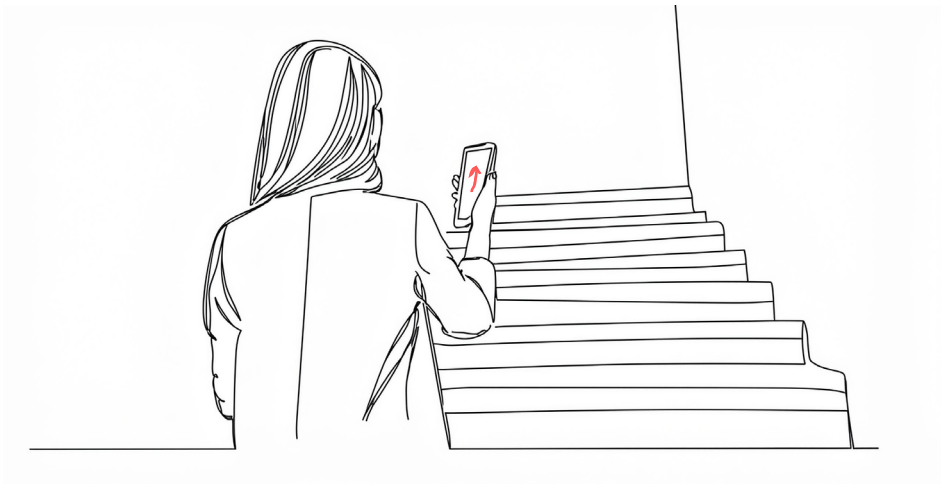
Train no. 57

## Way Ahead



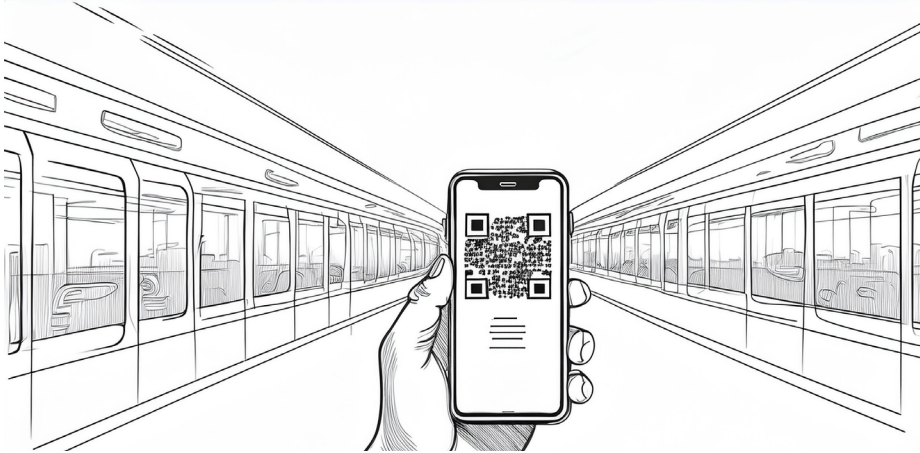
### NFC Card Recharge and Metro Merchandise

I observed that many passengers place their metro cards in their phone cases to avoid losing them and keep them easily accessible. Building on this behavior, I thought about leveraging it by enabling NFC payments for card recharges directly through the phone. Another idea was to create metro merchandise, such as phone cases designed to store metro cards, allowing them to be easily scanned at AFC gates when passengers place their phones on the scanner. This could enhance convenience and streamline the user experience.



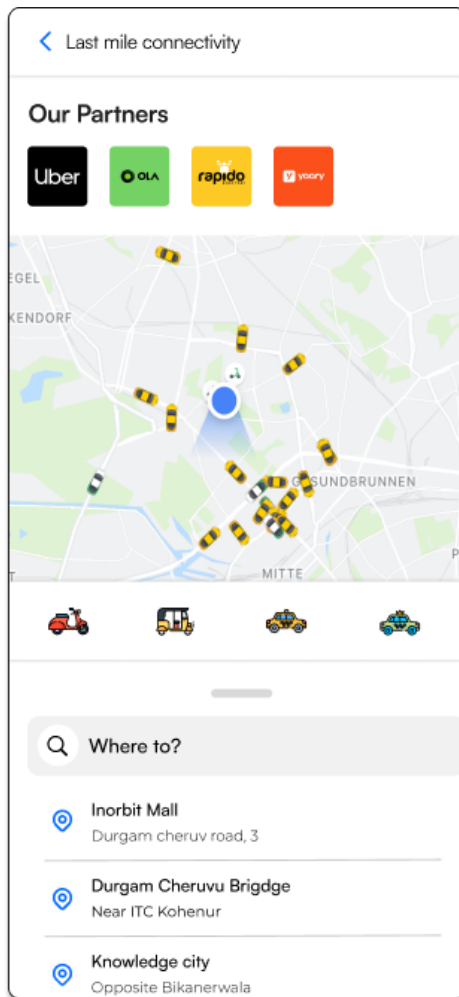
### AR Navigation

I considered the possibility of implementing AR navigation in the Hyderabad Metro, especially since most stations share a similar layout, making it relatively easy to roll out. This technology could be particularly useful for helping passengers exit the station and choose the correct side. However, given the current scale of the metro network, navigation is not overly confusing, so I wouldn't recommend it at this stage. Additionally, I'm concerned that AR navigation might make passengers less aware of their surroundings, which could be a drawback. As the metro network becomes denser, AR navigation could become a more valuable tool.



### One QR

I considered an idea called “One QR,” where passengers can purchase a unique QR code for their travel needs. This QR ticket could be bought on a monthly or weekly basis, or by the number of trips, such as 10 trips at once. The QR code would be valid for 3–4 months, functioning like a metro card but accessible via a phone. This would offer flexibility and convenience for frequent metro users while integrating seamlessly into their existing mobile routines.



## NFC Card Recharge and Metro Merchandise

I considered a feature for the LMC Master app that would involve partnering with companies like Ola, Uber, and Rapido. This feature would compare multiple ride options from these services at the backend to offer users the fastest ride available. This could streamline the booking process, as I observed that people often book rides on multiple apps and cancel the slower options. However, implementing this feature would require careful consideration of business strategies.

There is a concern that companies like Ola, Uber, and Rapido might face losses due to this feature, and it would be essential to evaluate their willingness to participate.



## 8. Epilogue

8.1 Conclusion

8.2 Retrospect

8.3 Appendix

8.4 References

## 8.1 Conclusion

Reflecting on the T-savaari app redesign project, several challenges emerged, including addressing the diverse needs of Hyderabad's metro users and managing the complexity of integrating multilingual support. Overcoming these obstacles required iterative testing and user feedback analysis.

