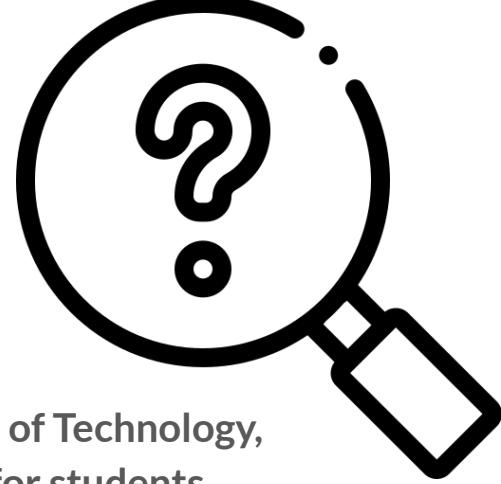
CAPSTONE PROJECT

Outdoor and Indoor Campus Navigation

Aditi Das 2020csb1064
Vaibhav 2020csb1215

Guided by Prof. Shashi Shekhar Jha

PROBLEM STATEMENT



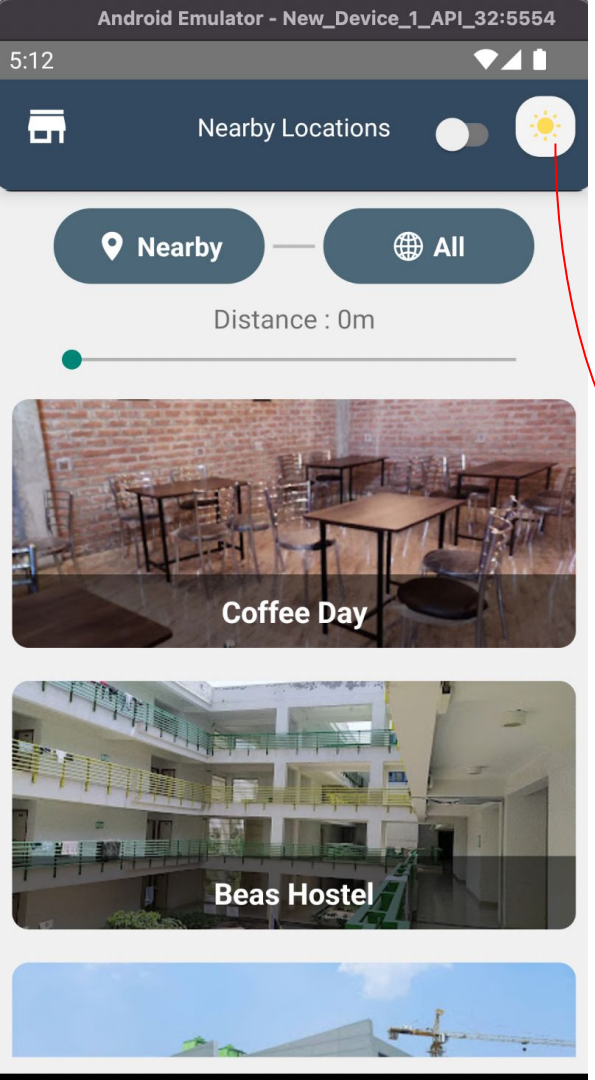
Navigating a sprawling educational institution like the Indian Institute of Technology, Ropar spread over around 500 acres of land can be a challenging task for students, faculty, and visitors alike. The campus is a diverse environment, encompassing both indoor and outdoor areas, such as numerous academic buildings, research facilities, administrative offices, student hostels, recreational zones, and the recently added Super Academics Block, which remains largely unexplored by many. This complex layout can lead to several navigation-related issues, which can be effectively addressed by the development of a dedicated Campus Navigation App for both outdoor and indoor navigation.

App Name: Uni-Fi

The name references '*Uni*' (university) and '*Wi-Fi*' suggesting the app's connectivity and ability to guide the user anywhere on campus.

