

### Introduction

As urban centers expand, and environmental sustainability becomes crucial, public transportation emerges as a key element of urban infrastructure. Offering a sustainable alternative to private vehicles helps reduce traffic congestion and pollution. However, the potential for local exploration through public transit is often underutilized, with existing navigation tools like Google Maps needing more specific features.

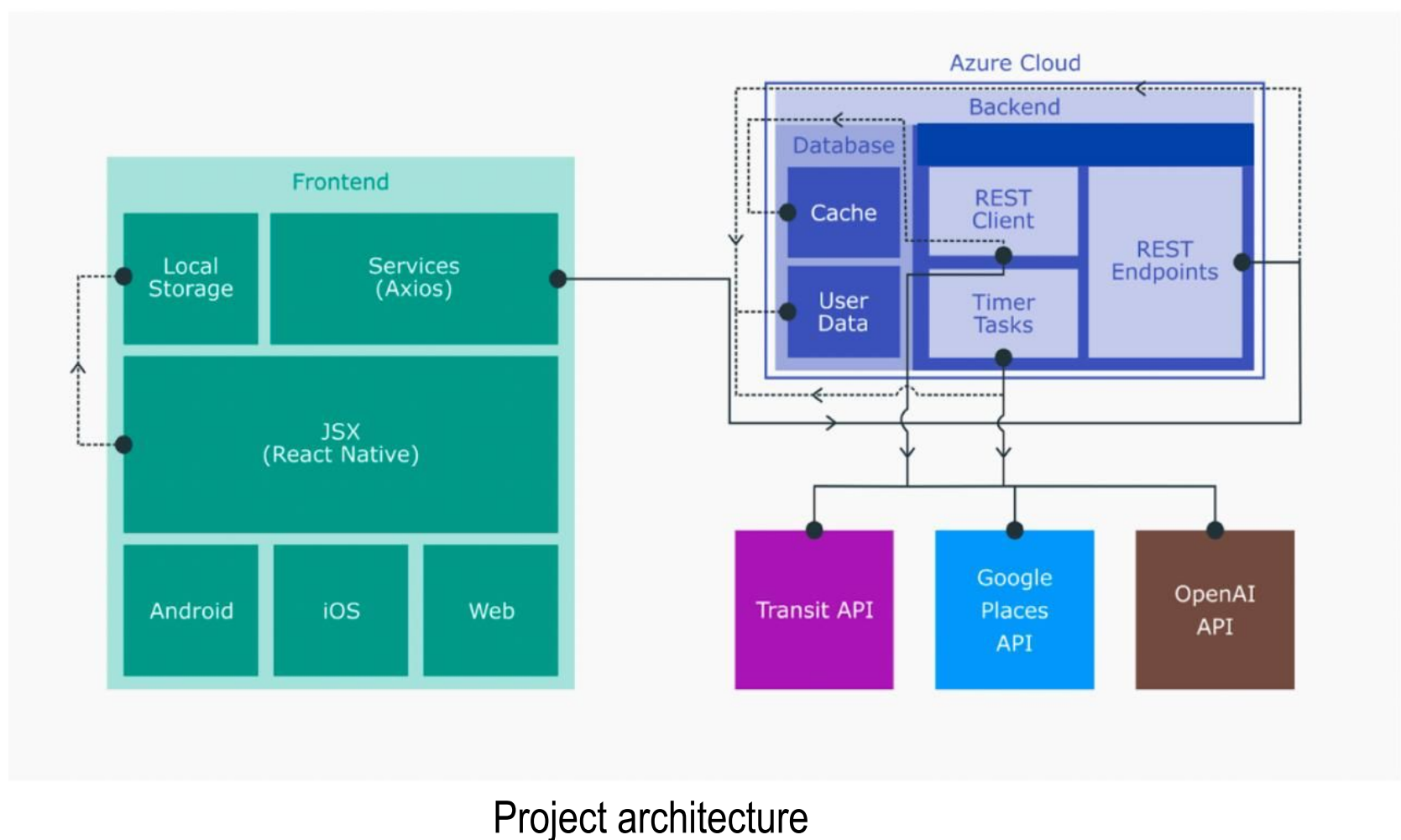


We present "Odyssey," a mobile application that enhances the usability of public transit for local exploration by integrating Google Maps and Transit APIs. Odyssey features an intelligent assistant powered by the OpenAI API, which provides personalized, contextually relevant information from Google Places and Transit APIs. Key features include intuitive destination displays, customized filtering, and more, all designed to improve user experience and promote sustainable urban mobility. Odyssey aims to foster a more connected and exploratory urban environment, demonstrating the significant role of technology in enhancing public transportation.