The project evolved from a basic UI/UX redesign to incorporating advanced features like customizable menus and enhanced digital signage. The redesign of the T-savaari app represents a significant enhancement in the passenger experience for the Hyderabad Metro. Through a comprehensive process of research, user feedback, and iterative design, the project has successfully addressed key issues identified in the initial stages.

The improved user interface now features a streamlined ticket purchasing process, enhanced navigational aids, and a more intuitive layout. Additionally, the redesigned digital signboards, which display information in multiple languages, provide clearer and more accessible communication for passengers.

During the presentation of the T-savaari app redesign to the client, the feedback was highly positive. They acknowledged that these features align well with their goals for improving the app's usability. The client appreciated the insights regarding the need for an upgrade, recognizing that the current T-savaari app was indeed in need of a significant enhancement to serve its users.

They were enthusiastic about moving forward with integrating these ideas into the app.

Key achievements of the project include:

**Enhanced Usability:** The app's new features, such as the customizable menu and improved ticketing options, significantly improve user convenience and satisfaction.

**Increased Accessibility:** Multilingual support and intuitive design choices make the app more inclusive and user-friendly.

**Improved Communication:** The updated digital signboards ensure that passengers can easily understand station information, regardless of their primary language.

This project not only meets its initial objectives but also lays a foundation for future improvements in metro travel experiences.

The T-savaari app redesign project has effectively transformed the digital travel experience for Hyderabad Metro passengers, aligning with both current needs and future possibilities. I was able to demonstrate the value of user-centered design and the impact of thoughtful, inclusive enhancements on public transportation systems.

## 8.2 Retrospect

Reflecting on the T-savaari app redesign project, several key aspects and lessons stand out. The design decisions made during this project will have significant implications, given the broad market that the app serves. By focusing on user-centered design and integrating feedback, the project aligns well with the diverse needs of Hyderabad's metro passengers. This approach not only enhances the app's functionality but also underscores the importance of returning to user needs when encountering obstacles, ensuring that solutions remain relevant and effective.

Effective teamwork was crucial throughout the project. Tinterdisciplinary approach was particularly beneficial, as it allowed me to leverage insights from Systems understanding and UI/UX design to address complex challenges and deliver a comprehensive solution.

The project provided valuable practical industrial experience, offering a real-world application of theoretical knowledge.

However, there were limitations and shortcomings. Notably, I was unable to conduct user testing with a large group of people due to time and resource constraints. Despite this, the research conducted provided a solid foundation, and tried-and-tested methods were employed in several areas to validate the design decisions. While this limitation posed challenges, the research-backed approach ensured that the solutions developed were grounded in real user needs and preferences.

Overall, the project was a significant learning experience that reinforced the importance of interdisciplinary collaboration and user-centric design in creating impactful digital solutions.

My time at L&T was an enriching experience that greatly contributed to the completion of the project. It was particularly gratifying to see the genuine curiosity and interest from the L&T team regarding our work. Their willingness to engage with us and share a wealth of knowledge and information, despite our status as interns, was incredibly valuable. This openness not only provided us with crucial insights but also fostered a collaborative environment where ideas and feedback flowed freely.

The support and guidance from the L&T team were instrumental in shaping our project. Their expertise and willingness to address our questions and discuss various aspects of the metro system helped us refine our design and ensure it was aligned with practical needs and constraints. This collaborative spirit made the project more dynamic and grounded in real-world applications, enhancing both the process and the final outcomes.



## 8.3 Appendix

### Appendix A

#### Questionnaire of Survey 1

1. Name

2. Age

3. Gender

- a. Male
- b. Female
- c. Non-binary
- d. Prefer not to say

4. Profession

- a. Student
- b. IT Professional
- c. Government Employee
- d. Private Sector Employee
- e. Other

5. Travel Type

- a. One-way
- b. Two-way

6. Travel Companions

- a. Alone
- b. Group

7. What do you do together while traveling with a group? How do you coordinate?

- a. Chat and discuss plans
- b. Use messaging apps
- c. Plan in advance
- d. Use phone calls
- e. Other

8. Purpose of Travel

- a. Work
- b. Education
- c. Leisure
- d. Errands
- e. Other

9. Format of Ticket Purchase

- a. Paper Ticket
- b. UPI
- c. Metro Card
- d. Mobile App
- e. Other

10. What do you think about the Paytm/PhonePe app to buy metro tickets?

- a. Very Convenient
- b. Convenient
- c. Neutral
- d. Inconvenient
- e. Very Inconvenient

11. Most Traveled – Lines and Stations

- a. Green Line
- b. Blue Line
- c. Red Line
- d. Parade Ground
- e. MGBS

12. Most Used LMC/FMC Options

- a. Recharge Metro Card
- b. Buy Tickets
- c. Check Timings
- d. Track Trains
- e. Other

13. Most Hectic/Annoying Stations

- a. Parade Ground
- b. MGBS
- c. Begumpet
- d. Hitech City
- e. Other

14. How do you plan your journey? Use of Metro Map?

- a. Use Metro Map
- b. Use Mobile App
- c. Ask for Directions
- d. Know the Route
- e. Other

15. Are you aware of the T-Savaari app?

- a. Yes
- b. No

16. Have you ever encountered any delays or disruptions in metro services due to ticketing-related issues?

- a. Yes
- b. No

17. If yes, what are the reasons for causing delay/disruption?

- a. Ticket Scanning Issues
- b. Card Malfunction
- c. System Errors
- d. Long Queues
- e. Other

18. How often did you have to get help/ assistance while scanning ticket or card?

- a. Always
- b. Often
- c. Occasionally
- d. Rarely
- e. Never

19. If you use a card, where do you store it and how do you access it?

- a. In a Wallet
- b. In a Phone Case
- c. In a Bag
- d. In a Pocket
- e. Other

20. Advice for First-Time Metro Users?

- a. Plan Your Route
- b. Check Timings
- c. Carry Sufficient Cash/Card
- d. Use Mobile App
- e. Other

21. Tips and Tricks to Travel in Crowded Stations?

- a. Avoid Rush Hours
- b. Stand in Designated Areas
- c. Use Alternative Routes
- d. Stay Calm
- e. Other

22. Witnessing Any Uncommon Things?

- a. Yes
- b. No

23. What are Your Go-To Retail Stores in the Metro Station?

- a. Food and Beverage Outlets
- b. Bookstores
- c. Convenience Stores
- d. Apparel Shops
- e. Other

24. If you had the power to change something about the metro, what would it be? And why?

- a. Improve Ticketing System
- b. Increase Train Frequency
- c. Enhance Cleanliness
- d. Expand Network
- e. Other

25. How do you tackle the boarding/ deboarding? How do you avoid getting pushed while boarding/deboarding? What are your feelings?