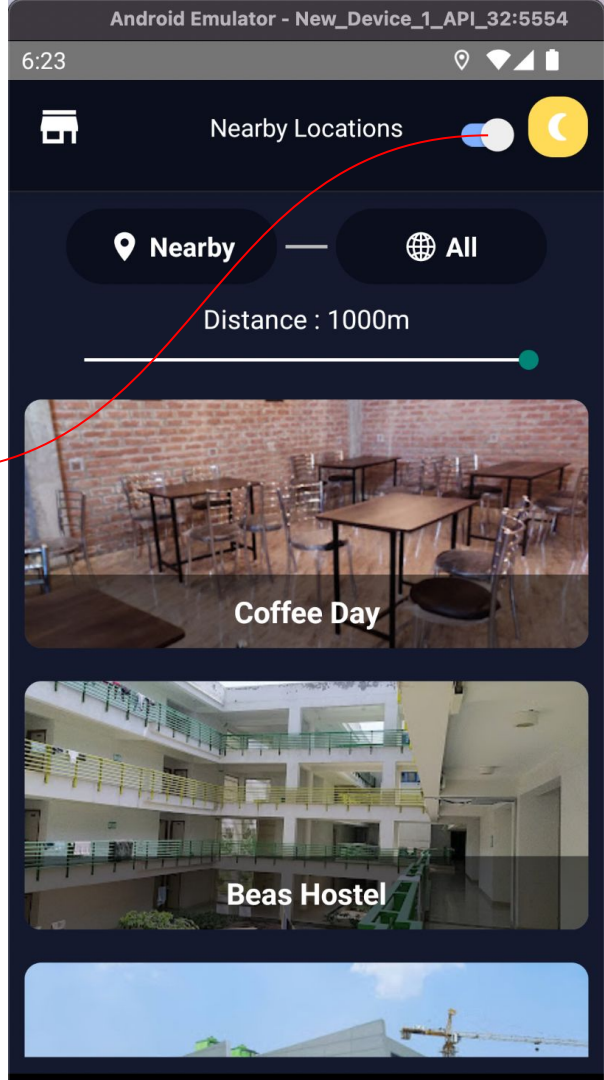
Outdoor Navigation using Mapbox API

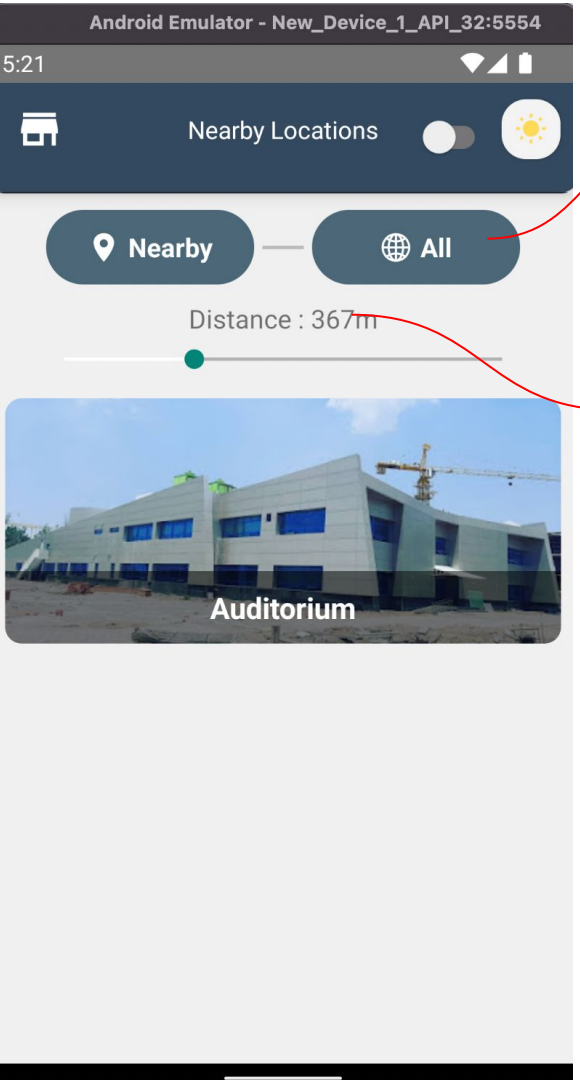
Emulator Screenshots
Home Page



Home Page has the option to switch between light and dark modes using the toggle button.

After the app is first opened, the user is asked to give current location access by turning on the GPS.

