



**SC2006:**

# **Software Engineering**

**Tutorial Group: SDAA**

**Group Name: PEEWEE**

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# Mission Statement

*PEEWEE* (Predictive Environment for Easy Wayfinding with Enhanced Efficiency) is an application that informs drivers of real-time traffic congestion levels and incidents to help them better plan their driving routes before heading out of their homes, or when out on a journey.

Other mapping or navigation devices such as Waze do not provide the full information of the current traffic condition in real time, and our application seeks to remedy this issue.

This project will be considered complete when the application is being tested, reviewed, and approved by the Land Transport Authority. This project supports the government's objective of harnessing publicly available data to help people make more informed decisions, contributing to the process of Singapore becoming a Smart Nation.

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# Functional Requirements

1. Sign up page
  - 1.1. System must allow the user to create an account
    - 1.1.1. User must enter an email address and password to sign up for an account
    - 1.1.2. System must verify that the email address exists and is not registered under other users
    - 1.1.3. System must implement restrictions on the password complexity
      - 1.1.3.1. Passwords must have at least 8 characters, with at least 1 uppercase, 1 lowercase and 1 special character
2. Login page
  - 2.1. System must allow the user to log in to an existing account
    - 2.1.1. User must enter a valid email address and password
    - 2.1.2. System must verify that the email address and password entered are valid
  - 2.2. System must allow the user to reset the password if the user forgets the password.
    - 2.2.1. System must send an 8 digit OTP to the user via the registered email address to reset their password
    - 2.2.2. User must enter a valid OTP to reset password
    - 2.2.3. User must enter a new password that complies with the restrictions on the password complexity outlined in 1.1.3
3. Traffic Image page
  - 3.1. System must allow the user to view all real-time traffic images retrievable from the Traffic Image API
  - 3.2. System must allow the user to search and view real-time traffic images from specific traffic camera locations
    - 3.2.1. User must enter a valid location to search for a traffic image
  - 3.3. System must allow the user to view hourly and daily trends of the number of vehicles across all traffic camera locations and at specific traffic camera locations
4. Traffic Incident page
  - 4.1. System must allow the user to report incidents that occur on driving roads

- 4.1.1. User must enter the incident type and incident description to report an incident
    - 4.1.1.1. Incident type is restricted to accidents, roadworks and closures
    - 4.1.2. System must request to access and use the user's current location as the incident location
  - 4.2. System must allow the user to view information of all the incidents reported in the past 24 hours
5. Traffic Map page
  - 5.1. System must allow the user to view real-time traffic congestion levels along driving roads, traffic camera locations and reported incident locations on google map
    - 5.1.1. System must assess real-time traffic congestion level by analysing real-time traffic images from the Traffic Image API
    - 5.1.2. System must allow the user to filter the map based on traffic camera types and incident types
      - 5.1.2.1. Traffic camera types include cameras at accident prone zone, city cameras and highway cameras
  - 5.2. System must allow the user to create driving routes
    - 5.2.1. User must enter a starting point and a destination to create driving routes
  - 5.3. System must allow the user to save their driving routes
  - 5.4. System must allow the user to view the number of traffic cameras and real-time congestion levels along a selected driving route on the google map

# Non-functional Requirements

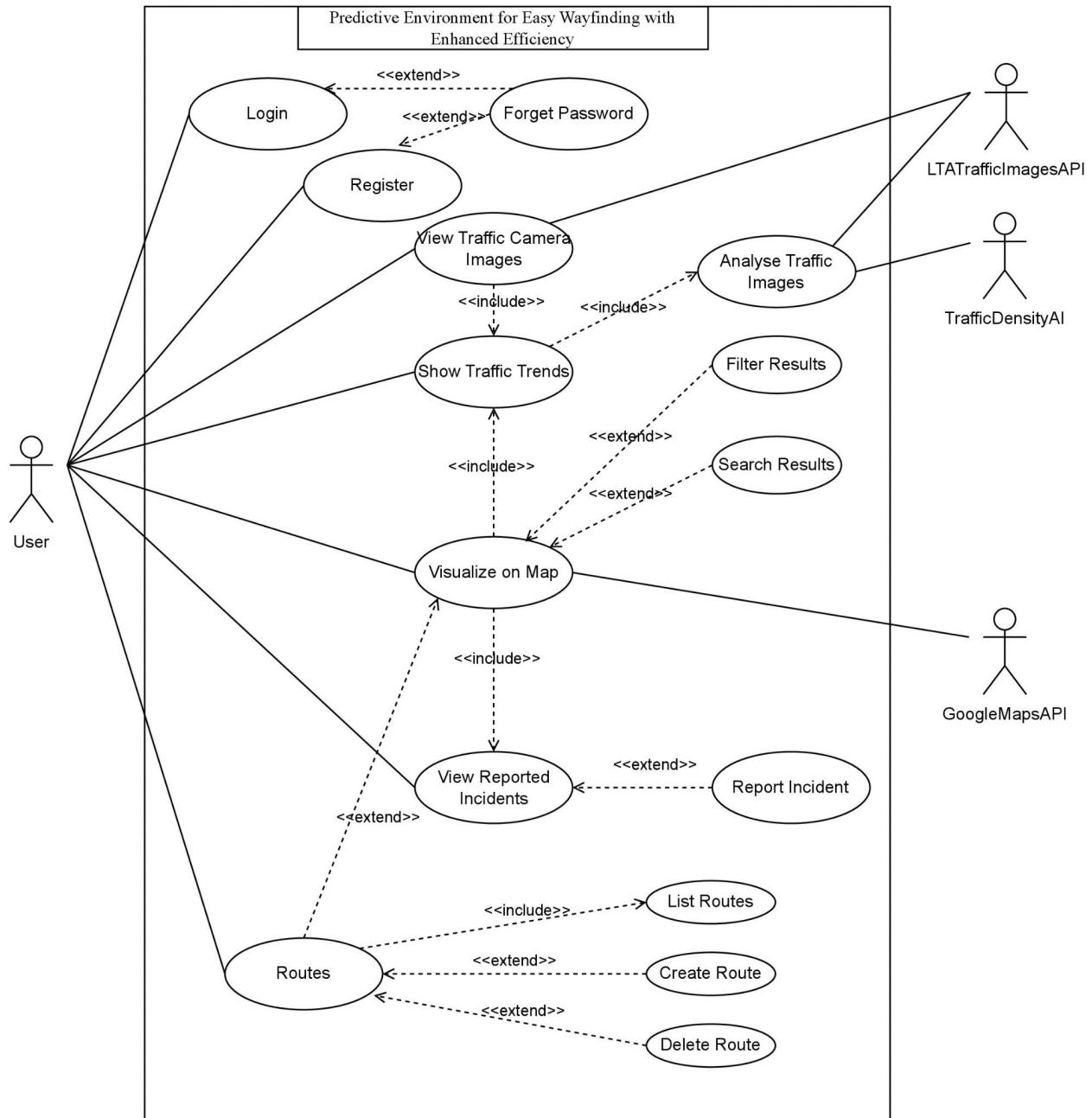
1. Performance
  - 1.1. System must load results in 10 seconds.
  - 1.2. System must detect vehicles in traffic images for congestion analysis with a decent accuracy of above 70%
2. Scalability
  - 2.1. System must support simultaneous access for at least 100 users
3. Availability
  - 3.1. System must be available to users 99% of the time in a day
  - 3.2. System must not crash when the real-time Traffic Image API or google map API are unresponsive or unavailable
4. Usability
  - 4.1. System must use clear labels and prompts for easy navigation
5. Security
  - 5.1. System must not expose user's password and data, such as saved routes, incident reports and search results
6. Compatibility
  - 6.1. System must be compatible with latest versions of web browsers such as chrome, firefox, safari, and edge

# Data Dictionary

Term	Definition
User	A driver who utilises the application to gain real-time information on traffic congestion levels, trends of traffic congestion levels and locations of roadblocks to plan out their routes.
Account	An identity created for a user. Every user account has a unique email address and password.
Traffic congestion level	The level of vehicle occupancy in an area, which can span multiple roads. The system's AI model will classify roads as high, moderate or low congestion.
Traffic camera	A camera currently operated to monitor vehicular traffic and its image data is retrievable from the Traffic Image API.
Traffic image	An image taken by a traffic camera that is retrievable from the Traffic Image API.
Driving road	A road that is mainly utilised by vehicles and which people are usually prohibited from travelling on except when crossing roads.
Accident	An incident that may result in injuries or damage that occurs on driving roads.
Roadwork	A driving road involved in construction works may be barricaded and barriers may be set up on the driving road.
Closure	A driving road closed by authorities cannot be used by the public.
Slow traffic	Traffic flow that is slower than what the user typically experiences. The speed of traffic flow is subjective to each user.
Real-time	Current time or not more than 20 seconds ago as the Traffic Image API retrieves images from traffic cameras every 20 seconds.
Driving route	A path on driving roads from a starting point to a destination.

# Use Case Model

## Diagram



# Use Case Specifications

## Notations

### **Alternative Flow Origin**

We will indicate the exact step of the Normal Flow from which the Alternative Flow originated from, using the following notation:

**AF-Sx**

Where **AF** denotes Alternative Flow, and **Sx** denotes that it came from **Step X** of the Normal Flow. For instance, **AF-S1** will denote that the Alternative Flow originated from **Step 1** of the Normal Flow.

### **Use Case ID**

We will label each use case using the following notation:

**UC-xx**

Where UC denotes Use Case and xx denotes the use case number

Use Case ID:	UC-01		
Use Case Name:	Login		
Created By:	Guang	Last Updated By:	Cheng Yao
Date Created:	05/09/2023	Date Last Updated:	25/10/2023

Actor:	User
Description:	Authenticate the User
Preconditions:	1. The User must have an account registered in the system
Postconditions:	The User will be authenticated
Priority:	High
Frequency of Use:	High
Flow of Events:	<ol style="list-style-type: none"> <li>1. User provides authentication information such as email address and password</li> <li>2. User clicks on login</li> <li>3. The system authenticates User</li> <li>4. User is brought to the dashboard</li> </ol>
Alternative Flows:	<p>AF-S1: Credentials are incorrect</p> <ol style="list-style-type: none"> <li>1. The system displays an error message indicating an incorrect credentials</li> <li>2. Flow resets to Step 1 of normal flow</li> </ol> <p>AF-S1: User clicks on forgot password</p> <ol style="list-style-type: none"> <li>1. The system redirects User to UC-03 Forgot Password, and User changes to a new password</li> <li>2. The system brings User back to current flow</li> <li>3. Flow resets to Step 1 of normal flow</li> </ol> <p>AF-S3: The system fails to authenticate User</p> <ol style="list-style-type: none"> <li>1. The system displays an error message indicating the reason of failure</li> <li>2. Flow resets to Step 1 of normal flow</li> </ol>
Exceptions:	EX1: Error connecting to server

	<ol style="list-style-type: none"><li>1. System displays an error message indicating connection is lost</li><li>2. Use case ends</li></ol>
Includes:	(Extends) UC-03 Forgot Password
Special Requirements:	-
Assumptions:	-
Notes and Issues:	-

Use Case ID:	UC-02		
Use Case Name:	Register		
Created By:	Guang	Last Updated By:	Cheng Yao
Date Created:	05/09/2023	Date Last Updated:	25/10//2023

Actor:	User
Description:	Register a User account in the system
Preconditions:	<ul style="list-style-type: none"> <li>1. The User must not have an account already registered in the system with the same credentials</li> </ul>
Postconditions:	A new User account will be created in the system
Priority:	High
Frequency of Use:	Medium
Flow of Events:	<ul style="list-style-type: none"> <li>1. User provides a valid email address</li> <li>2. User provides a password and confirms the password in the confirm password field</li> <li>3. The system validates the provided information and registers a new account for User</li> <li>4. User is redirected to the Dashboard</li> </ul>
Alternative Flows:	<p>AF-S1: User provides invalid email address</p> <ul style="list-style-type: none"> <li>1. The system displays an error alert</li> <li>2. Flow resets to Step 1 of normal flow</li> </ul> <p>AF-S2: Password and confirm password fields do not match</p> <ul style="list-style-type: none"> <li>1. The system displays an error and prompts User to re-enter password</li> <li>2. Flow resets to Step 1</li> </ul> <p>AF-S3: Entered password does not conform to password policy</p> <ul style="list-style-type: none"> <li>1. The system will prompt the User to re-enter a new password, specifying which condition policy has not been satisfied</li> <li>Flow resets to Step 2</li> </ul> <p>AF-S4: User provides an email address that is already registered</p> <ul style="list-style-type: none"> <li>1. The system will alert User</li> </ul>