### Methodology

#### Project Architecture

The system design of Odyssey focuses on a detailed architecture that integrates various technologies and methodologies to enhance the public transit experience through technology. The design includes a multi-layered structure featuring front-end components developed with React Native and backend systems using Python Flask. The system is designed to handle data flow efficiently between these components, ensuring a smooth user experience and robust performance.



### Methodology

#### APIs

Odyssey leverages several critical APIs to provide its functionality:



**Google Maps API:** Used for mapping, geolocation services, route planning, and location exploration.



**Transit APIs:** Employed to fetch real-time data on public transportation, including bus schedules and route details.



**Google Places API:** Supplies information about points of interest along bus routes, which is essential for the exploration features of the app.



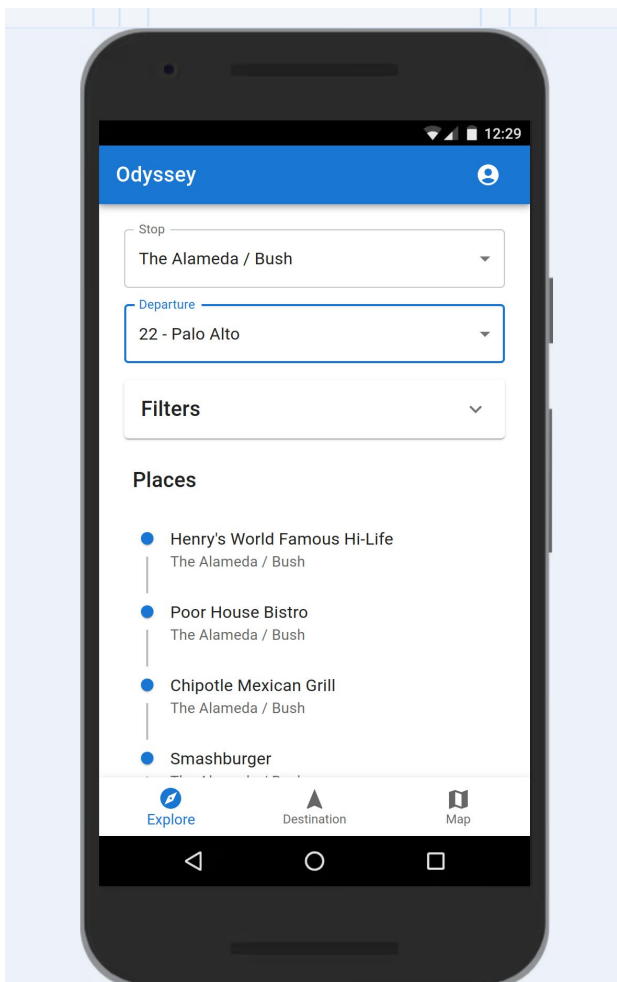
**OpenAI API:** Integrated for the AI virtual assistant that processes user queries and provides information and suggestions based on dynamic data retrieval from the other APIs.

These APIs are essential for providing accurate and timely information to users, enhancing their navigation and exploration experience within the urban environment.

### Features

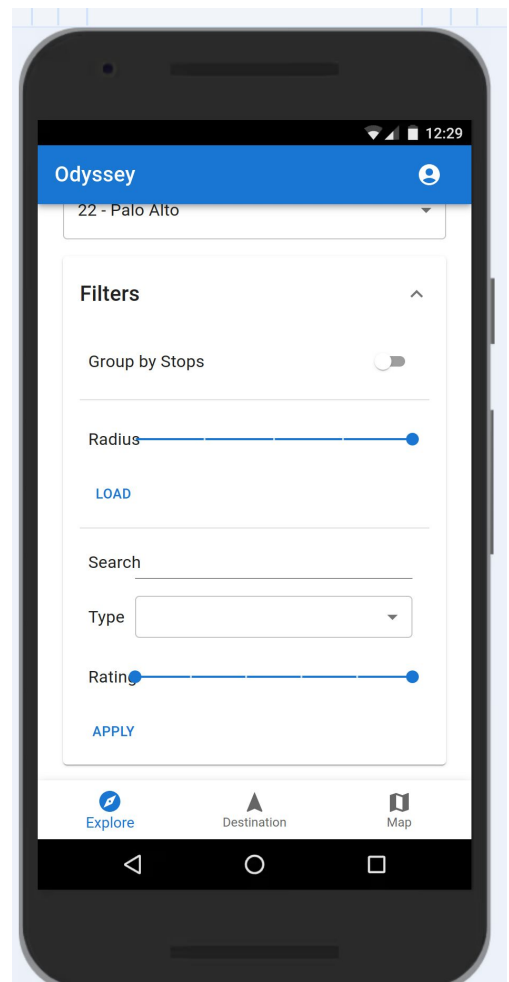
#### 1.Explore Nearby Routes and Local Highlights:

This feature allows the user to look for bus stops close to their location and know about the buses that go through these stops. After choosing a bus stop in the vicinity the user can immediately see the list of buses that stop at the bus stop. The user can choose from these multiple bus options and see what places of attractions fall along their route.