- a. Queue Properly
- b. Use Designated Areas
- c. Wait for Passengers to Disembark
- d. Maintain Personal Space
- e. Other

26. Cleanliness – On a Scale of 1 to 5

- a. 1 (Very Poor)
- b. 2 (Poor)
- c. 3 (Average)
- d. 4 (Good)
- e. 5 (Excellent)

27. Efficiency – On a Scale of 1 to 5

- a. 1 (Very Poor)
- b. 2 (Poor)
- c. 3 (Average)
- d. 4 (Good)
- e. 5 (Excellent)

28. Comfort – On a Scale of 1 to 5

- a. 1 (Very Poor)
- b. 2 (Poor)
- c. 3 (Average)
- d. 4 (Good)
- e. 5 (Excellent)

29. Passenger Behavior – On a Scale of 1 to 5

- a. 1 (Very Poor)
- b. 2 (Poor)
- c. 3 (Average)
- d. 4 (Good)
- e. 5 (Excellent)

30. Accessibility – On a Scale of 1 to 5

- a. 1 (Very Poor)
- b. 2 (Poor)
- c. 3 (Average)
- d. 4 (Good)
- e. 5 (Excellent)

31. Ease of Navigation – On a Scale of 1 to 5

- a. 1 (Very Poor)
- b. 2 (Poor)
- c. 3 (Average)
- d. 4 (Good)
- e. 5 (Excellent)

32. Importance of Announcements and Screens – On a Scale of 1 to 5

- a. 1 (Not Important)
- b. 2 (Slightly Important)
- c. 3 (Moderately Important)
- d. 4 (Very Important)
- e. 5 (Extremely Important)

33. How satisfied are you overall with the ticketing process?\*\*

- a. Very Dissatisfied
- b. Dissatisfied
- c. Neutral
- d. Satisfied
- e. Very Satisfied

34. On a Scale of 1-10, How Important is Finding a Seat to You?\*\*

- a. 1 (Not Important)
- b. 2
- c. 3
- d. 4
- e. 5
- f. 6
- g. 7
- h. 8
- i. 9
- j. 10 (Very Important)

35. In What Situations Do You Need to Sit?

- a. Long Commutes
- b. During Peak Hours
- c. When Feeling Tired
- d. When Carrying Heavy Items
- e. Other

36. What is Your Preferred Position to Stand in the Metro?\*\*

- a. Near the Doors
- b. In the Middle of the Carriage
- c. Near the Window
- d. Close to Handrails
- e. Other

37. When Do You Start Moving to the Train Doors?

- a. 1 Station Away
- b. When Doors Open
- c. At the Current Station
- d. After the Train Slows Down
- e. Other

38. Hitech – Raidurg Fiasco?

- a. Familiar with Incident
- b. Not Familiar with Incident
- c. Other

39. \*\*Upload Pictures Section\*\*

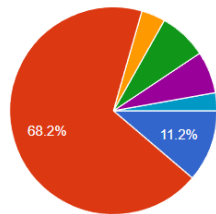
- a. Upload Relevant Pictures of Metro Experience
- b. Optional Upload
- c. No Upload

Feel free to adjust any of the options or questions to better fit your research needs!

## Survey Results

### Age

107 responses

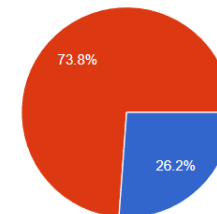


- 13-19
- 20-29
- 30-39
- 40-49
- 50-59
- 60+

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### How do you travel?

107 responses

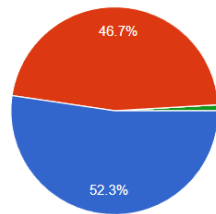


- One way
- Two way

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### Gender

107 responses

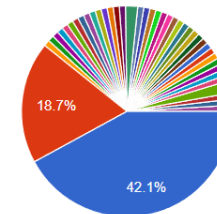


- Male
- Female
- Prefer not to say
- They/dont know me son

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### Purpose of travelling?

107 responses



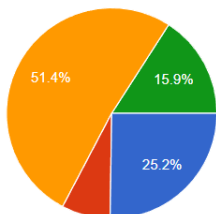
- Work
- Studies
- I don't stay here so I use it to travel w...
- Other
- Sightseeing or meeting friends
- Leisure/ Site Visit
- Friends and family
- Depends

▲ 1/6 ▼

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### How often do you travel in Metro?

107 responses

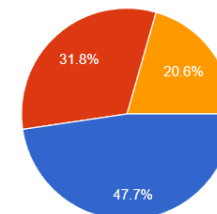


- Regularly
- Weekly
- Occasionally
- Rarely

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### How do you purchase metro tickets?

107 responses

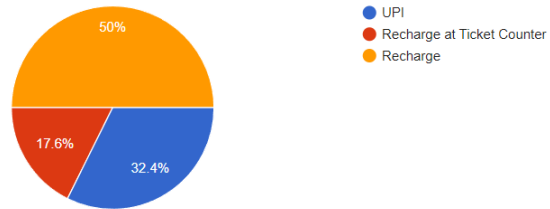


- UPI
- Card
- QR Ticket (Paper/Token)

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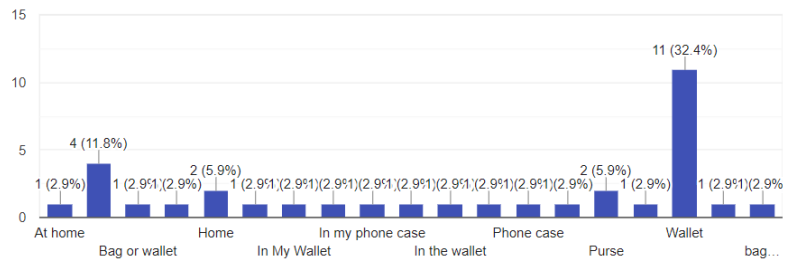
### How do you recharge your card?