	<ol style="list-style-type: none"> <li>2. The system will prompt User to register with another email address</li> <li>3. Flow resets to Step 1</li> </ol>
Exceptions:	EX1: System is offline and is unable to register a new account <ol style="list-style-type: none"> <li>1. The system displays an error message with an error code</li> <li>2. Use case ends</li> </ol>
Includes:	(Extends) UC-03 Forgot Password
Special Requirements:	For security, passwords must conform to a specific password policy: <ol style="list-style-type: none"> <li>1. Minimum length of 8 characters</li> <li>2. At least 1 uppercase character</li> <li>3. At least 1 lowercase character</li> <li>4. At least 1 special character</li> </ol>
Assumptions:	-
Notes and Issues:	-

Use Case ID:	UC-03		
Use Case Name:	Forgot Password		
Created By:	Guang	Last Updated By:	Cheng Yao
Date Created:	05/09/2023	Date Last Updated:	25/10/2023

Actor:	User
Description:	Reset the password of the User
Preconditions:	1. The User must have an account registered in the system
Postconditions:	The User account's password will be changed to a new password
Priority:	High
Frequency of Use:	Low
Flow of Events:	<ol style="list-style-type: none"> <li>1. User provides their email address</li> <li>2. The system sends an OTP to the User's email</li> <li>3. User enters the OTP into the page</li> <li>4. The system prompts the User for a new password with a password and confirm password field</li> <li>5. User clicks on change password</li> <li>6. The system successfully changes User's password and redirects to the Login use case</li> </ol>
Alternative Flows:	<p>AF-S1: User provides an invalid email address</p> <ol style="list-style-type: none"> <li>1. The system shows an error message and prompts User for a valid email address</li> <li>2. Flow returns to Step 1 of normal flow</li> </ol> <p>AF-S3: OTP is incorrect or expired</p> <ol style="list-style-type: none"> <li>1. The system will prevent the User from changing their password.</li> <li>2. User can request for a new OTP after a cooldown of 60 seconds, up to 3 times total</li> <li>3. Flow returns to Step 3 of normal flow</li> </ol> <p>AF-S4: Password and confirm password fields do not match</p> <ol style="list-style-type: none"> <li>1. The system displays an error and prompts User to re-enter</li> </ol>

	<p>password</p> <ol style="list-style-type: none"> <li>2. User enters the password correctly</li> <li>3. Flow moves to Step 5 of normal flow</li> </ol> <p>AF-S4: Entered password does not conform to password policy</p> <ol style="list-style-type: none"> <li>1. The system will prompt the User to re-enter a new password, specifying which condition policy has not been satisfied</li> <li>2. Flow returns to Step 4 of normal flow</li> </ol>
Exceptions:	<p>EX1: OTP entered incorrectly for 3 times</p> <ol style="list-style-type: none"> <li>1. The system displays an error message</li> <li>2. Use case ends</li> </ol>
Includes:	-
Special Requirements:	<p>For security, passwords must conform to a specific requirement:</p> <ol style="list-style-type: none"> <li>1. Minimum length of 8 characters</li> <li>2. At least 1 uppercase character</li> <li>3. At least 1 lowercase character</li> <li>4. At least 1 special character</li> </ol> <p>OTPs will expire after 5 minutes</p>
Assumptions:	-
Notes and Issues:	-

Use Case ID:	UC-04		
Use Case Name:	Visualise on Map		
Created By:	Aaron	Last Updated By:	Guang
Date Created:	05/09/2023	Date Last Updated:	25/10/2023

Actor:	User
Description:	<ul style="list-style-type: none"> <li>Facilities Users to visually interact with a dynamic map, spotting real-time traffic conditions, traffic cameras, and road incidents.</li> <li>The map offers an intuitive overlay, giving users a holistic view of the traffic ecosystem, ensuring a seamless navigation experience.</li> </ul>
Preconditions:	<ol style="list-style-type: none"> <li>User is authenticated and has access rights.</li> <li>Stable and consistent Internet connection.</li> </ol>
Postconditions:	<ol style="list-style-type: none"> <li>Users get a graphical representation of the traffic landscape with key highlights.</li> <li>Relevant traffic markers, including cameras and incidents, are visible to users.</li> </ol>
Priority:	Essential
Frequency of Use:	Regular (before and during commuting.)
Flow of Events:	<ol style="list-style-type: none"> <li>User selects the “Visualise on Map” feature.</li> <li>System does step 1 to 3 in UC-09 normal flow to gather incident reports.</li> <li>System does steps 1 to 3 in UC-11 normal flow to gather the general traffic trends.</li> <li>Application loads a real-time map of the user’s current location or specified area. <ul style="list-style-type: none"> <li>Traffic conditions are colour-coded: green for light, orange for medium, and red for heavy.</li> <li>Markers for traffic cameras and incidents are plotted on the map.</li> </ul> </li> <li>User can zoom, pan, and click on individual markers for more detailed information.</li> <li>System plots all incidents when selected.</li> </ol>

Alternative Flows:	<p>AF-S2: If the map fails to load due to weak connection or API issue:</p> <ol style="list-style-type: none"> <li>1. The application advises the user: "Unable to load the map."</li> <li>2. Please check your connection or try again later".</li> <li>3. Return to Step 2 in normal flow.</li> </ol> <p>AF-S2: If the user seeks a region with restricted data:</p> <ol style="list-style-type: none"> <li>1. The map displays, but with limited or no data, and notifies: "Information for this area is limited or restricted."</li> <li>2. Return to Step 2 in normal flow.</li> </ol>
Exceptions:	<p>EX1: If there's a malfunction with real-time data updating:</p> <ol style="list-style-type: none"> <li>1. The system sends an alert: "Some data might be outdated. Proceed with caution."</li> </ol> <p>EX2: When the application encounters a crash or unexpected failure:</p> <ol style="list-style-type: none"> <li>1. User is prompted with: "Sorry for the inconvenience. We're experiencing technical difficulties. Please retry shortly."</li> </ol>
Includes:	<p>UC-11 View Traffic Trends UC-09 View Reported Incidents</p>
Special Requirements:	<ul style="list-style-type: none"> <li>• Data must be as real-time as possible with refresh intervals not exceeding a few minutes.</li> <li>• The application must handle high-resolution camera feeds without lag.</li> </ul>
Assumptions:	<ul style="list-style-type: none"> <li>• The database is constantly updated with fresh traffic, camera, and incident data.</li> <li>• Users have basic knowledge of map interfaces and can understand common traffic symbols.</li> </ul>
Notes and Issues:	<ul style="list-style-type: none"> <li>• Ensure consistent uptime for the service to be useful during critical times.</li> <li>• Periodically review and update the map interface to include new roads, landmarks, and traffic management tools.</li> </ul>

Use Case ID:	UC-05		
Use Case Name:	Search Results		
Created By:	Aaron	Last Updated By:	Guang
Date Created:	05/09/2023	Date Last Updated:	25/10/2023

Actor:	User
Description:	<p>Allows users to search traffic conditions.</p> <ul style="list-style-type: none"> <li>The feature allows users to search for traffic cameras and traffic incidents within the website.</li> <li>Data aims to give users a comprehensive understanding of the traffic conditions, easing their efforts in making informed decisions about their desired routes.</li> </ul>
Preconditions:	<ul style="list-style-type: none"> <li>User must be registered and logged into the system.</li> <li>Internet connectivity is available.</li> </ul>
Postconditions:	<ul style="list-style-type: none"> <li>User is presented with accurate traffic conditions and related statistics for the chosen location or route.</li> <li>User's search queries are saved in their search history for future reference.</li> </ul>
Priority:	High
Frequency of Use:	High(High usage during peak commuting hours.)
Flow of Events:	<p><b>Traffic Search:</b></p> <ol style="list-style-type: none"> <li>User accessing "Traffic Search" feature.</li> <li>System prompts the user to put a specific road, landmark, or search for a traffic camera or reported incident.</li> <li>User input the desired location or criteria.</li> <li>System fetches data and provides information on traffic camera or reported incidents</li> </ol>
Alternative Flows:	<p>AF-S2: If the user's input does not match any existing roads or landmarks:</p> <ol style="list-style-type: none"> <li>The system suggests similar or nearby locations.</li> <li>User can select a suggested location or re-enter their search.</li> <li>User Return to Step 2 in Normal Flow.</li> </ol>

	<p>AF-S2: If the system cannot retrieve live data to any external issues:</p> <ol style="list-style-type: none"> <li>1. The user is notified of the temporary unavailability of data.</li> <li>2. The system may provide the most recent cached data with a timestamp, if available.</li> <li>3. User Return to Step 2 in Normal Flow.</li> </ol>
Exceptions:	<p>EX1: If the user searches for a restricted or private area:</p> <ol style="list-style-type: none"> <li>1. The system notifies them: "Data for the selected location is restricted or not available."</li> </ol> <p>EX2: If the system faces an unexpected internal error:</p> <ol style="list-style-type: none"> <li>1. The user is alerted: "An unexpected error occurred. Please try again later."</li> </ol>
Includes:	-
Special Requirements:	<ul style="list-style-type: none"> <li>● System ensures data accuracy and updates traffic conditions in real-time.</li> <li>● Ensure privacy and security of user search history.</li> </ul>
Assumptions:	<ul style="list-style-type: none"> <li>● Traffic data provided is sourced from reliable channels or databases.</li> <li>● Registered users understand basic traffic terms and classifications.</li> </ul>
Notes and Issues:	<ul style="list-style-type: none"> <li>● Regularly update the system's database to include new roads or landmarks.</li> <li>● Monitor for any discrepancies or inconsistencies in traffic data sourced from multiple channels.</li> </ul>

Use Case ID:	UC-06		
Use Case Name:	Filter Results		
Created By:	Aaron	Last Updated By:	Guang
Date Created:	05/09/2023	Date Last Updated:	25/10/2023

Actor:	User
Description:	<p>Allows users to filter map information.</p> <ul style="list-style-type: none"> <li>By eliminating unwanted incident types and traffic cameras, users can make informed decisions within the system more effectively.</li> </ul>
Preconditions:	<ul style="list-style-type: none"> <li>User must be registered and logged into the system.</li> <li>Internet connectivity is available.</li> </ul>
Postconditions:	<p>Traffic conditions on the map are updated to reflect the user's selected filters.</p> <p>Users can save filter preferences for future use.</p>
Priority:	High
Frequency of Use:	High(High usage during peak commuting hours.)
Flow of Events:	<ol style="list-style-type: none"> <li>Accessing Filter Options: <ul style="list-style-type: none"> <li>Once the search results are displayed on the map, a filter icon or button appears on the top or side of the screen.</li> <li>The user can click on this icon to access filter options.</li> </ul> </li> <li>Display of Filter Options: <ul style="list-style-type: none"> <li>A dropdown or slide-out panel appears displaying various filter criteria.</li> <li>Filters are primarily categorised as "Traffic Cameras" and "Road Incidents."</li> <li>Under "Road Incidents," options like "Accidents," "Roadwork," and "Closures" are presented.</li> </ul> </li> <li>Selecting Filters: <ul style="list-style-type: none"> <li>Users can choose to select multiple filters or deselect them based on their preferences. For example, they might want to see only "Accidents" and "RoadWorks" but not other incidents.</li> </ul> </li> </ol>

	<ul style="list-style-type: none"> <li>- Once the desired filters are selected, there's an "Apply" or "Update" button at the bottom of the filter panel.</li> </ul> <p>4. Applying Filters to Map View:</p> <ul style="list-style-type: none"> <li>- Clicking Apply, map updates to display the traffic cameras and incidents that match the user's selected filters.</li> <li>- All irrelevant data points are removed from the map.</li> </ul> <p>5. Clearing and Resetting Filters:</p> <ul style="list-style-type: none"> <li>- Option to "Reset" is provided within the panel.</li> <li>- If selected, it restores the map view to the original state, displaying all traffic cameras and incident types.</li> </ul> <p>6. Close the Filter Panel:</p> <ul style="list-style-type: none"> <li>- Once user set preferences, they can click outside the filter panel or click on the "close or X" icon to return to the map view with their filter settings applied.</li> </ul>
Alternative Flows:	<p>AF-S1: If system faces a delay in updating the map view:</p> <ul style="list-style-type: none"> <li>- User is shown a loading indicator with a message "Updating your view, please wait"</li> <li>- System returns to Step 1 in the normal flow.</li> </ul>
Exceptions:	-
Includes:	-
Special Requirements:	<ul style="list-style-type: none"> <li>• System must have an updated database of traffic conditions and camera locations.</li> <li>• System should be responsive and adaptive to different screen sizes and electronics gadgets.</li> </ul>
Assumptions:	<ul style="list-style-type: none"> <li>• Traffic data is frequently updated in the background for the most accurate representation.</li> </ul>
Notes and Issues:	<ul style="list-style-type: none"> <li>• Short tutorial would be considered for first-time users who are unfamiliar with the filter process.</li> </ul>