#### 2. Intelligent Filtering:

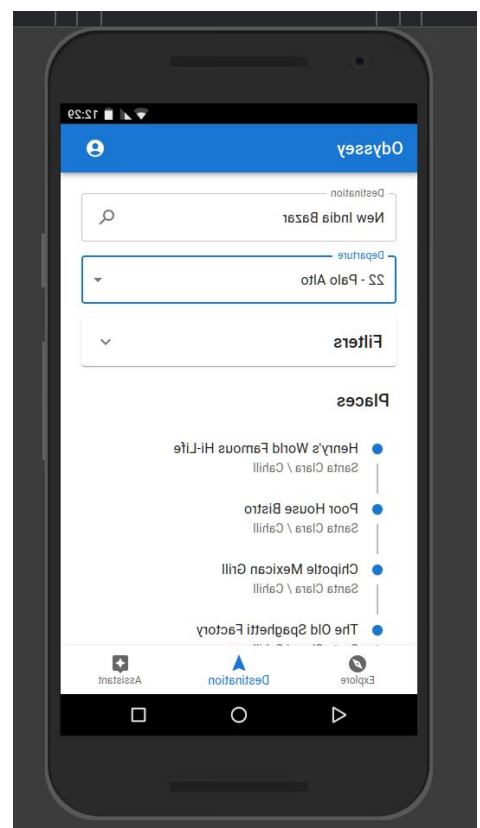
This feature lets users filter places of interest by type—like landmarks, restaurants, and stores—and distance, enhancing the app's utility for a personalized experience. A radius feature excludes locations beyond a set distance from a stop, ensuring users only see nearby options.



### Features

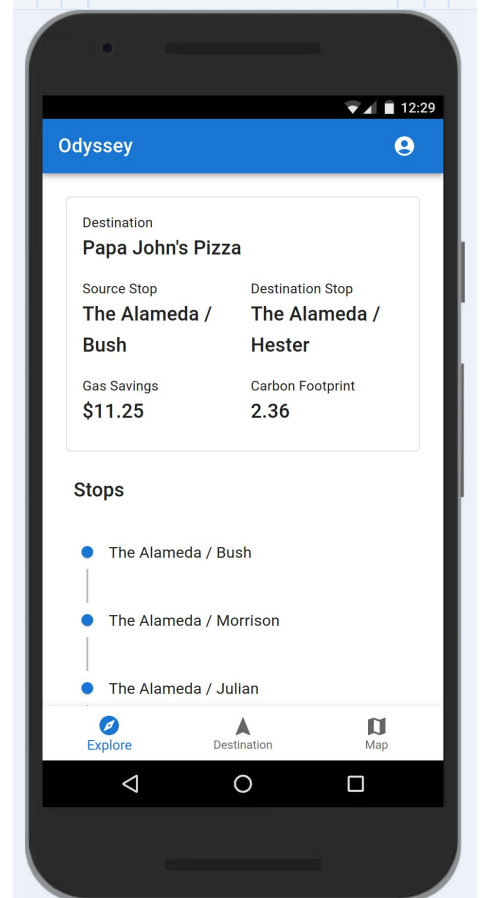
#### 3. Search destination and explore routes:

With this feature, users can search for a destination and view all buses from their location to that destination. After selecting a bus, they can see local places along the route. This enables users to optimize their trips like a student stopping at a grocery store on their way home from school to save time.