34 responses



### Where do you keep your card when not using it?

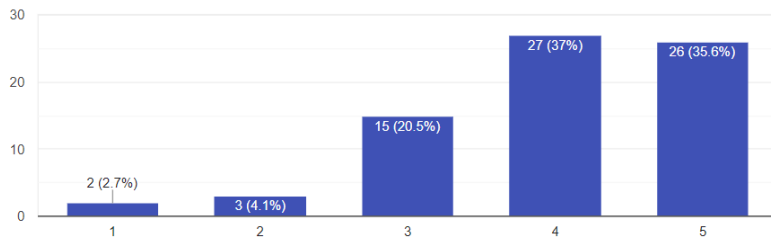
34 responses



### UPI

### On the scale of 1-5, rate your experience of using UPI to buy ticket.

73 responses



### What do you not like about UPI ticketing?

52 responses

It's better to have APP for metro

Process of verifying the transaction is time consuming, especially during peak hours

Some time issues with bank server ( rarely )

The ticket seller once shouted at me while im asking in calmly , my phone battery is very lo I thought QR ticket will be problem and i went to counter and asked abt ticket he was so rude to tell me that " it doesnt matter weather you take QR or here while paying through upi .. ( i asked for physical ticket or that coin ) .. he denied my question and made to do in phone itself and i some how managed to go out by approaching other members

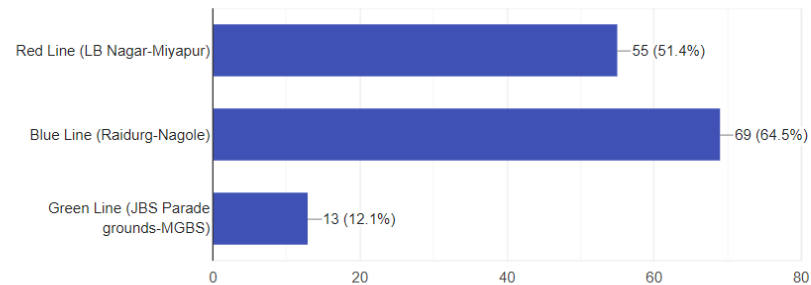
I don't see any problem

Using it for the first time can get tricky because there are codes from different wallets put up on stations. And the first time ever, one person asked me to download metro app and book ticket from there. I think the process doesn't cater first time users we'll enough. Oh, and I just remembered finding the qr code once I close the app took me sooo much time that's bad ui

### Station Data

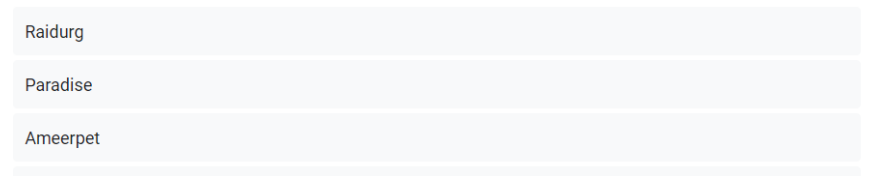
### Your most travelled metro lines

107 responses



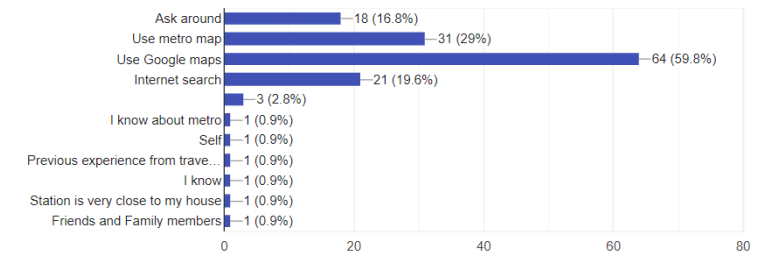
### Your most travelled stations

107 responses



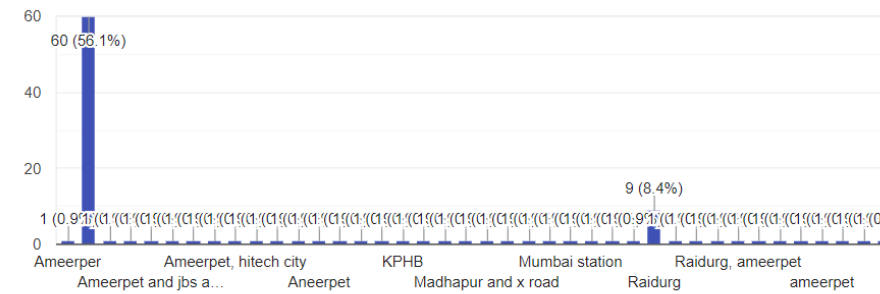
### How do you plan your journey? (How do you find the closest metro station)

107 responses



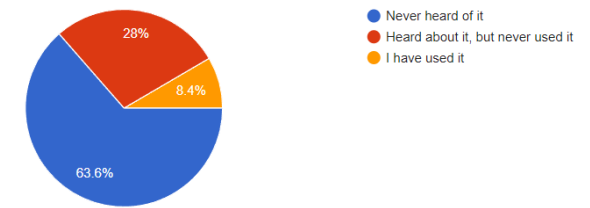
### Which station do you find the most chaotic or hectic?

107 responses



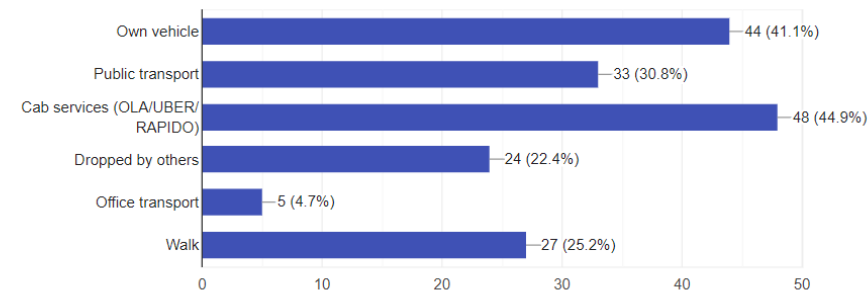
### Are you aware of the T-Savaari app? And do you use it?

107 responses



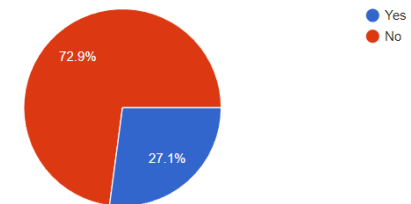
### How do you travel to and from the metro station?

107 responses



### Have you encountered any delays or disruptions in metro services due to ticketing related issues?

107 responses



## Reason for delay

What are the reasons for delays / disruptions in ticketing? Describe what went wrong?

29 responses

The ticket vending machine problem

Its time consuming

Card online payment is reflected slow.