Use Case ID:	UC-07		
Use Case Name:	Routes		
Created By:	Cheng Yao	Last Updated By:	Cheng Yao
Date Created:	05/09/2023	Date Last Updated:	05/09/23

Actor:	User
Description:	Allows users to check traffic conditions.
Preconditions:	<ul style="list-style-type: none"> <li>• User is logged in</li> <li>• User clicks on “Routes” under Map</li> </ul>
Postconditions:	<ol style="list-style-type: none"> <li>1. User exits the app OR</li> <li>2. User moves to another screen/page</li> </ol>
Priority:	High
Frequency of Use:	High
Flow of Events:	<ol style="list-style-type: none"> <li>1. User clicks on routes under Map screen</li> <li>2. System displays the user's favourite routes.</li> <li>3. System prompts the user to select a route from their favourited route list or search for a route using Origin and Destination</li> <li>4. User selects a route from their favourited list</li> <li>5. System will retrieve route information from Maps API through the Map feature. System will display the traffic conditions along the route and save the searched route in user's search history</li> <li>6. If the route has not been favourited, user can click on the unlit favourite icon to save the route</li> <li>7. If user favourites the route, the system will store it into the user's favourites list</li> <li>8. Users can search for another route or click on previously searched routes</li> <li>9. If user clicks on the exit button, return them to the map page and end the flow</li> </ol>

Alternative Flows:	<p>AF-S6: If the user's route is already favoured</p> <ol style="list-style-type: none"> <li>1. The System will display a lit up favourite icon</li> <li>2. Clicking on the favourite icon will unfavourite the route, removing it from their favourites list</li> <li>3. The System returns to Step 5 in Normal Flow</li> </ol> <p>AF-S3: If the user searches for another route</p> <ol style="list-style-type: none"> <li>1. User enters the origin and destination in the map</li> <li>2. The system verifies the validity of the origin and destination</li> <li>3. If the origin and destination are valid, the system returns the user to Step 5 in the normal flow</li> <li>4. If the user searches for a location that has restricted access (e.g. SAF restricted zone), the system alerts the user: "Information is restricted or not available." and returns the user to Step 3 in the normal flow</li> </ol>
Exceptions:	<p>EX1: If there temporary issue or outage with the Maps API:</p> <ol style="list-style-type: none"> <li>1. System notifies the user: "There seems to be a temporary issue retrieving data. Please try again in a moment."</li> <li>2. Use case ends and the user is returned to UC-04 Visualise on Map</li> </ol>
Includes:	(Extends) UC-04 Visualise on Map
Special Requirements:	Requires real-time syncing with the Maps API
Assumptions:	<p>Traffic conditions will change frequently, requiring continuous updates.</p> <p>Users could input multiple favourite routes.</p>
Notes and Issues:	<p>Possibility in minor delays upon fetching real-time data during peak server loads.</p> <p>Camera data only covers specific locations in a fixed angle, might not be available for all locations.</p>

Use Case ID:	UC-08		
Use Case Name:	Report Incidents		
Created By:	Zi Qin	Last Updated By:	Zi Qin
Date Created:	05/09/23	Date Last Updated:	21/10/23

Actor:	User
Description:	This use case allows the user to alert other users of incidents that occur on the driving roads.
Preconditions:	User has logged into the system and is viewing the Traffic Incident page
Postconditions:	User is returned to the Traffic Incident page
Priority:	Medium
Frequency of Use:	Low
Flow of Events:	<ol style="list-style-type: none"> <li>The user selects “Report Incident” in the Traffic Incident page.</li> <li>The system requests the user to select an incident type.</li> <li>The user selects an incident type.</li> <li>The system requests to access the user’s location.</li> <li>The system displays buttons to allow the user to accept location access or return to the incident page.</li> <li>The user accepts the system’s request to access the user’s current location.</li> <li>The system detects and displays the current location detected.</li> <li>The system requests the user to enter the incident description.</li> <li>The user enters the incident description.</li> <li>The system displays a “Submit” button.</li> <li>The user clicks on the “Submit” button.</li> <li>The system saves a record of the time of report submission, incident type, incident location and incident description.</li> <li>The system displays a message on the submission status.</li> <li>The system displays a button to return the user to the incident list.</li> <li>The user selects the button to return to the incident list.</li> <li>The system directs the user back to the Incident list.</li> </ol>
Alternative Flows:	<p>AF-S5: If the user selects to return to the incident list</p> <ol style="list-style-type: none"> <li>The system goes to Step 16 of normal flow.</li> </ol>

	<p>AF-S7: If the system fails to detect the user's location</p> <ol style="list-style-type: none"> <li>1. The system displays a message "Failed to detect location. Redetect current location?"</li> <li>2. The system displays buttons to allow the user to redetect current location or return to the incident list.</li> <li>3. The user selects to redetect the current location.</li> <li>4. The system goes back to Step 7 of normal flow.</li> </ol>
Exceptions:	-
Includes:	-
Special Requirements:	-
Assumptions:	-
Notes and Issues:	-

Use Case ID:	UC-09		
Use Case Name:	View Reported Incidents		
Created By:	Zi Qin	Last Updated By:	Zi Qin
Date Created:	05/09/23	Date Last Updated:	21/10/23

Actor:	User
Description:	This use case informs users about the incidents reported by other users.
Preconditions:	User has logged into the system
Postconditions:	User is viewing the Traffic Incident page
Priority:	Medium
Frequency of Use:	Medium
Flow of Events:	<ol style="list-style-type: none"> <li>1. The user selects “Incidents” in the main menu of the user interface.</li> <li>2. The system retrieves records of all incidents reported on the day.</li> <li>3. The system displays all the information on the reported incidents: <ul style="list-style-type: none"> <li>• Incident Type</li> <li>• Reported Time</li> <li>• Incident Location</li> <li>• Incident Description</li> </ul> </li> </ol>
Alternative Flows:	<p>AF-S2: If there are no incidents reported on the day</p> <ol style="list-style-type: none"> <li>1. The system displays the message “There are no incidents reported today”.</li> <li>2. The user refreshes the user interface.</li> <li>3. The system goes back to Step 2 of normal flow</li> </ol> <p>AF-S2: If the system fails to retrieve incident records</p> <ol style="list-style-type: none"> <li>1. The system displays a message “Error in loading. Please refresh the page again.”</li> <li>2. The user refreshes the user interface.</li> <li>3. The system goes back to Step 2 of normal flow.</li> </ol>

Exceptions:	-
Includes:	-
Special Requirements:	-
Assumptions:	-
Notes and Issues:	-

Use Case ID:	UC-10		
Use Case Name:	View Traffic Camera Images		
Created By:	Hamka	Last Updated By:	Eugenia
Date Created:	05/09/2023	Date Last Updated:	25/10/2023

Actor:	User
Description:	This use case allows users to look at the live image from a specific camera
Preconditions:	The user has selected a specific camera location
Postconditions:	System allows users to view traffic photos of the specific camera location.
Priority:	High
Frequency of Use:	High
Flow of Events:	<ol style="list-style-type: none"> <li>1. User clicks on View Traffic Camera Images in the specific camera page</li> <li>2. System displays the following information of the camera <ul style="list-style-type: none"> <li>o Location</li> <li>o Traffic Image</li> <li>o Camera ID</li> <li>o Timestamp</li> <li>o Specific Reported Incidents</li> <li>o Traffic Peakness Level <ul style="list-style-type: none"> <li>i. Low</li> <li>ii. Medium</li> <li>iii. High</li> </ul> </li> </ul> </li> </ol>
Alternative Flows:	-
Exceptions:	-
Includes:	UC-11 View Traffic Trends
Special Requirements:	-
Assumptions:	-

Notes and Issues:	-
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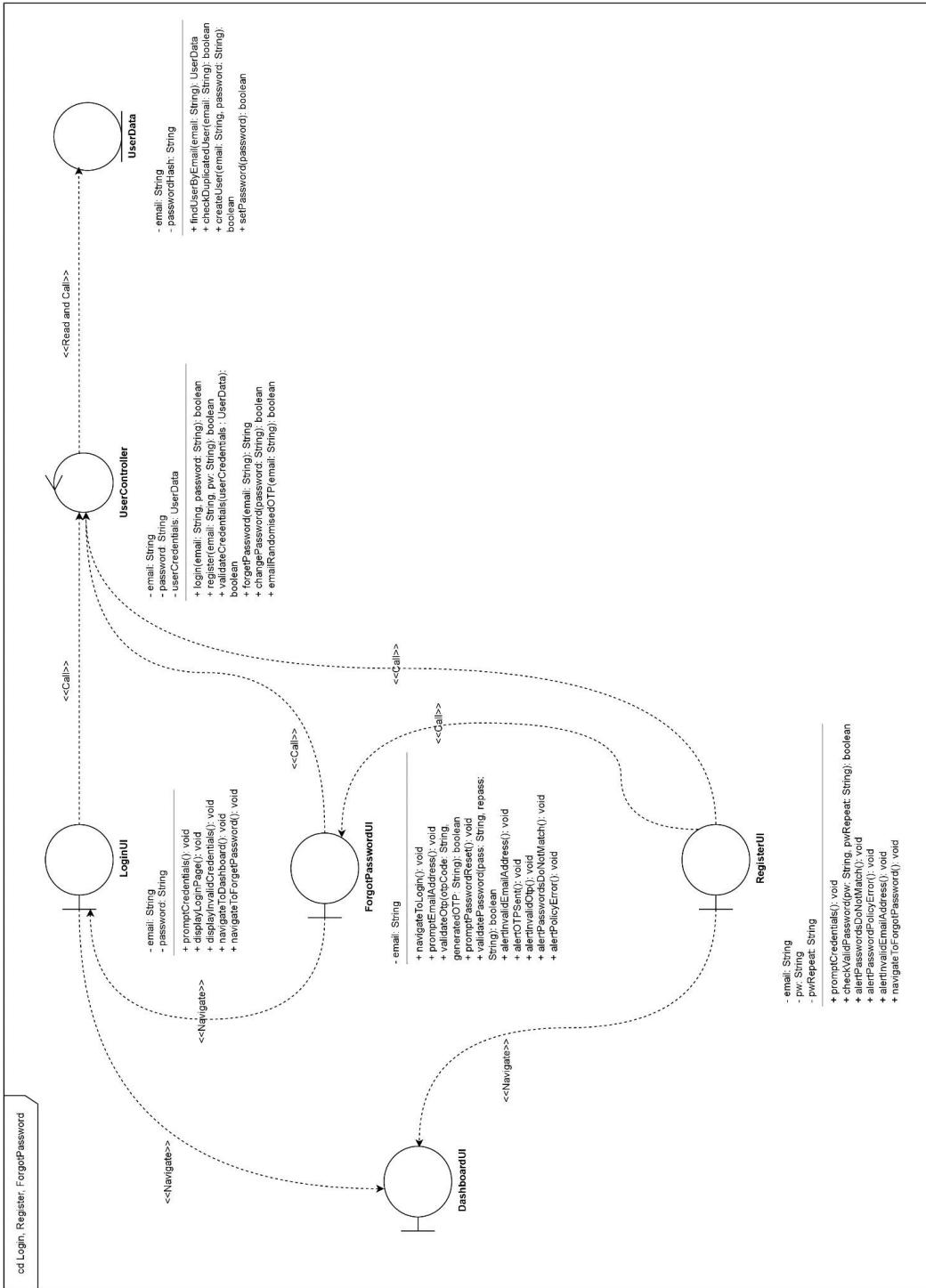
Use Case ID:	UC-11		
Use Case Name:	Show Traffic Trends		
Created By:	Hamka	Last Updated By:	Eugenia
Date Created:	05/09/2023	Date Last Updated:	25/10/2023