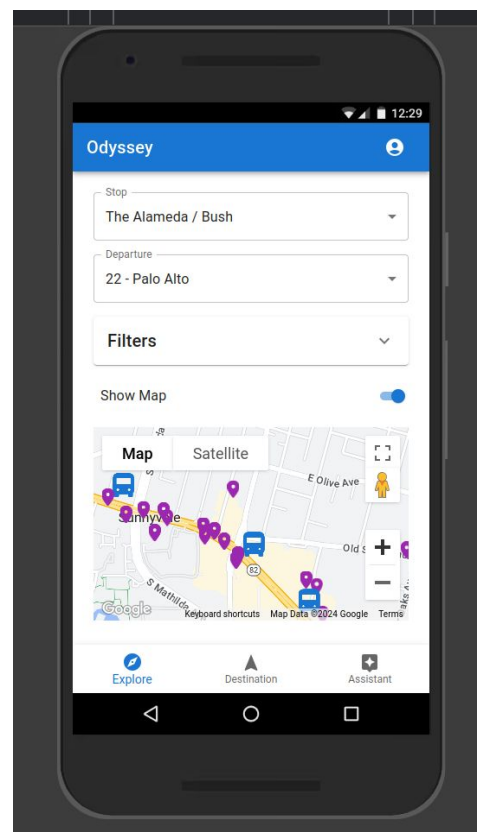
#### 4. Eco-Savings Calculator:

Odyssey calculates and displays the potential savings on gas and the reduction in carbon footprint achieved by choosing public transportation over private vehicles. This feature promotes environmental awareness and encourages sustainable travel choices.



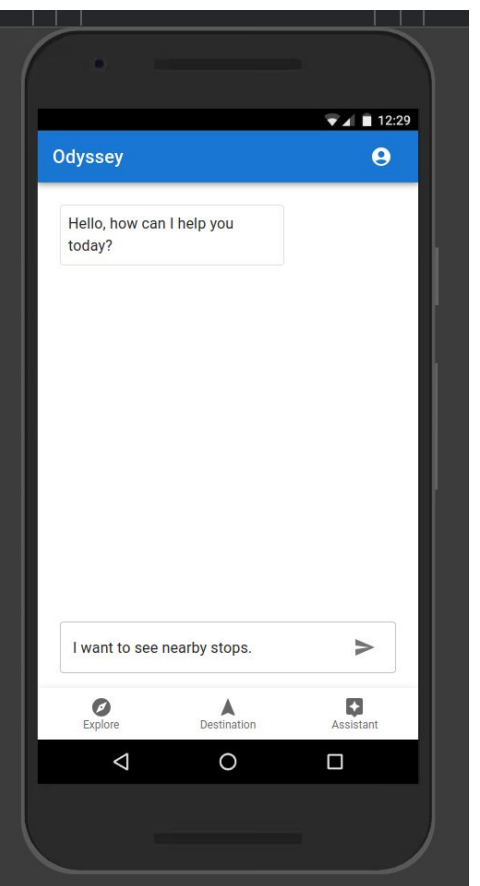
#### 5. Map View:

Users may prefer viewing places plotted on a map rather than a list, providing a clearer sense of distance from bus stops and aiding decision-making. Location plotting shows walkability and offers a more intuitive understanding of proximity.



#### 6. AI Assistant:

The AI assistant allows a user to explore all the features discussed until now through textual prompts. This feature uses the openAI API to interpret the user input and serve particular requests from the user. The assistant is intelligent enough to understand complex commands and makes it easier for users who might find it challenging to navigate through the rest of the app.



### Implications

Odyssey shows the potential to change urban mobility by making public transit more accessible and appealing. Integrating seamlessly with Google Maps, Transit APIs, and OpenAI APIs, it simplifies navigation, enhances the discovery of new destinations, and personalizes travel experiences, encouraging more users to choose public over personal vehicles. As adoption grows, significant reductions in carbon emissions and urban congestion follow, contributing to cleaner, more livable cities.

### Future Scope

Building on Odyssey's foundation, here are key enhancements to improve its impact on urban mobility:

**Multi-Modal Journey Planner:** Expand itinerary planning to include bikeshares, e-scooters, and subways, offering a full spectrum of eco-friendly travel options.

**Extended API Integrations:** Integrate additional APIs for local events, weather, and environmental conditions, making Odyssey a comprehensive urban mobility hub.

### Summary/Conclusions

In conclusion, the application has been able to achieving its goal of allowing the use of public transport as a mode of neighborhood exploration. The app can integrate well the Google Maps, Transit , and OpenAI APIs. It can overcome the rate-limiting of these APIs with the use of caching and methods like throttling. The app also shows good throughput, latency, and other critical performance measures which makes it suitable to be used in real -time environments.

### Key References

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### Acknowledgements

We express our deepest gratitude to Professor Mahima Agumbe Suresh for her invaluable guidance and expertise throughout the development of the Odyssey app. Her expertise and insightful feedback have been crucial in refining our application and directing its progress. We also thank the Department of Engineering for providing the necessary resources and facilities.