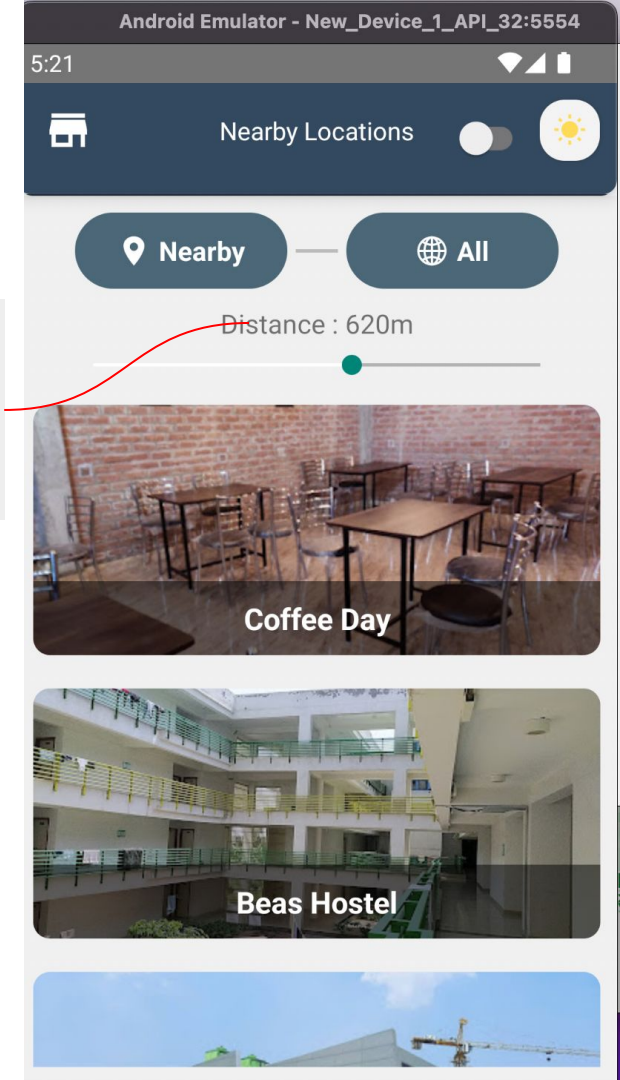




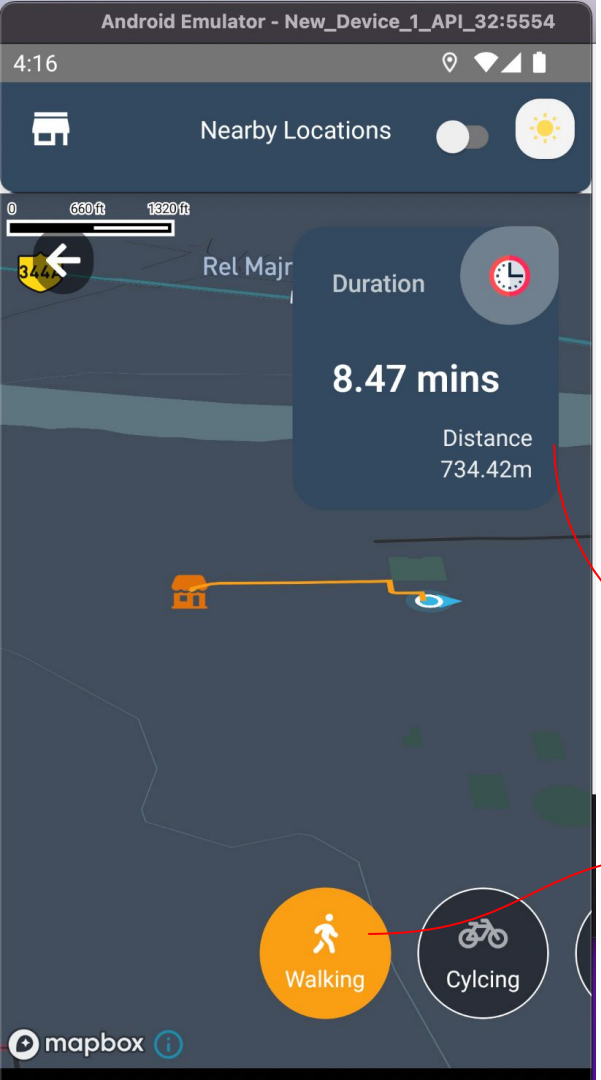
The **All** button displays all the locations in the database.

The Distance slider helps the user check the nearby locations within the distance they specify.

The distance between two coordinates is calculated using the **Haversine** formula to find the nearest locations from the user's current location.



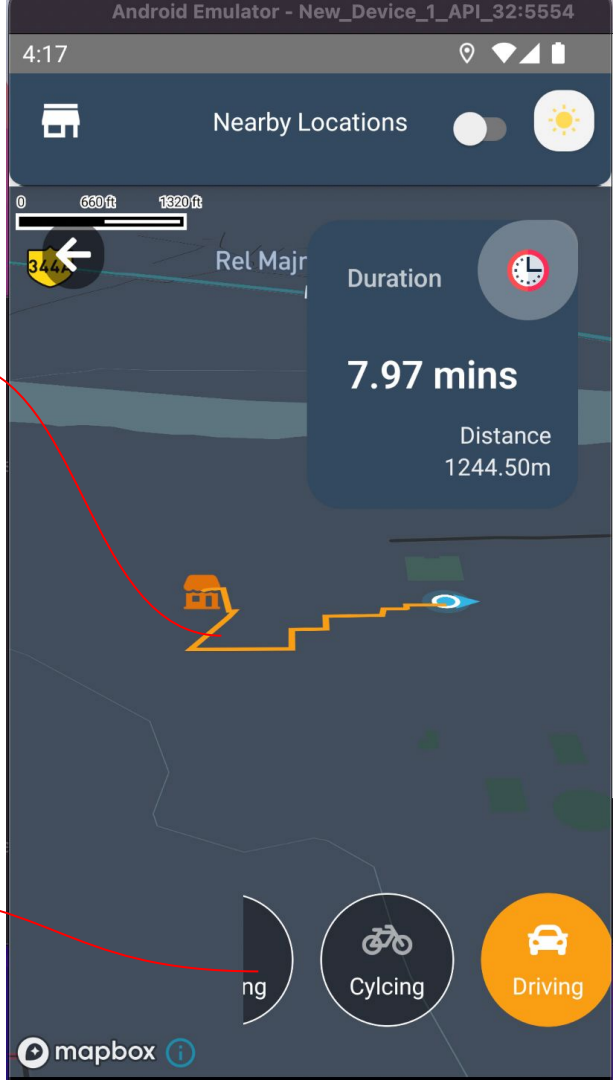
Emulator Screenshots
Outdoor Navigation Page



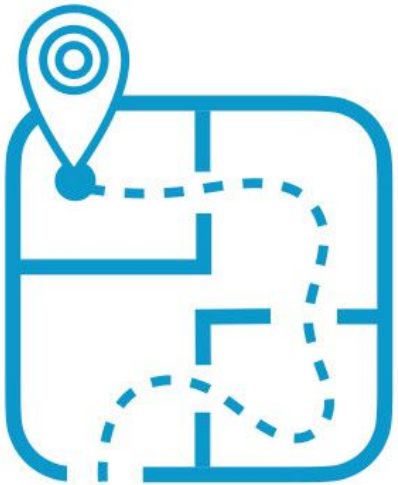
When the user selects a location, the API creates a route from the user's current location to the selected campus location.