Actor:	User
Description:	This use case allows users to view overall traffic trends.
Preconditions:	The user is either on the specific camera page or at the overall Road Conditions page
Postconditions:	System allows users to view traffic trends of either the specific camera or overall trends of the whole of Singapore
Priority:	High
Frequency of Use:	High
Flow of Events:	<ol style="list-style-type: none"> <li>1. The system prompts a slide-out panel that shows a graph of the overall traffic trends for Singapore</li> <li>2. User can filter by <ul style="list-style-type: none"> <li>o Minute (Last Hour)</li> <li>o Hour (Last Day)</li> <li>o Day (Last Week)</li> </ul> </li> <li>3. The graph displays <ul style="list-style-type: none"> <li>o Count(Number of Vehicles on the rRoad)</li> <li>o Peakness(Count compared to count at other timings)</li> </ul> </li> </ol>
Alternative Flows:	<p>AF-S1: If the user chooses to view the traffic trend of a specific camera on the traffic camera page</p> <ol style="list-style-type: none"> <li>1. The system prompts a slide-out panel that shows a overview of the traffic trend of the specific camera</li> <li>2. Flow returns to Step 2 of normal flow</li> </ol>
Exceptions:	-
Includes:	-
Special Requirements:	-

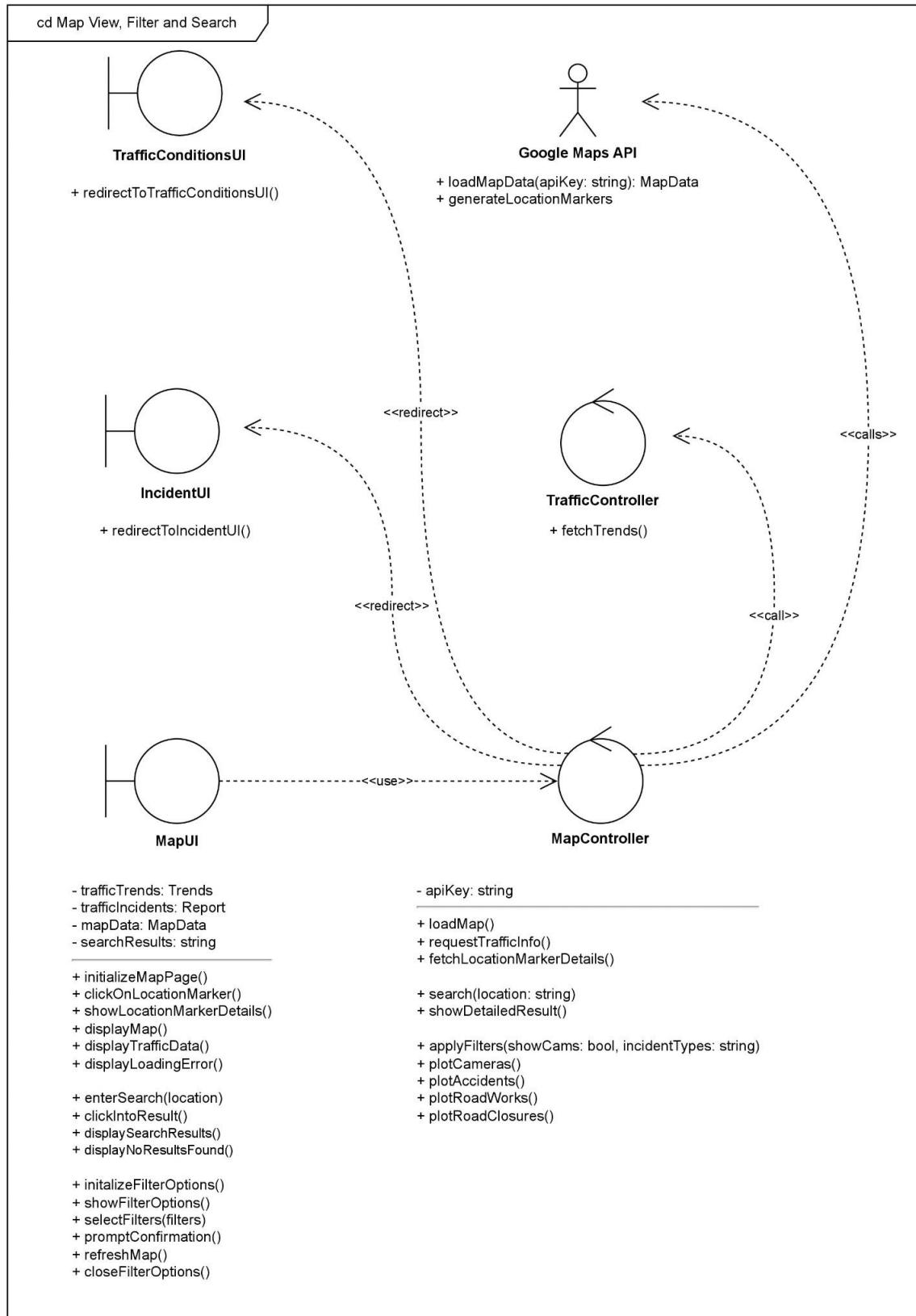
Assumptions:	-
Notes and Issues:	-

# Class Diagrams

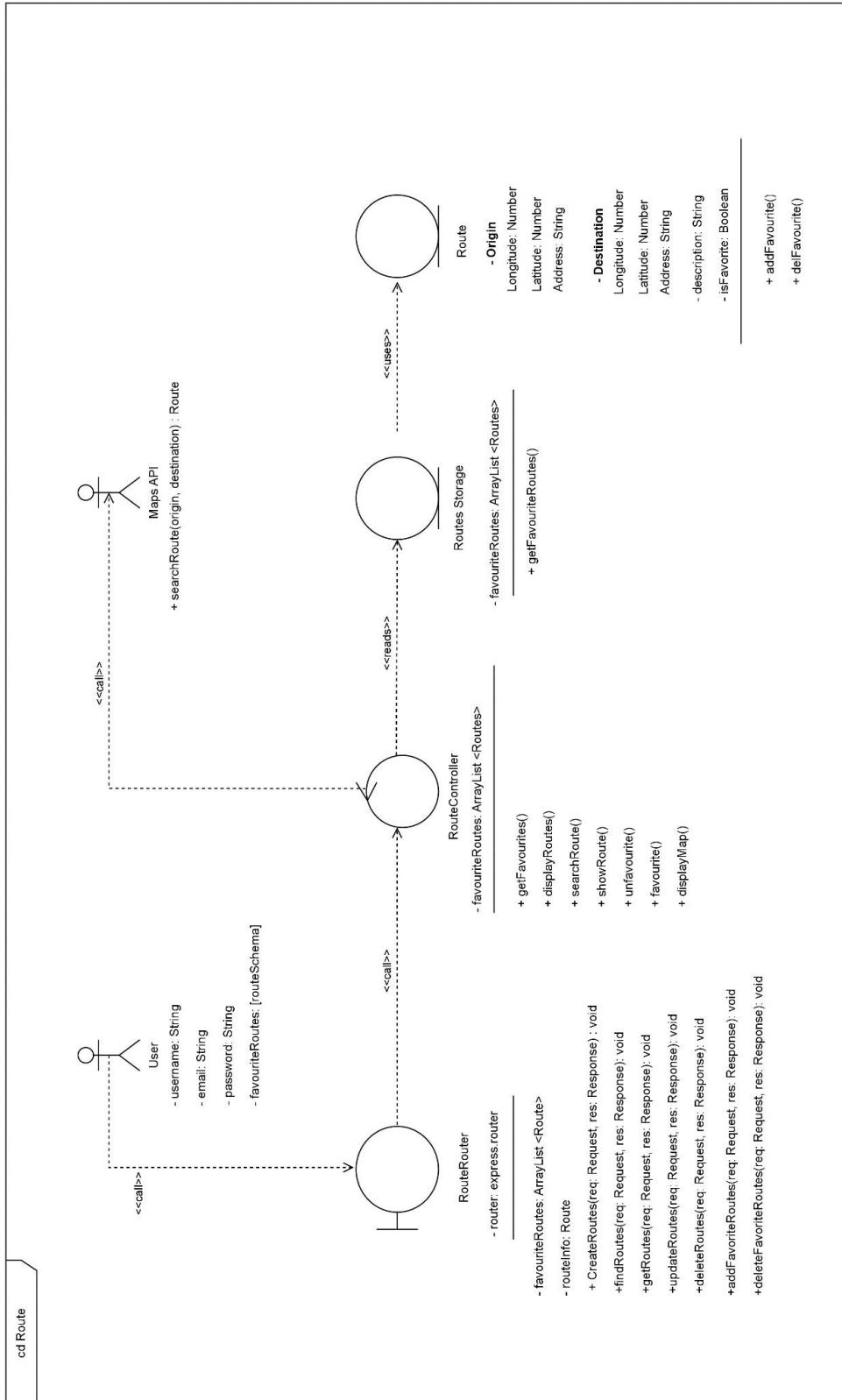