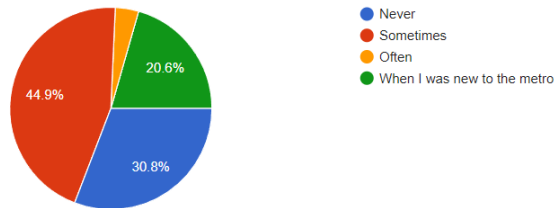
Chaos around

Ratio of counter to the people , it wont get scanned properly

## Assistance

How often did you have to get help / assistance from metro staff or other passengers? [Copy](#)

107 responses



What tips and tricks do you recommend for first time metro users based on your own experience?

107 responses

Better take online ticket or use metro card rather than buying at the station because of queue. Please keep your luggage under the seat and offer to hold other's bags if you get a seat in the train.

Better instructions

It's best to travel light during rush hours

See the maps

Could you provide examples of uncommon behaviours you've seen on trains?

107 responses

Few! People looks like so decent and asks for help and money , " they say! I will return your money after going home and they will get down in next station and they repeat whole dayy , i paid like 300/- for him and he never called me or lift the call "

Tightly packed trams making people to stand very close to each other

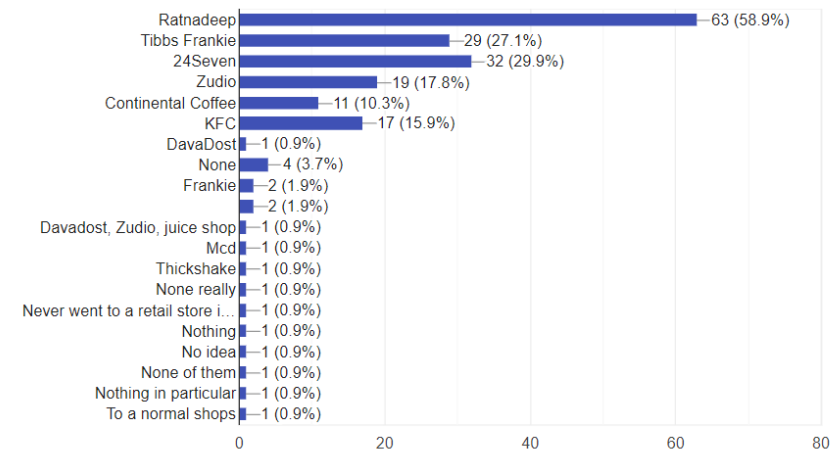
Never experienced but heard because of heavy traffic in the metro train, there could be unintentionally or intentionally touching inappropriately. So better be careful and there b could be theft too

Cutting through lines

What are your go to retail stores in the metro station?

[Copy](#)

107 responses



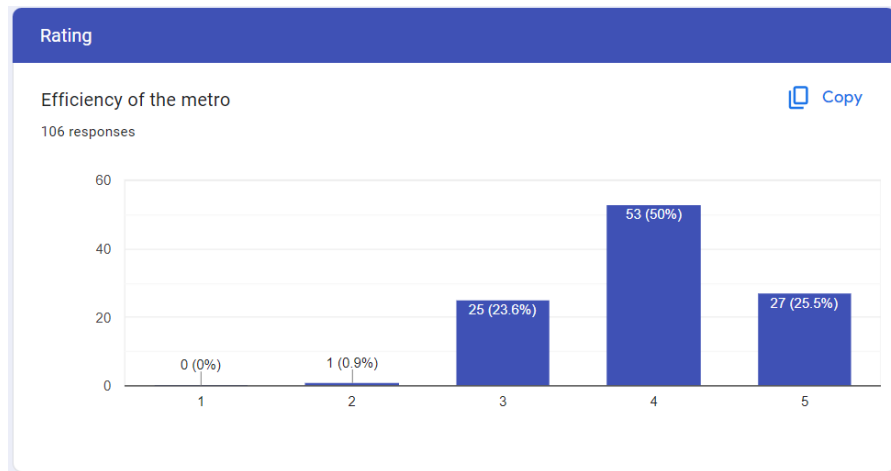
How do board and de-board the train in crowded stations? What emotions do you experience?

107 responses

I literally use curse words in my head. You can understand my emotions by this statement.

Stressing

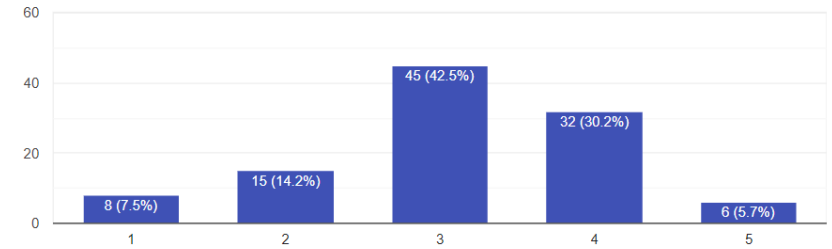
A bit scared so that my leg doesn't get caught in the gap, tired and claustrophobic



**Passenger Behaviour**

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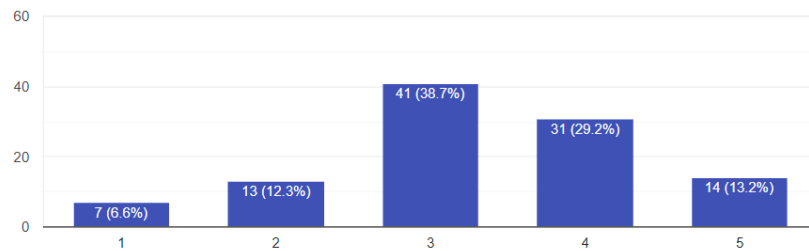
106 responses



**Comfort**

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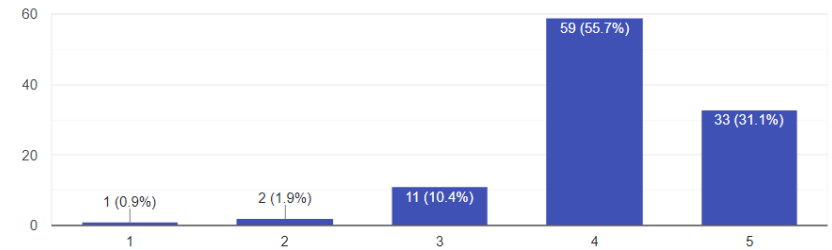
106 responses