The distance and duration is displayed in the floating card.

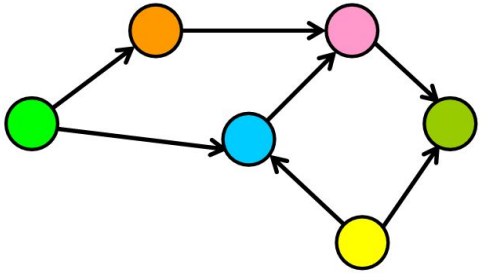
There are three route profiles for the user to choose from - walking, cycling and driving.



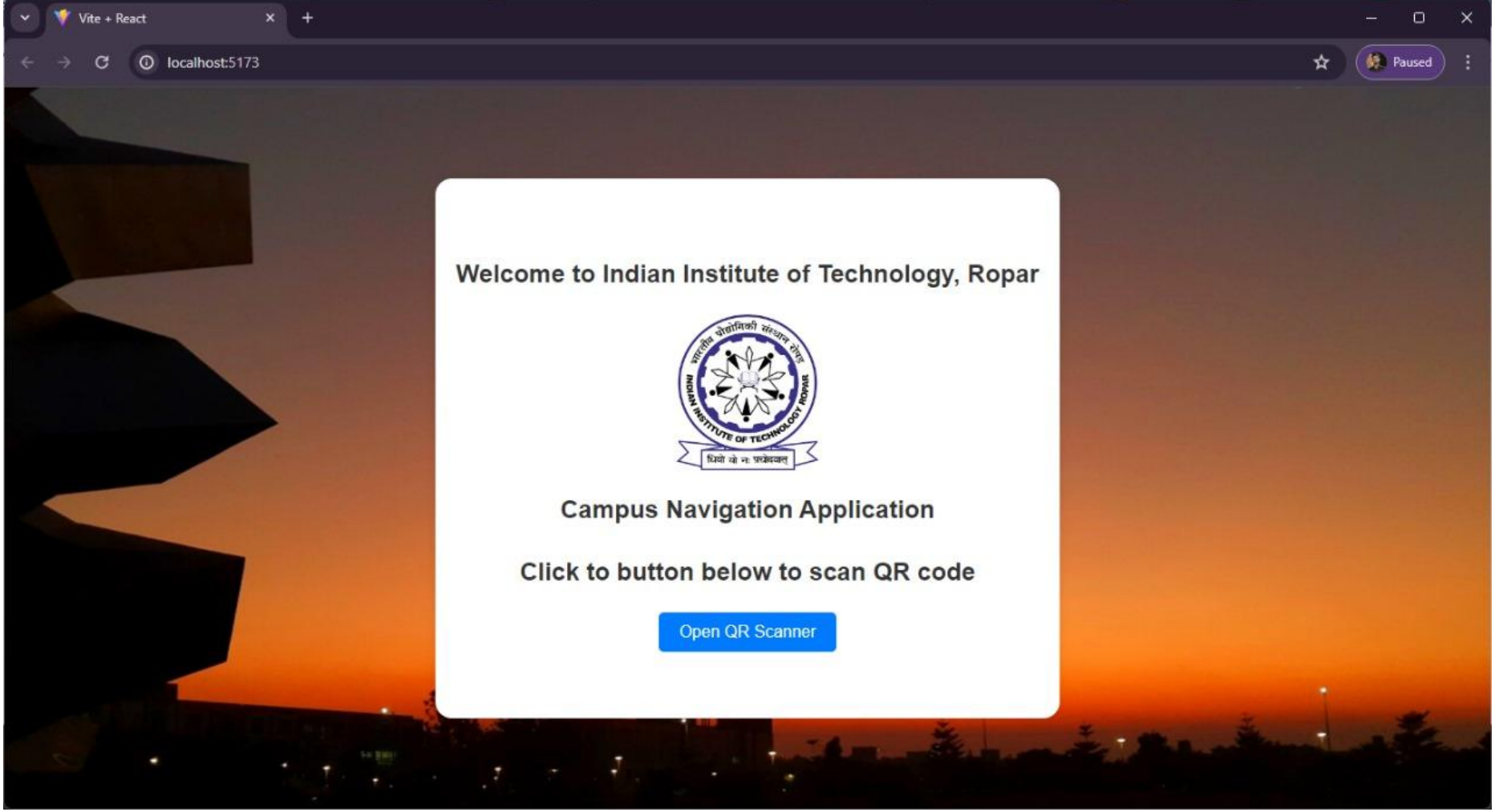
QR-based Indoor Navigation



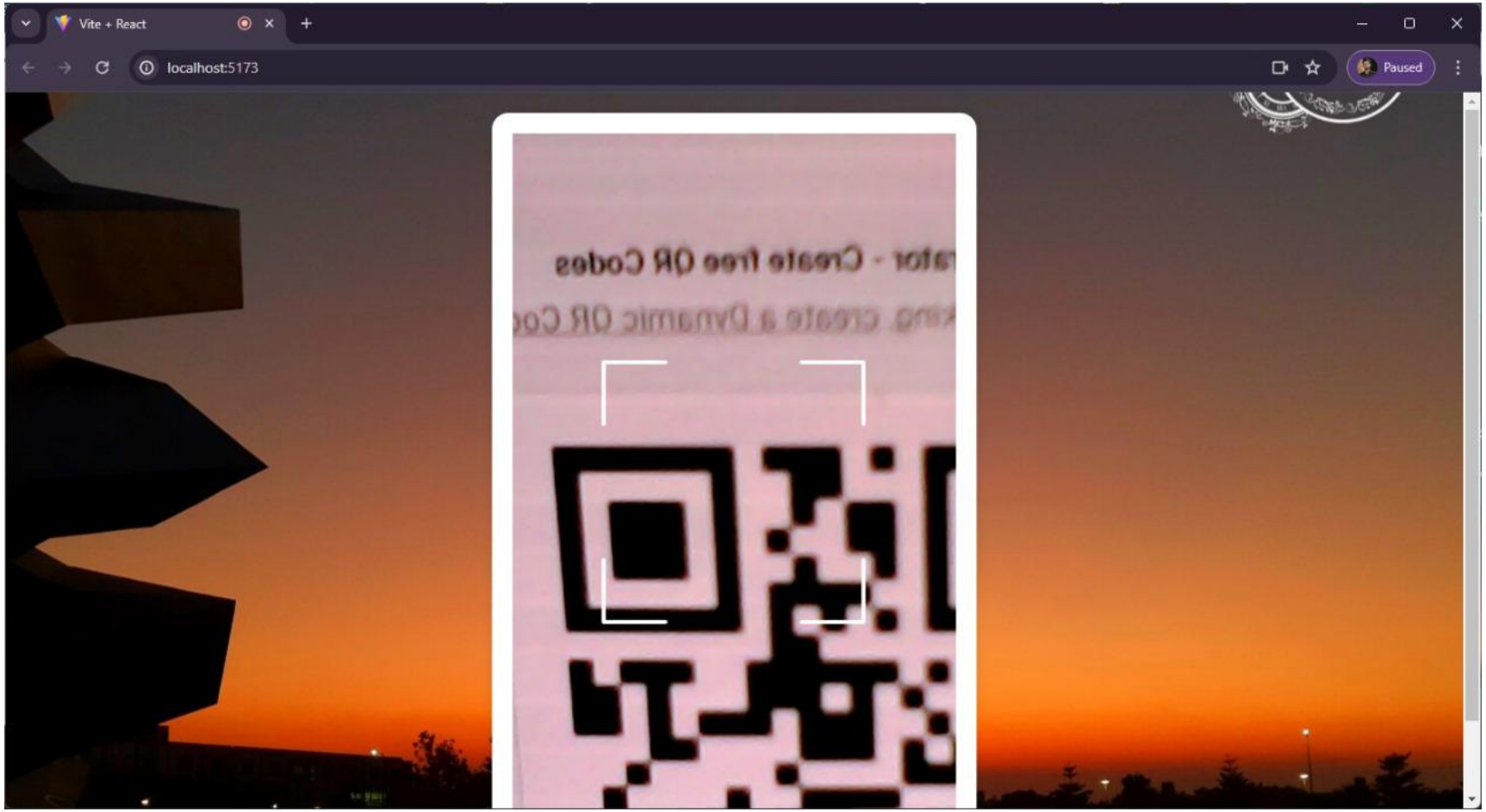
Implementation



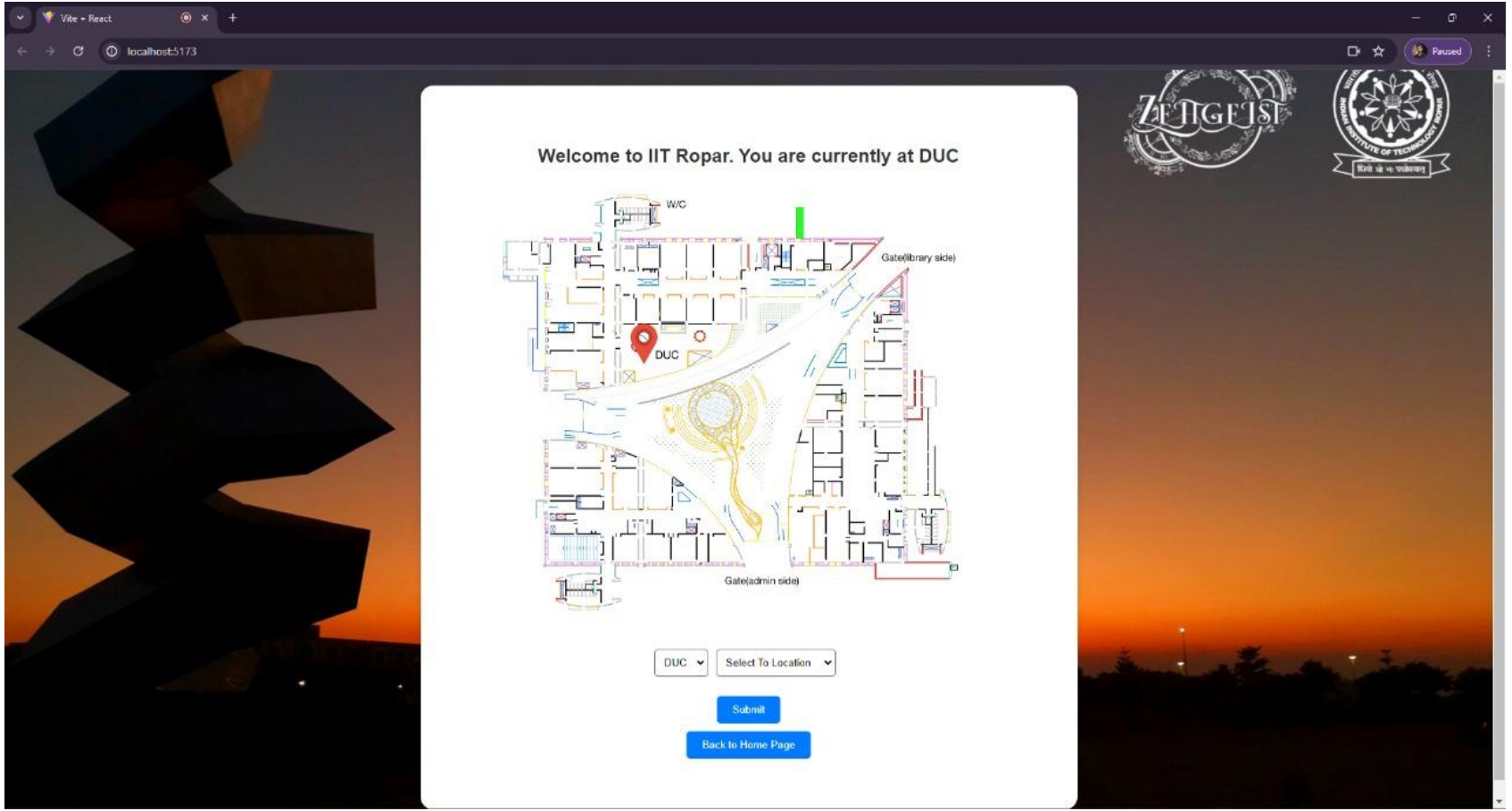
- Creation of unique QR code corresponding different locations
- Creation of AutoCAD indoor map floor plan of SAB.
- Graphical representation of indoor map with each node pointing to specific pixel coordinates on indoor map image.
- Dijkstra’s Algorithm to find shortest path between two nodes.
- Path visualisation by connecting the pixel coordinates of corresponding nodes in the shortest path output by Dijkstra’s on indoor map image.