## Login, Register, Forgot Password



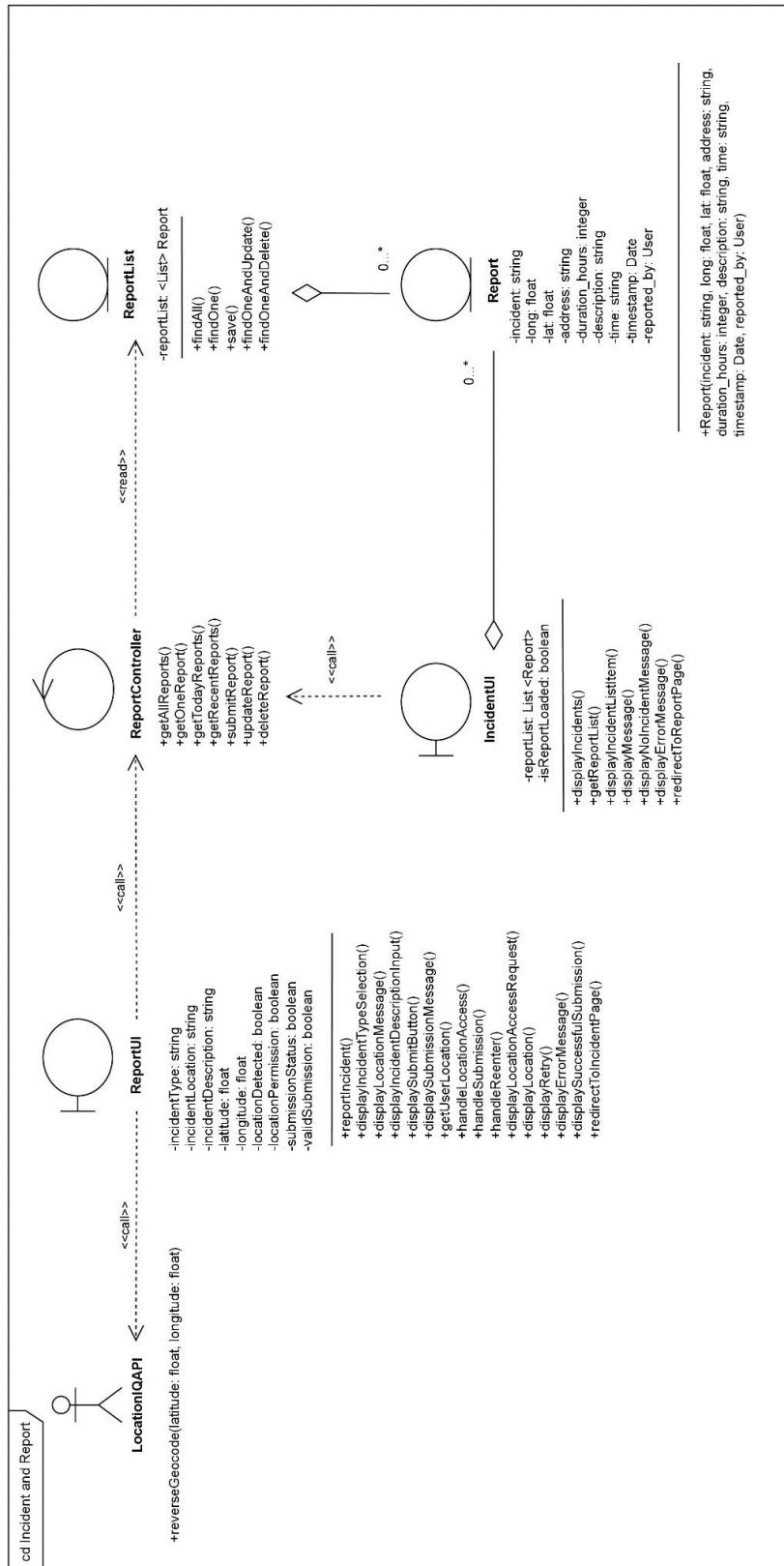
# Map View, Filter, Search



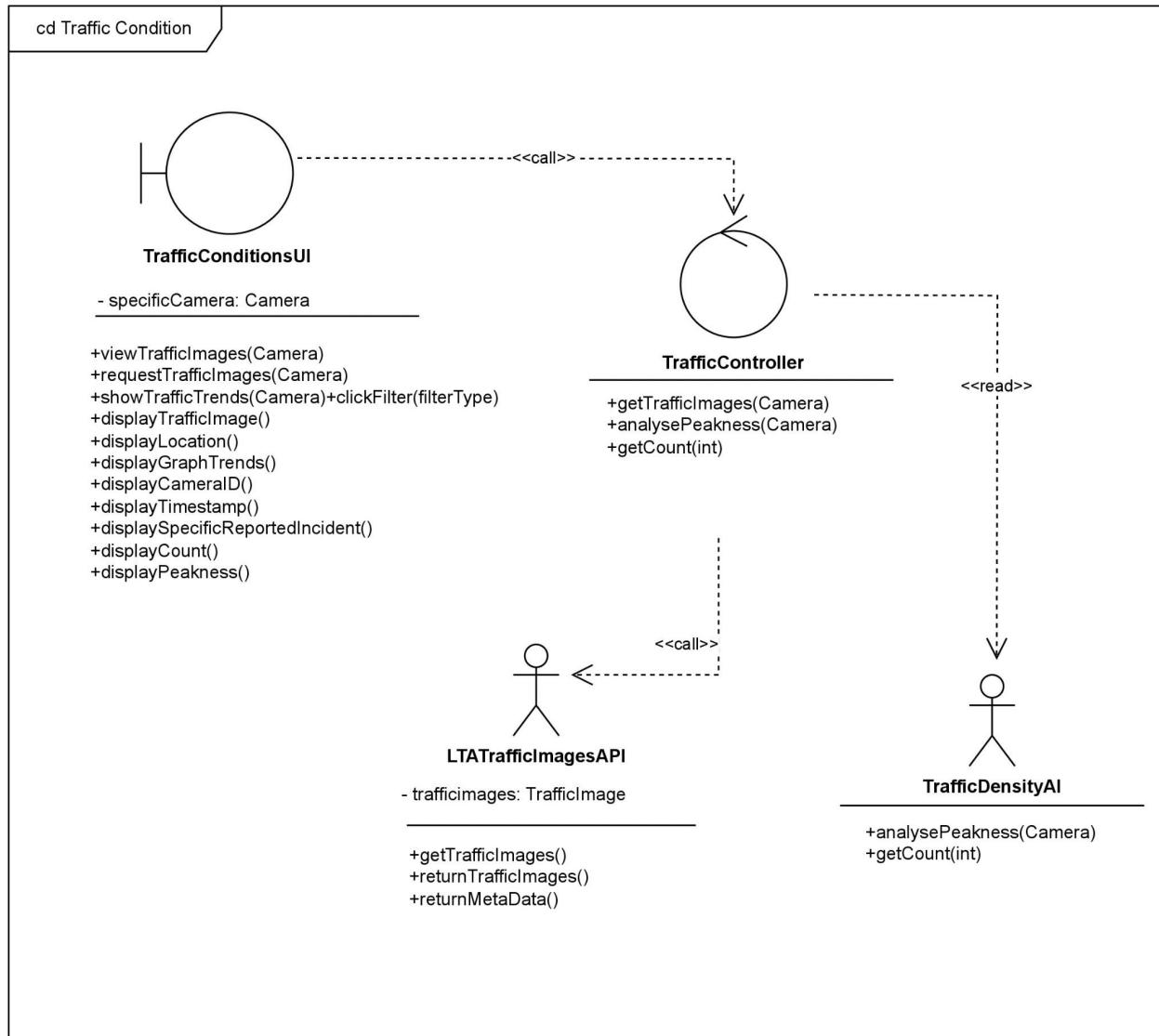
## Routes



## Incident and Report

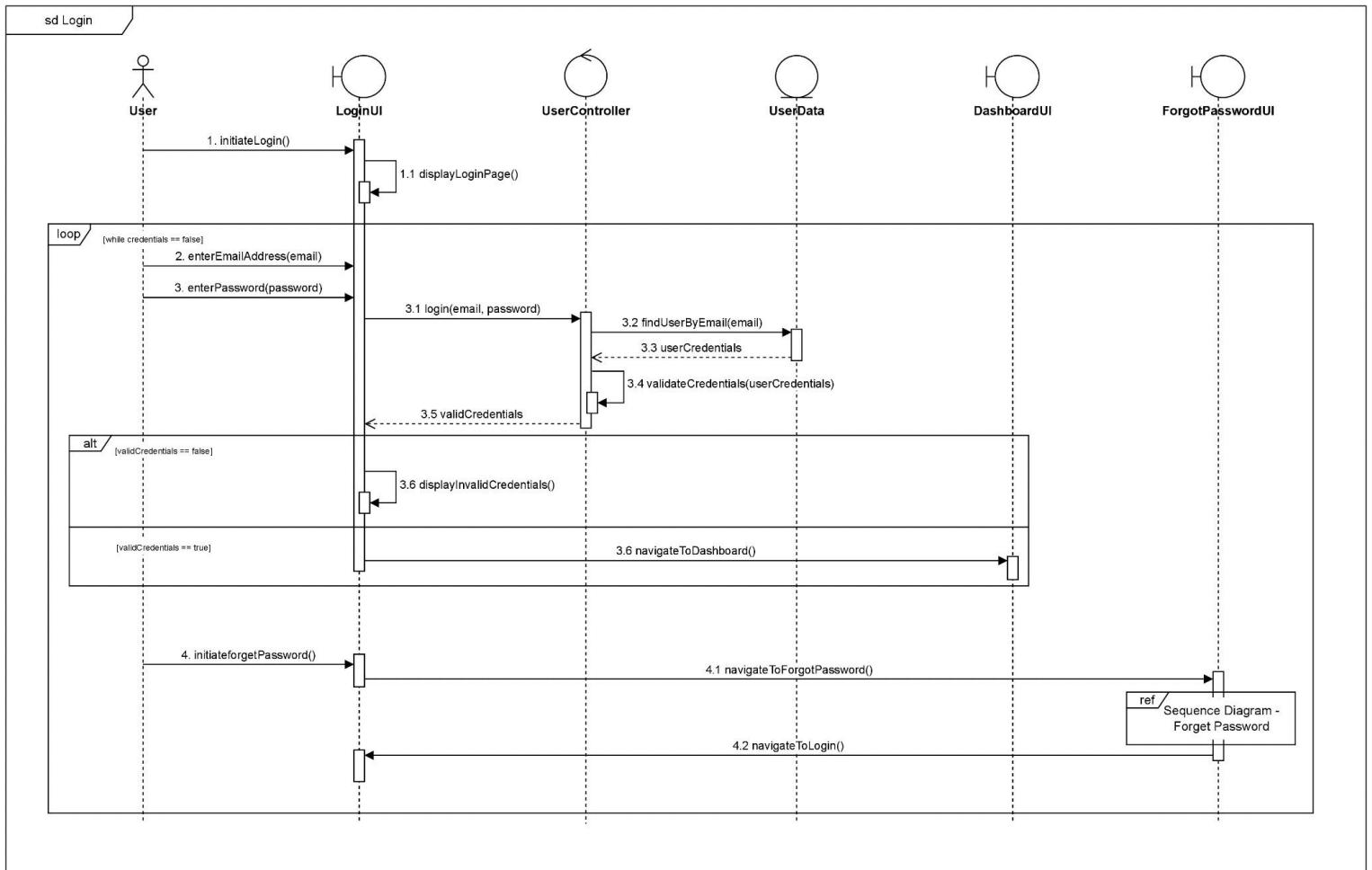


## Traffic Condition

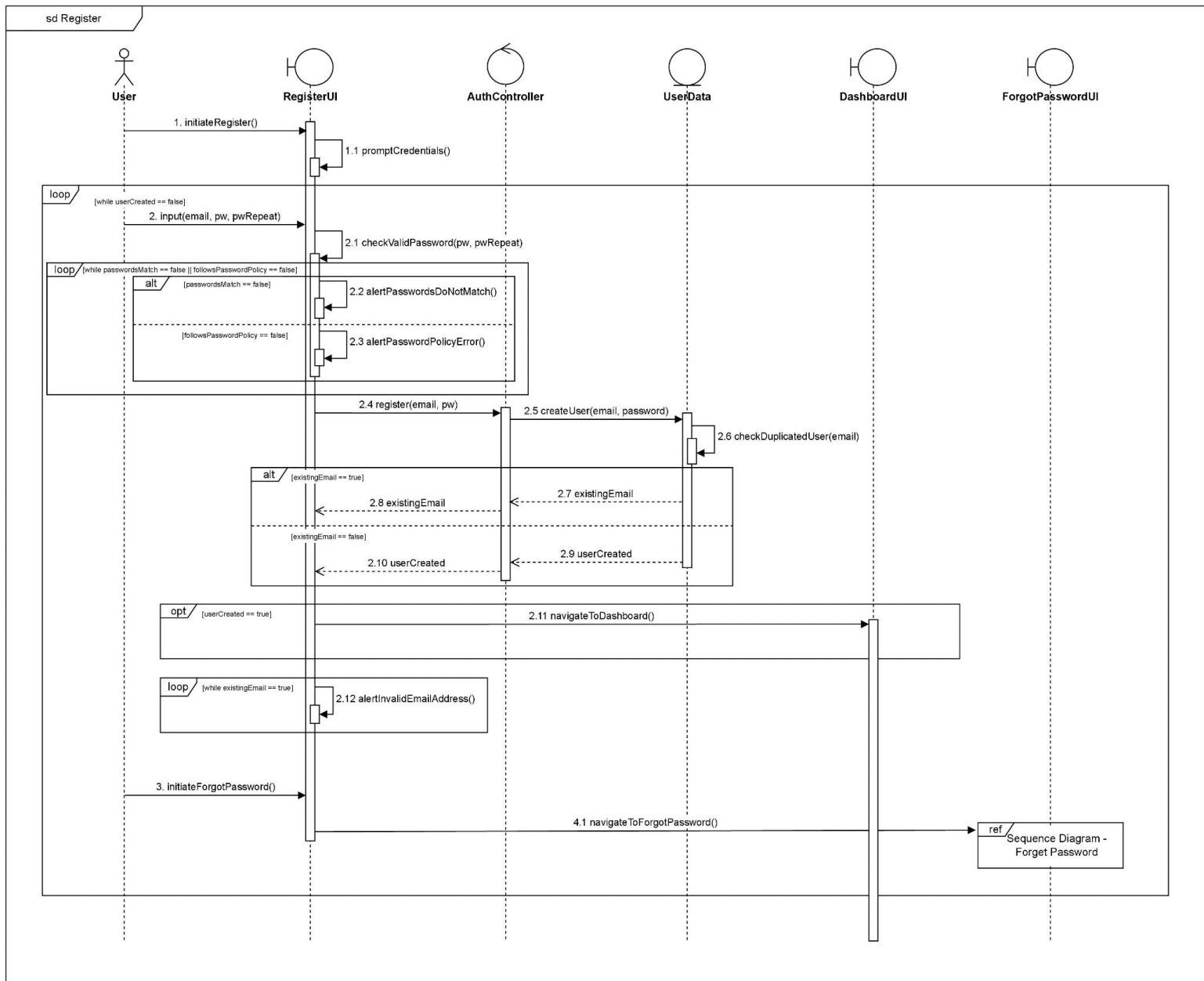


# Sequence Diagrams

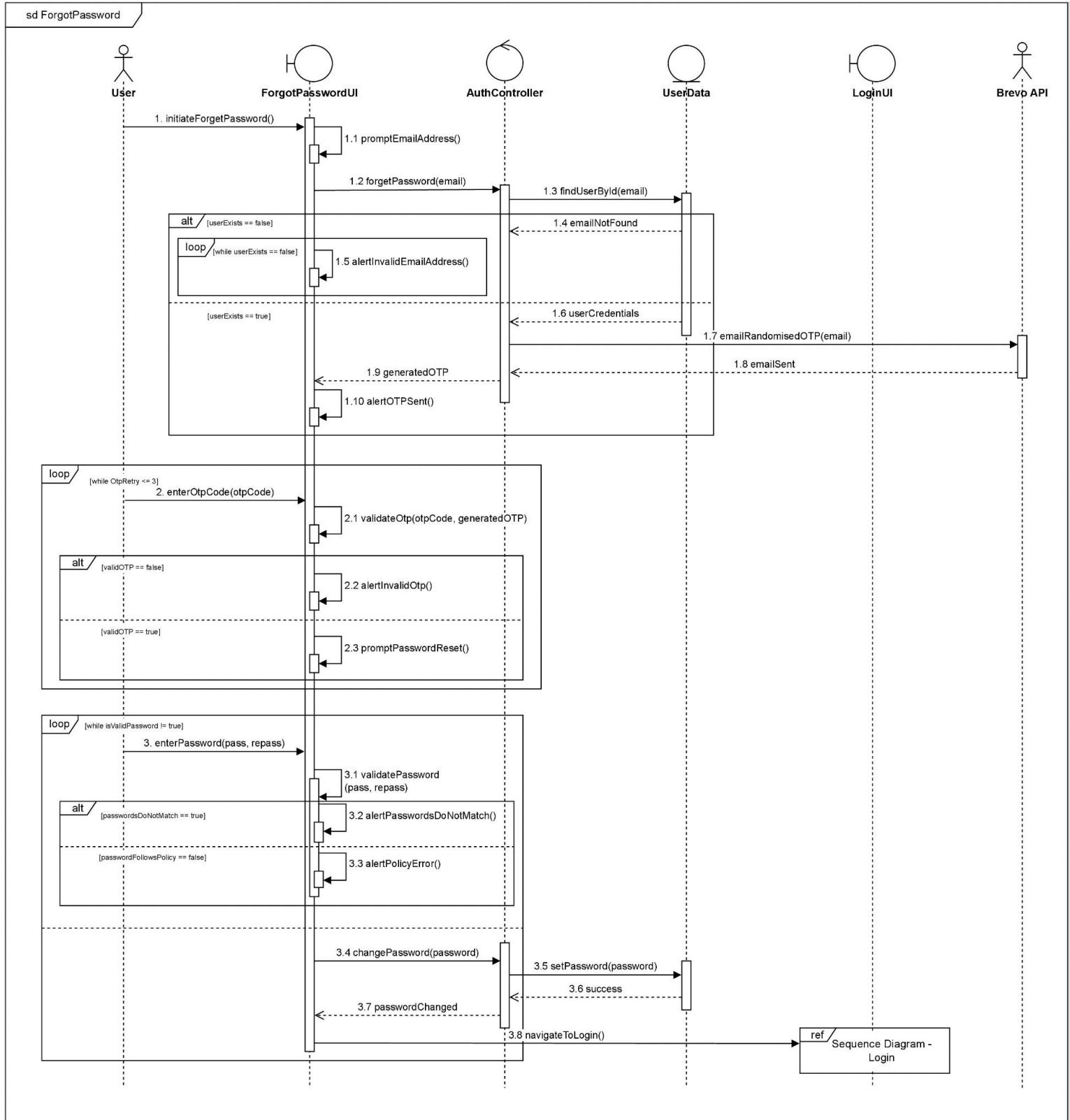
## Login



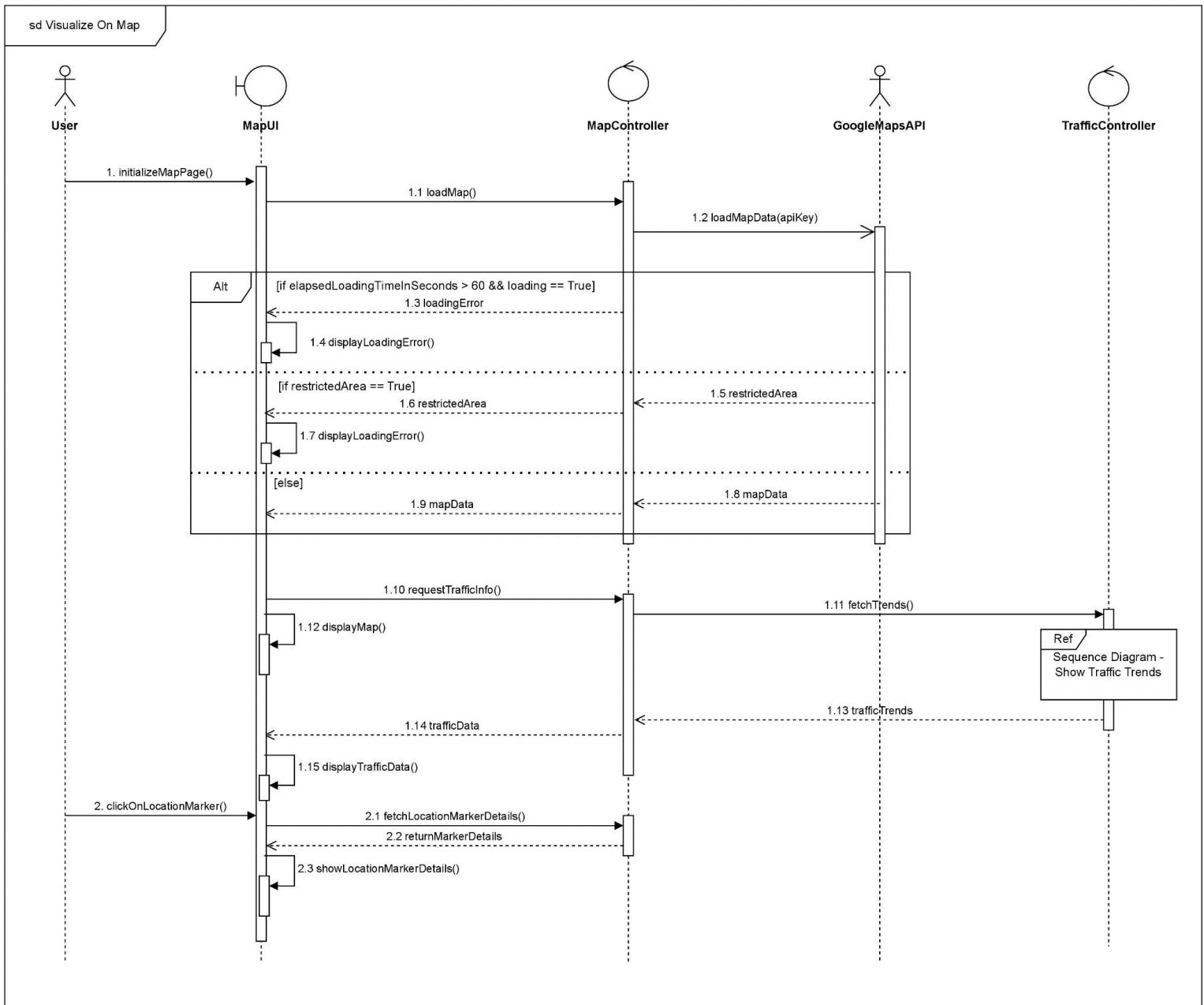
# Register



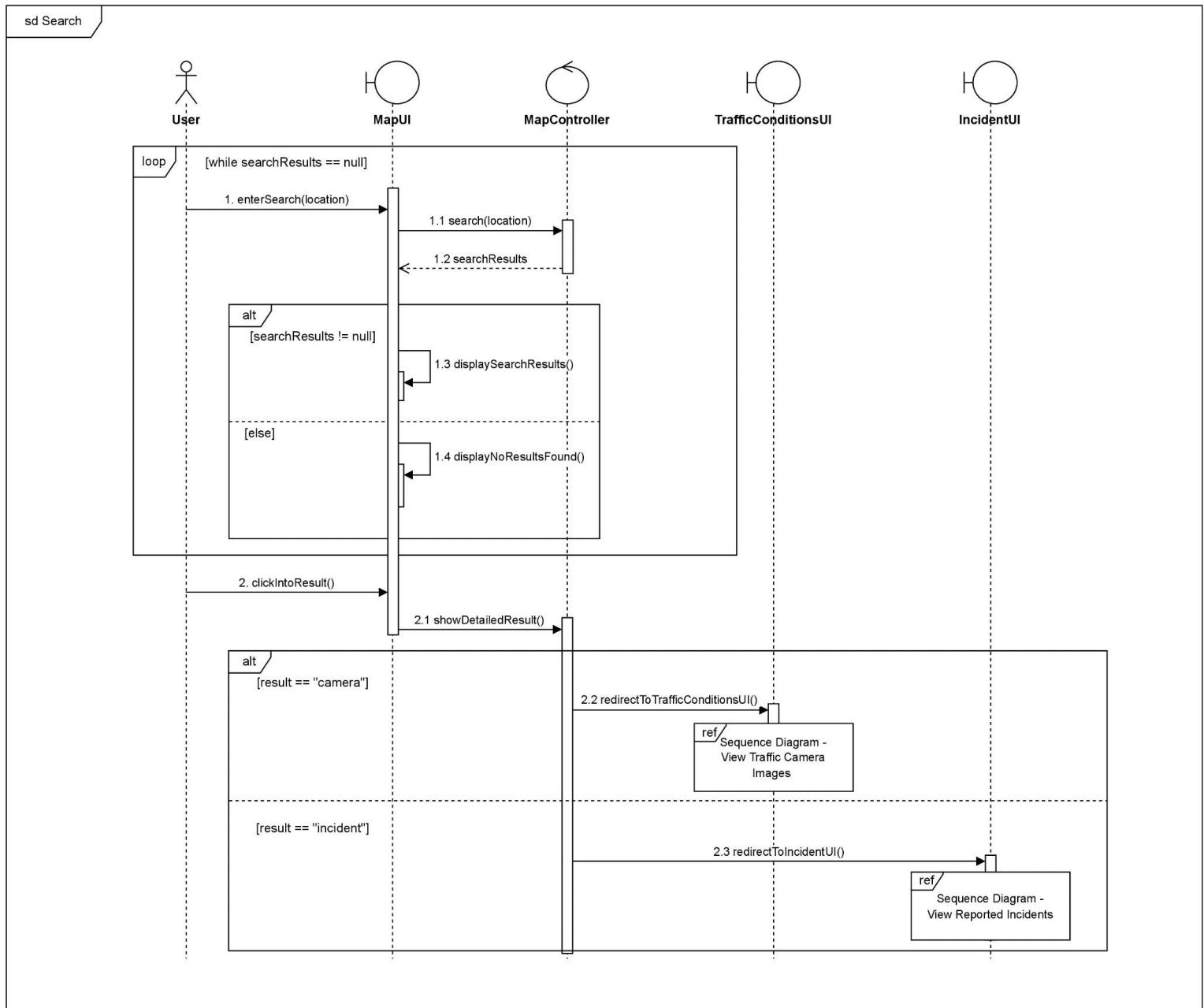