**Cleanliness**

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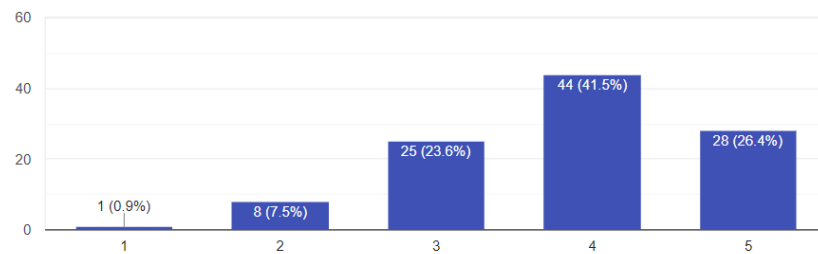
106 responses



**Ease of navigation**

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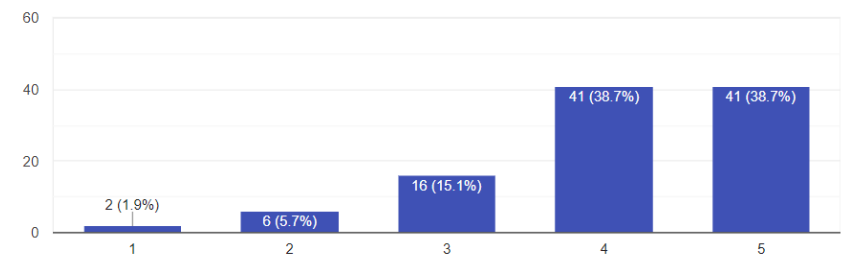
106 responses



**Announcements and train station signage**

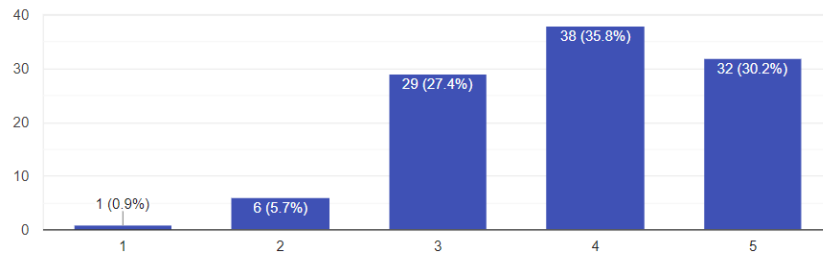
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106 responses



### Ticketing process

106 responses



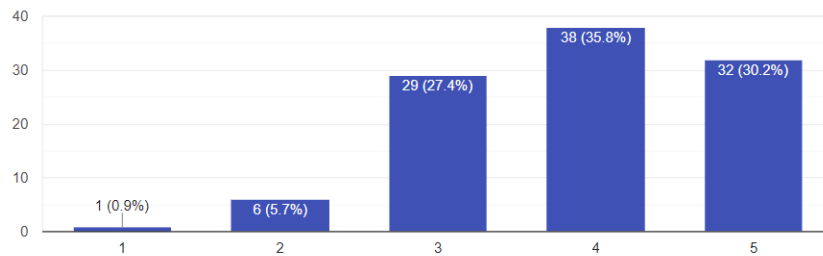
### In what situations do you need a seat?

106 responses

- When tired, while holding heavy luggage, while sick. But nobody understands
- Everyday i need seat i dont
- When the journey is long
- When I carry luggage or when I am not fine physically
- Ameerpet
- When I'm on my periods or when I'm facing any health issues

### Ticketing process

106 responses



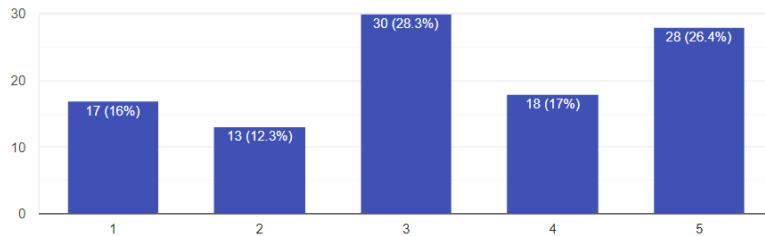
### If you had power to change something about the metro, what would it be? And why?

106 responses

- Orderliness of getting in and getting out, management of crowd during peak hours
- The seat locations
- Frequency of the metro in some of the busy lines can be increased and decrease the frequency of the other lines. Blue line is too crowded because of office going crowd

### How important is finding a seat to you?

106 responses



### How can you organize plans and coordinate with people you want to travel with on the Hyderabad metro?

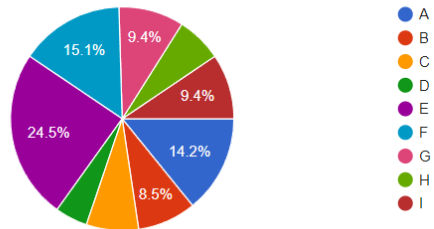
86 responses

- Maybe meet in the common station or navigate within the train
- We coordinate based on the distance of the metro station to our house.
- I think it's not that hard, just let everyone know where to get down
- Meet at metro station and hop places
- Text them

What is your preferred position to stand in the metro (when the seats are occupied)

[Copy](#)

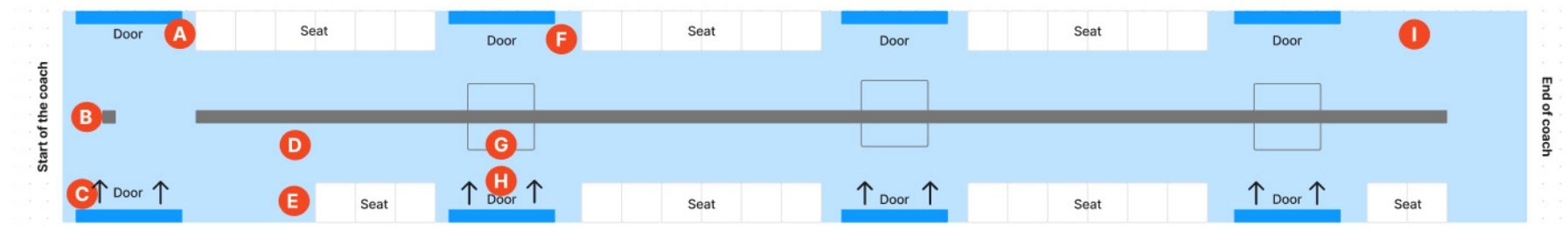
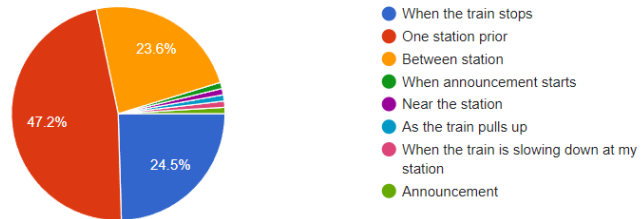
106 responses



At what time do you begin moving towards the doors to exit the train?