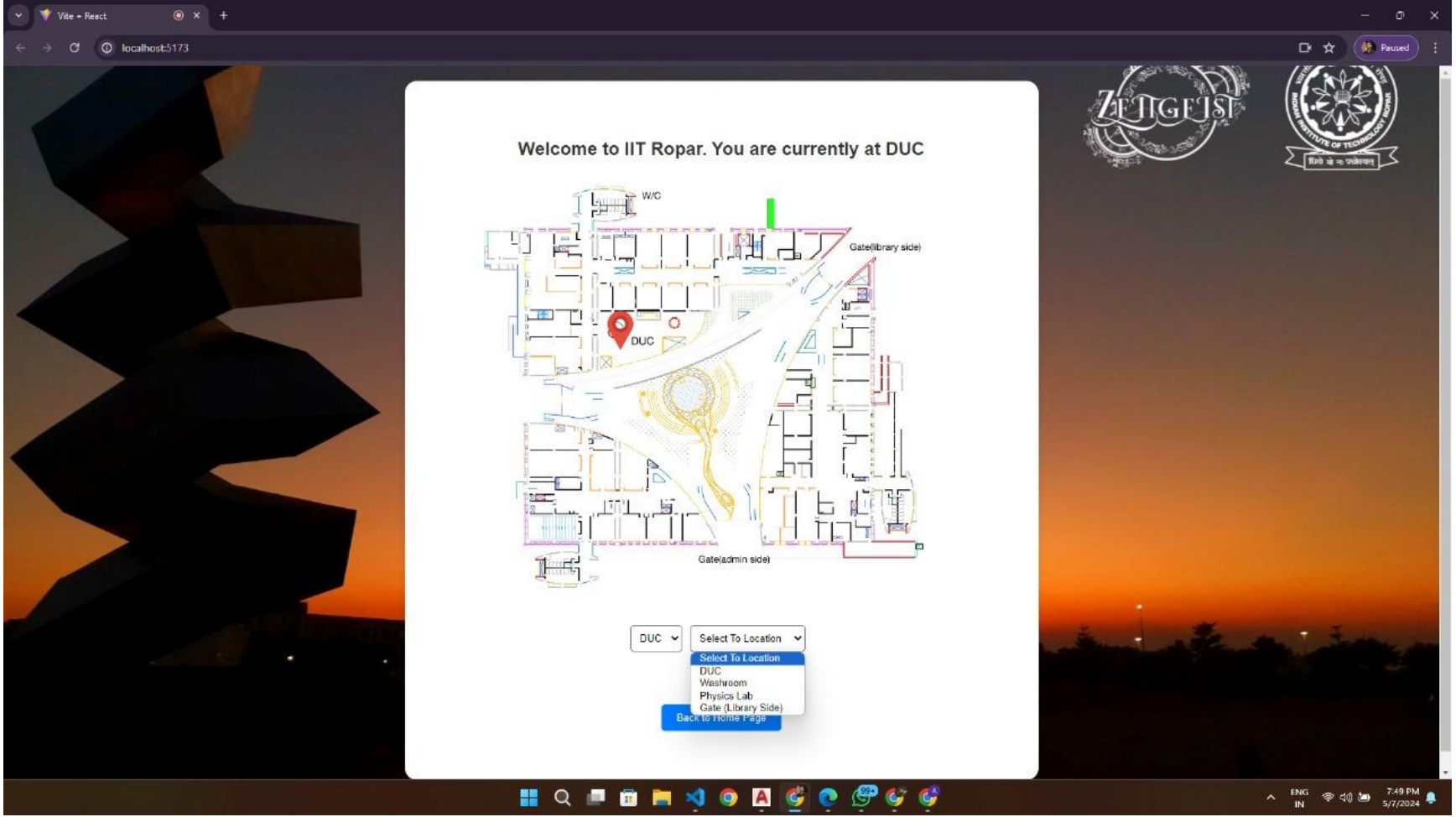
Home Screen with option to open QR Scanner