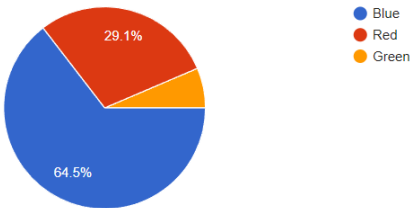
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106 responses



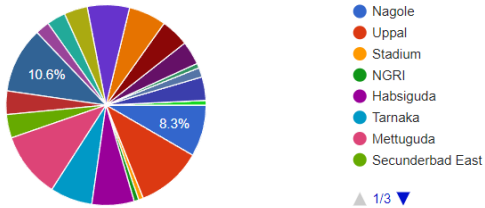
Appendix B

Deboard at which line  
203 responses



Copy

Blue Line  
132 responses

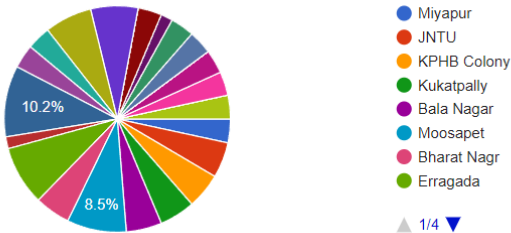


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Red Line

Red Line  
59 responses

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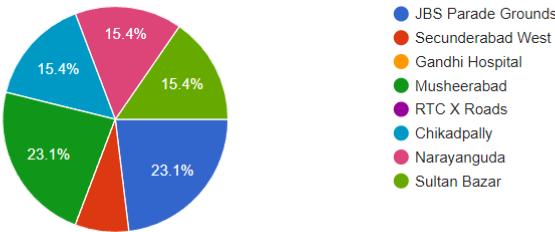
- Miyapur
- JNTU
- KPHB Colony
- Kukatpally
- Bala Nagar
- Moosapet
- Bharat Nagar
- Erragada

1/4

Green Line

Green Line  
13 responses

Copy



- JBS Parade Grounds
- Secunderabad West
- Gandhi Hospital
- Musheerabad
- RTC X Roads
- Chikadpally
- Narayanguda
- Sultan Bazar

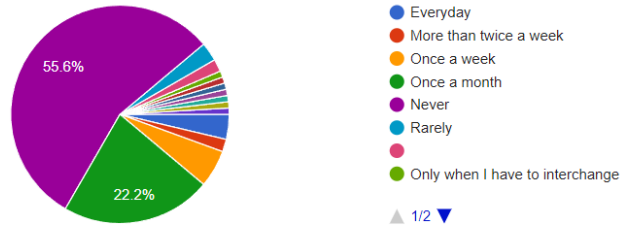
What would you want from the metro app?  
5 responses

- Small in size because I don't have storage
- I would want it to be user friendly and not have any complicated hidden features.
- I want everything that related to the metro to be on a single application
- I don't want the app.
- Easy access to recharge metro card, book tickets etc

## Passenger Behaviour Questions

How often do you stop/get down at Ameerpet to shop/eat?

108 responses

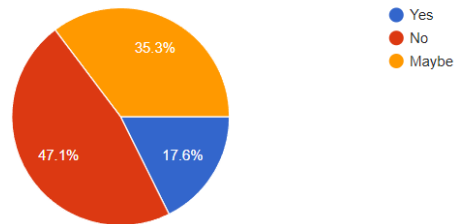


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## Waiting back section

If you are not in a rush, would you mind waiting to travel in non-peak hours?

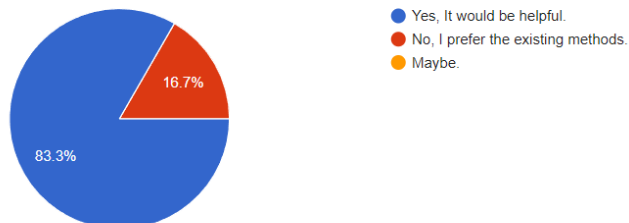
17 responses



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Would you like an official metro app to assist you with your metro travel, including features like recharging, booking tickets, and much more?

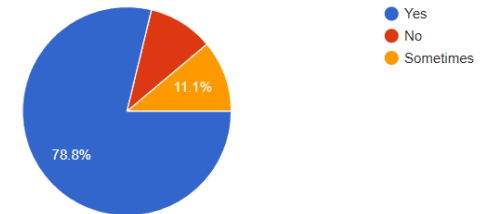
12 responses



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Are you in a rush while going home everyday?

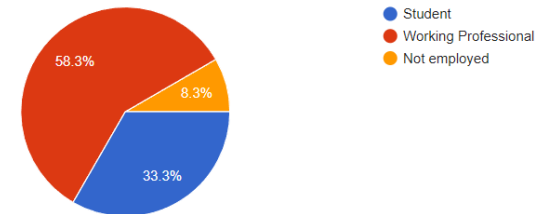
99 responses



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Profession

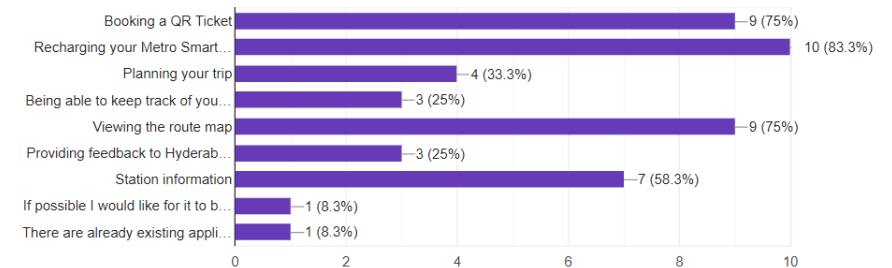
12 responses



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What according to you are the most important features of a metro app?