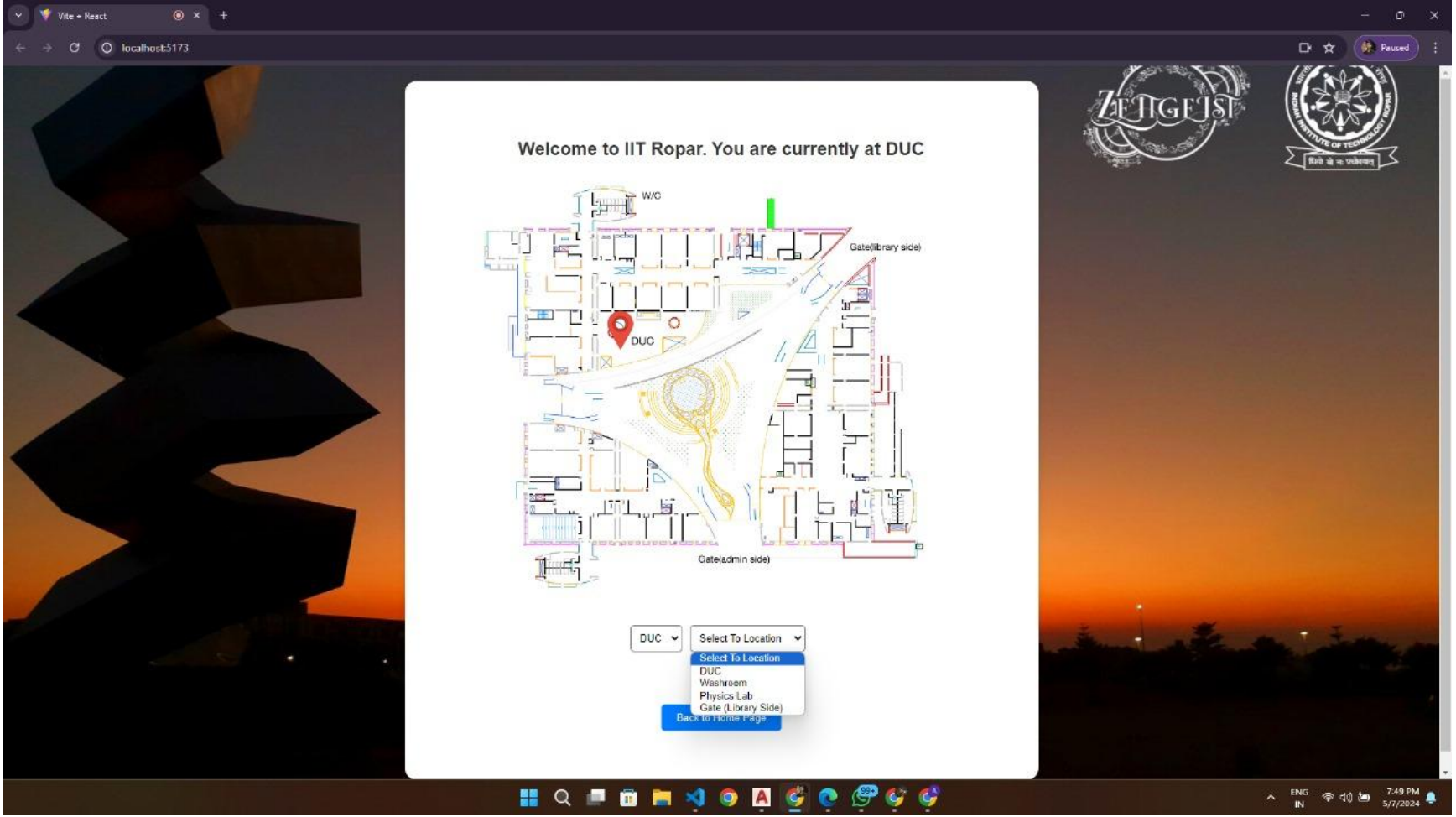
Scanning unique QR Code



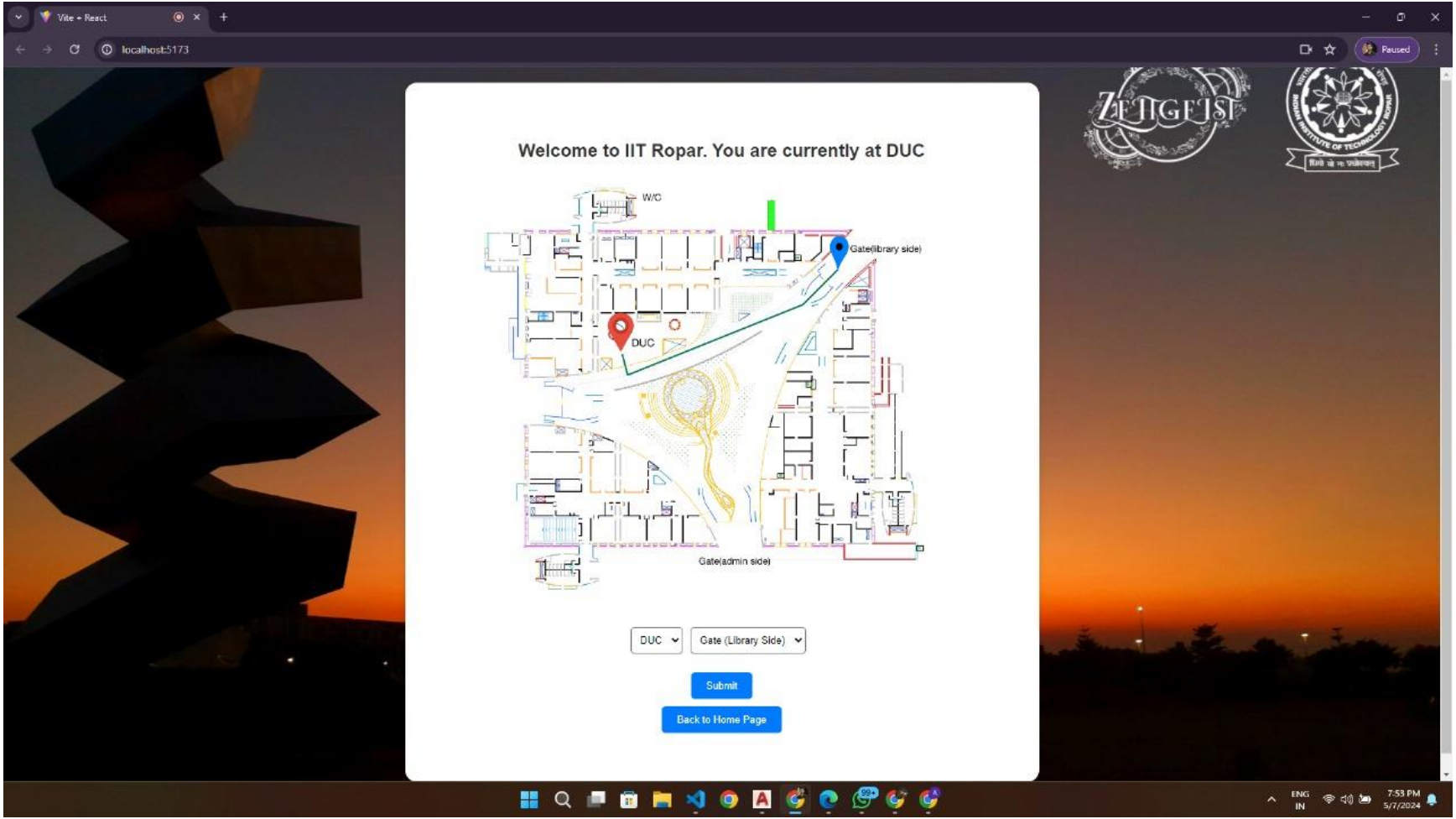
Retrieves User Location via QR Code(DUC here) and asks user to select destination



List of locations for the user to choose from



List of locations for the user to choose from



Output Image displaying path for indoor navigation (DUC to Gate - Library Side here)

Thank You