12 responses



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## 8.4 References

- Ashita, K.S. and Khoo, H.L. 2020. Incentivised travel and mobile application as multiple policy intervention for mode shift. *KSCE Journal of Civil Engineering* 24: 3074–3091.
- Böcker, L., Prillwitz, J., & Dijst, M. 2013. Climate change impacts on mode choices and travelled distances: A comparison of present with 2050 weather conditions for the Randstad Holland. *Journal of Transport Geography* 28: 176–185.
- Böcker, L., van Amen, P., & Helbich, M. 2017. Elderly travel frequencies and transport mode choices in Greater Rotterdam, the Netherlands. *Transportation* 44(4): 831–852.
- Burgers, C., Brugman, B., & Boeynaems, A. 2019. Systematic literature reviews: Four applications for interdisciplinary research. *Journal of Pragmatics* 145: 102–109.
- Can, V. V. 2013. Estimation of travel mode choice for domestic tourists to Nha Trang using the multinomial probit model. *Transportation Research Part A: Policy and Practice* 49: 149–159.
- Chikaraishi, M., Fujiwara, A., Zhang, J. & Axhausen, K. W. 2011. Identifying variations and co-variations in discrete choice models. *Transportation* 38(6): 993–1016.
- Clayton, W., Ben-Elia, E., Parkhurst, G., & Ricci, M. 2014. Where to park? A behavioural comparison of bus Park and Ride and city centre car park usage in Bath, UK. *Journal of Transport Geography* 36(C): 124–133.
- Cook, D.J., Mulrow, C.D., & Haynes, R.B. 1997. Systematic reviews: synthesis of best evidence for clinical decisions. *Annals of Internal Medicine* 126(5): 376–380.
- Currie, G., & Delbosc, A. 2011. Exploring the trip chaining behaviour of public transport users in Melbourne. *Transport Policy* 18(1): 204–210.
- de Abreu e Silva, J., Morency, C. & Goulias, K. G. 2012.
- Abdel-Latif Aboul-Atta, T., & Elmaraghy, S. B. (2022). Factors affecting performance improvement of the metro system in cities. *\*Journal of Engineering and Applied Science*, 69\*, 27. <https://doi.org/10.1186/s44147-022-00078-4>
- Bian, J., Li, W., Zhong, S., Lee, C., Foster, M., & Ye, X. (2021). The end-user benefits of smartphone transit apps: A systematic literature review. *\*Transport Reviews\**. <https://doi.org/10.1080/01441647.2021.1950864>
- Casquero Soler, D., Monzón, A., García, M., & Ismail, M. A. (2022). Key elements of mobility apps for improving urban travel patterns: A literature review. *\*Future Transportation\**. <https://doi.org/10.3390/futuretransp2010001>
- Husnina, S. N., Mokhtar, S., Muhammad Hussein, M. Z. S., Hamid, Z. J. M., Sinniah, G. K., & Abdul Ghani, N. (2021). Mobile public transportation application: Factors influencing urban rail transit passengers' use. *\*Journal of Engineering and Applied Science*, 69\*, 27. <https://doi.org/10.1186/s44147-022-00078-4>
- Jain, S., & Jain, S. S. (2022). Development of intelligent transportation system and its applications for an urban corridor during COVID-19. *\*Future Transportation\**.
- Jee Qian Suaa, A., Chuua, H. N., Khoob, H. L., Lowa, Y. C., Lee, A. S. H., & Ismail, M. A. (2022). User mode choice behavior in public transportation: A systematic literature review. *\*Transport Reviews\**.
- Levy, C. (2013). Travel choice reframed: “Deep distribution” and gender in urban transport. *\*Environment and Urbanization*, 25\*(1), 47–63.

– Liddle, B., & Lung, S. (2010). Age-structure, urbanization, and climate change in developed countries: Revisiting STIRPAT for disaggregated population and consumption-related environmental impacts. \*Population and Environment, 31\*(5), 317–343.

– McCormick, K., Anderberg, S., Coenen, L., & Neij, L. (2013). Advancing sustainable urban transformation. \*Journal of Cleaner Production, 50\*, 1–11.

– Owusu-Agyemang, S., Simons, R. A., Henning, M., & Marshall, M. (2016). Transit made easy: Examining the adoption and impact of mobile fare payment technology among bus riders. \*Transportation Research Part A: Policy and Practice, 91\*, 192–204.

– Petrescu, R. V., Aversa, R., Kozaitis, S., Apicella, A., & Petrescu, F. I. (2017). The quality of transport and environmental protection, part I. \*American Journal of Engineering and Applied Sciences, 10\*(3), 738–755.

– Saaty, T. L., & Vargas, L. G. (2013). \*The logic of priorities: Applications of business, energy, health and transportation\*. Springer Science & Business Media.

– Saidi Siuhi, S., & Mwakalonge, J. (2016). Opportunities and challenges of smart mobile applications in transportation. \*Transportation Research Part C: Emerging Technologies, 71\*, 264–282.

– Wirasinghe, S. C., Kattan, L., Rahman, M. M., Hubbell, J., Thilakaratne, R., & Anowar, S. (2013). Bus rapid transit – A review. \*International Journal of Urban Sciences, 17\*(1), 1–31.

– Material Design. (n.d.-a). App bars: top. Retrieved from <https://m2.material.io/components/app-bars-top#theming>

– Material Design. (n.d.-b). Buttons. Retrieved from <https://m2.material.io/components/buttons>

– Hyderabad OpenStreetMap. (n.d.). Wikimedia Commons. Retrieved from [https://en.m.wikipedia.org/wiki/File:Hyderabad\\_OpenStreetMap.svg](https://en.m.wikipedia.org/wiki/File:Hyderabad_OpenStreetMap.svg)

– Hyderabad Metro Rail’s T-Savaari: A one-stop app for commuters. (n.d.). CIO. Retrieved from <https://www.cio.com/article/218484/hyderabad-metro-rail-s-tsavaari-a-one-stop-app-for-commuters.html>

R.R. Sanseverino, Smart cities atlas, in Smart rules for smart cities, managing efficient cities in euro-Mediterranean countries. ed. by E.R. Sanseverino, R.R. Sanseverino, V. Vaccaro, G. Zizzo (Springer, Switzerland, 2014)

J.R. Wootton, A. Garcia-Ortiz, Intelligent transportation systems: a global perspective. Math Comput Model 22(4–7), 259–268 (1995)

Deakin, Mainstreaming intelligent transportation systems, in Assessing the benefits and costs of ITS—Making the business case for ITS investments, Transportation research, economics and policy, vol. 10, ed. by D. Gillen, D. Levinson (Springer, Heidelberg, 2004), pp. 333–347

A.A. Shah, L.J. Dal, Intelligent transportation systems in transitional and developing countries. IEEE A&E Syst Mag 22(8), 27–33 (2007)

J. Gurjar, P.K. Agarwal, P.K. Jain, Performance evaluation of public transport system from user point of view. Perform. Eval. 15(7), 115–123 (2016)

G.E.N.D.R.E.A.U. Ioannou, M.N. Kritikos, G.P. Prastacos, Maproute: a GIS-based decision support system for intra-city vehicle routing with time windows. J. Oper. Res. Soc. 53(8), 842–854 (2002)