# Forgot Password



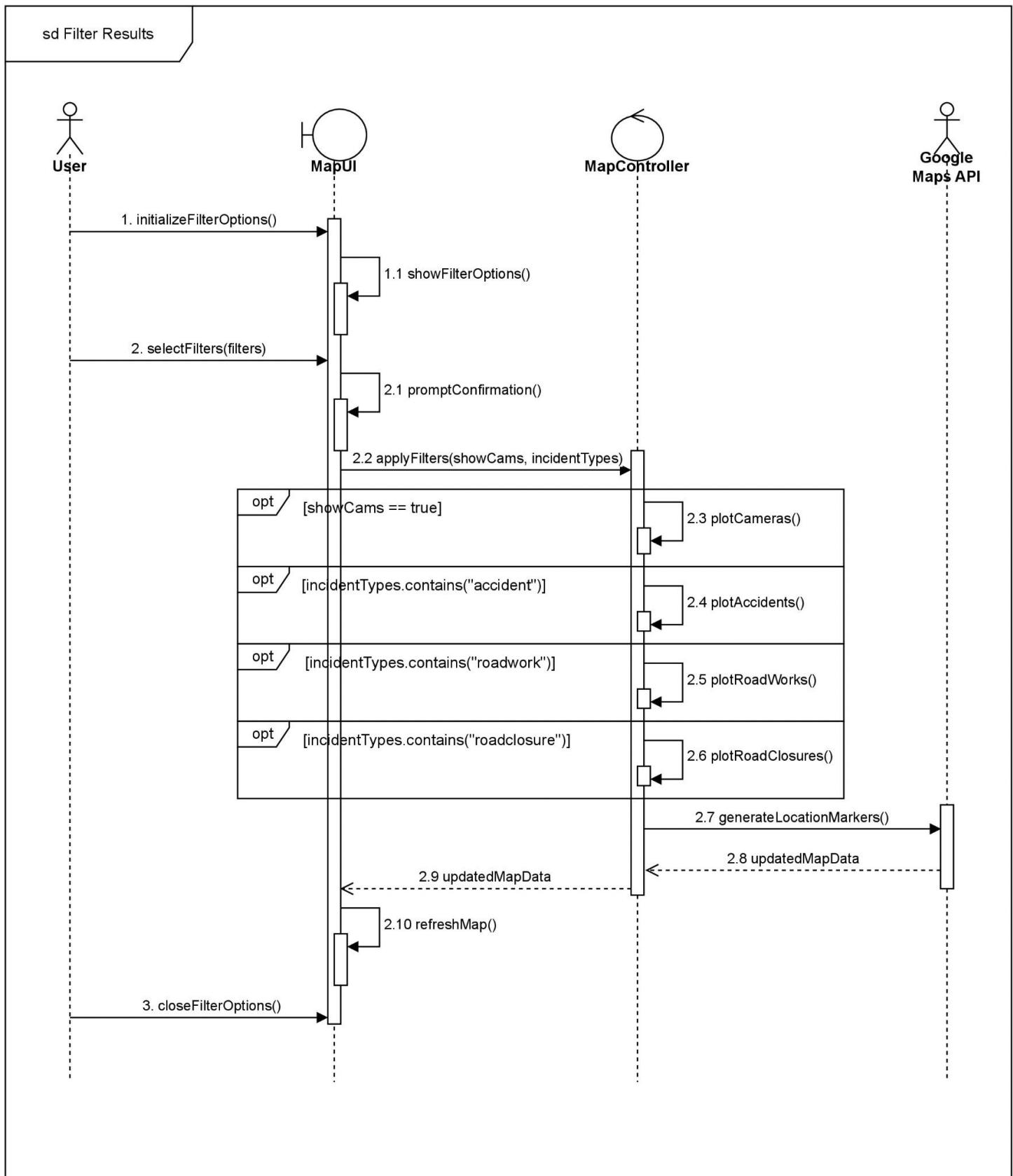
## Visualise On Map



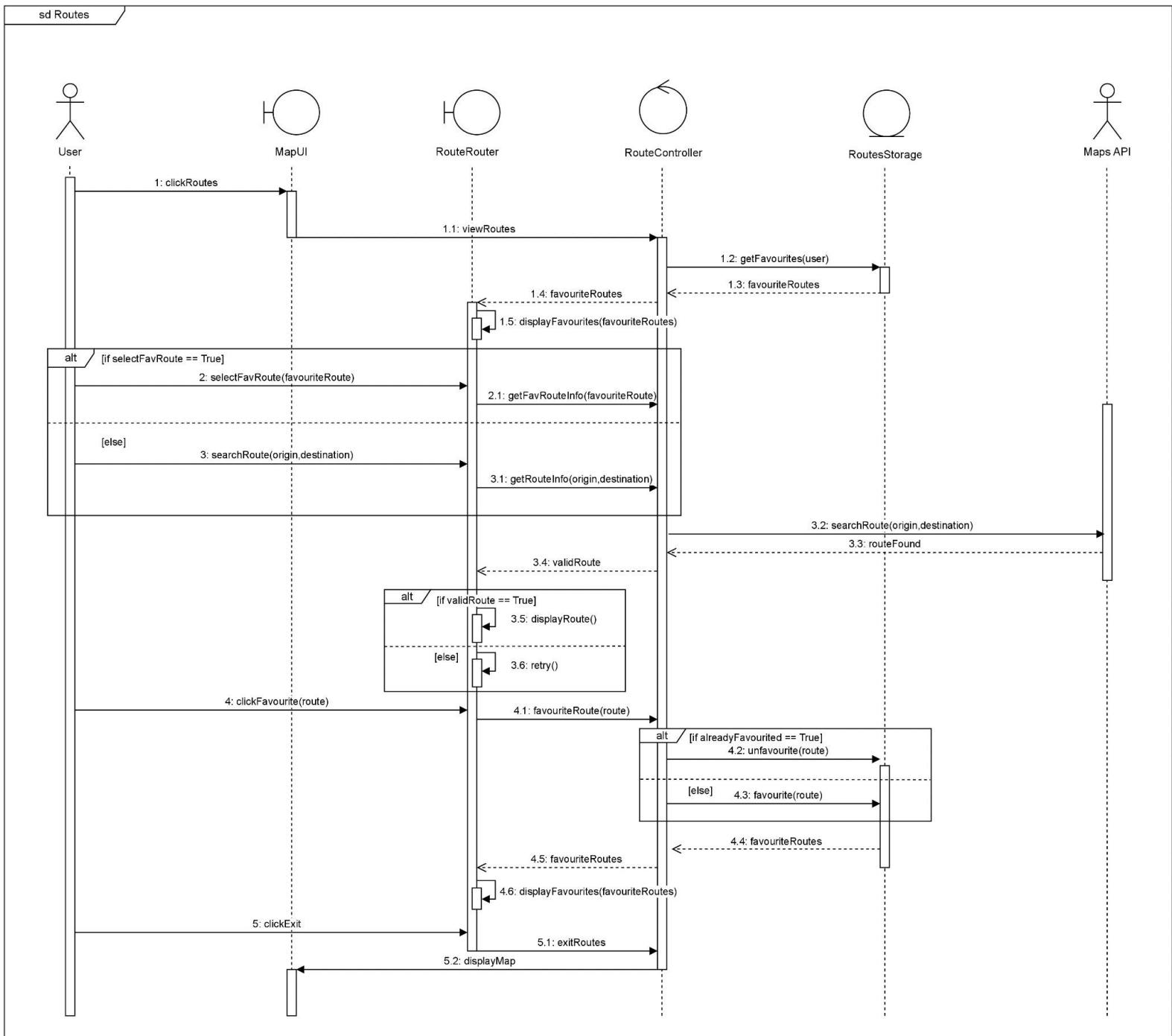
# Search Results



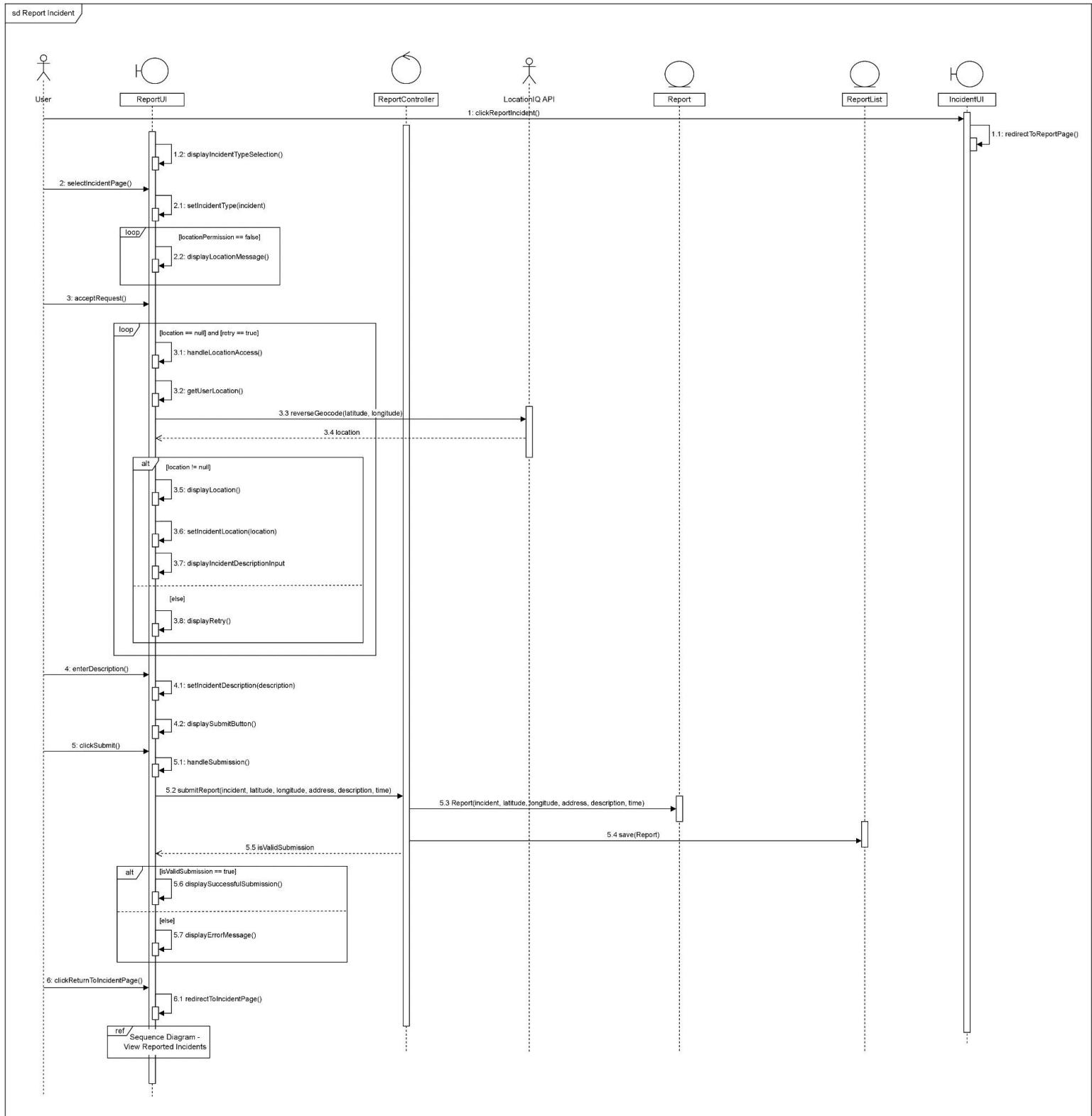
## Filter Results



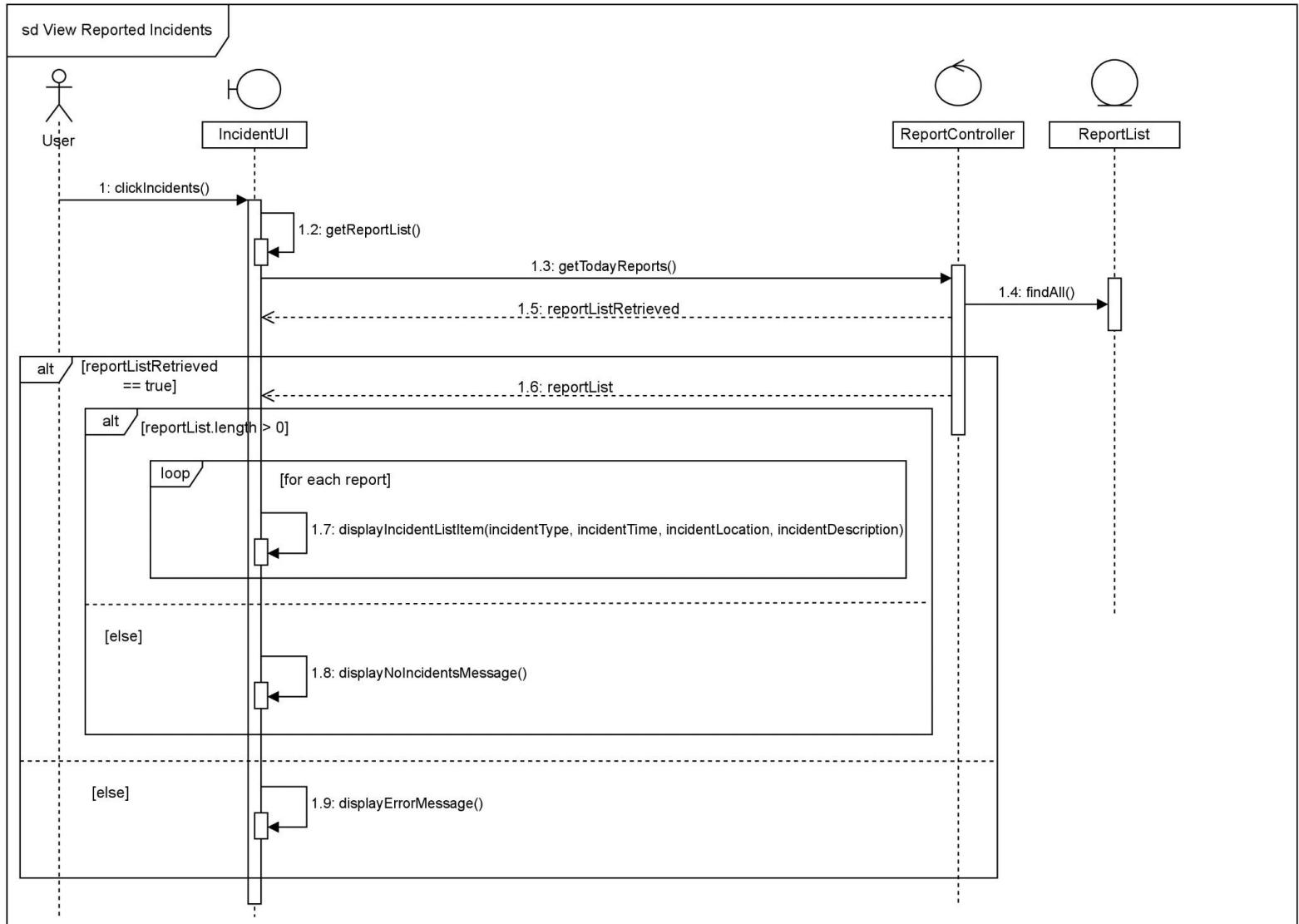
# Routes



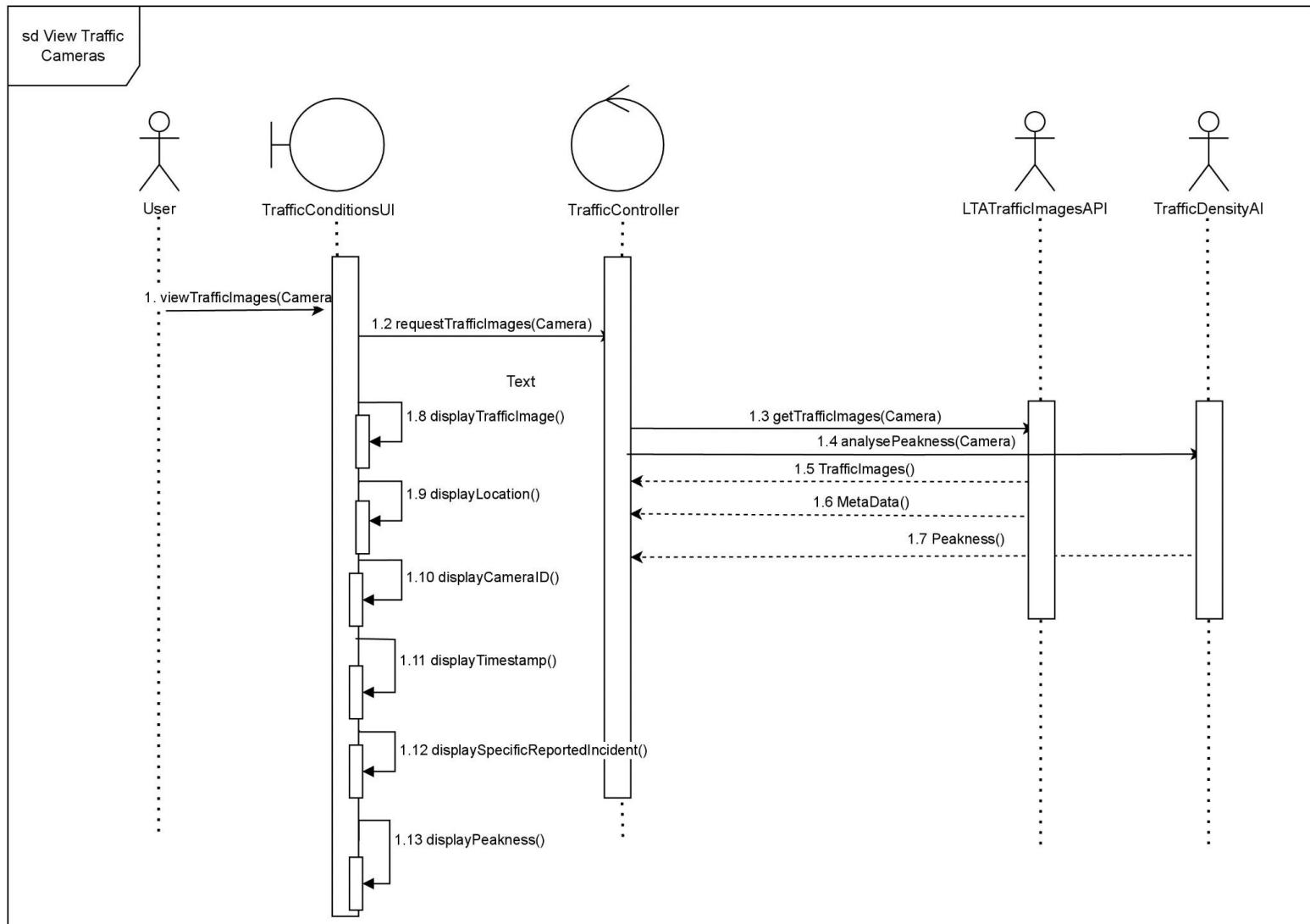
# Report Incidents



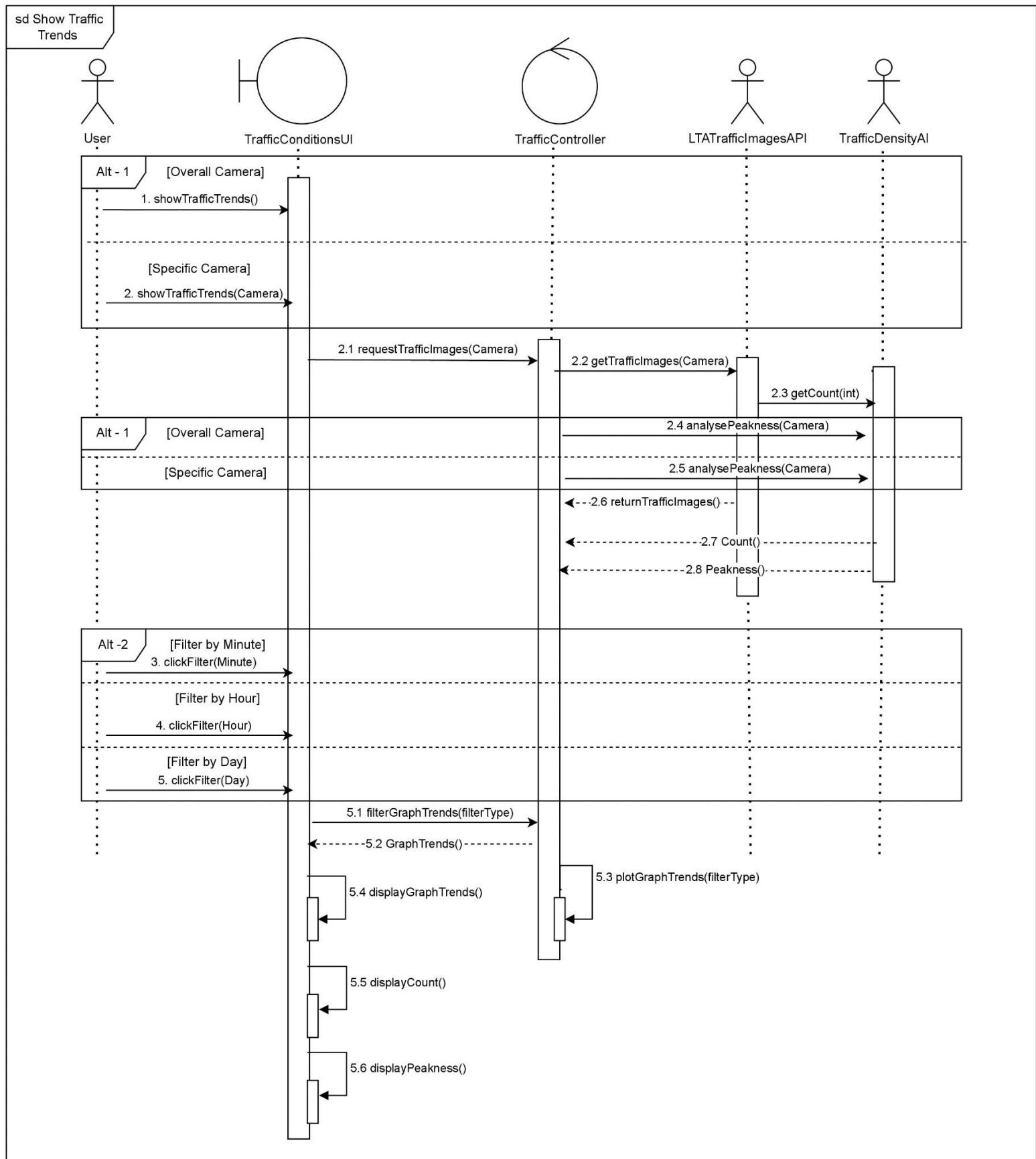
## View Reported Incidents



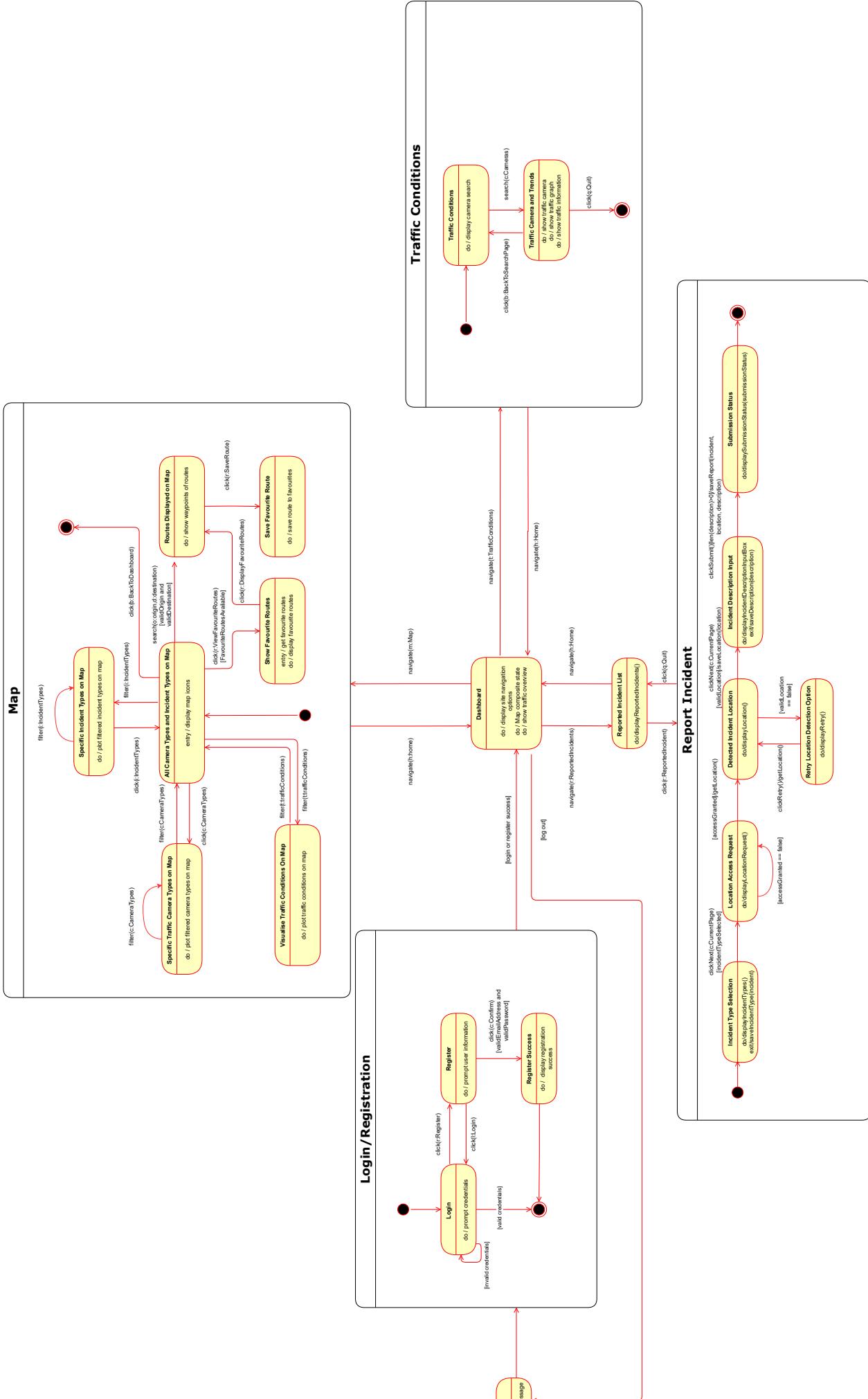
## View Traffic Camera Images



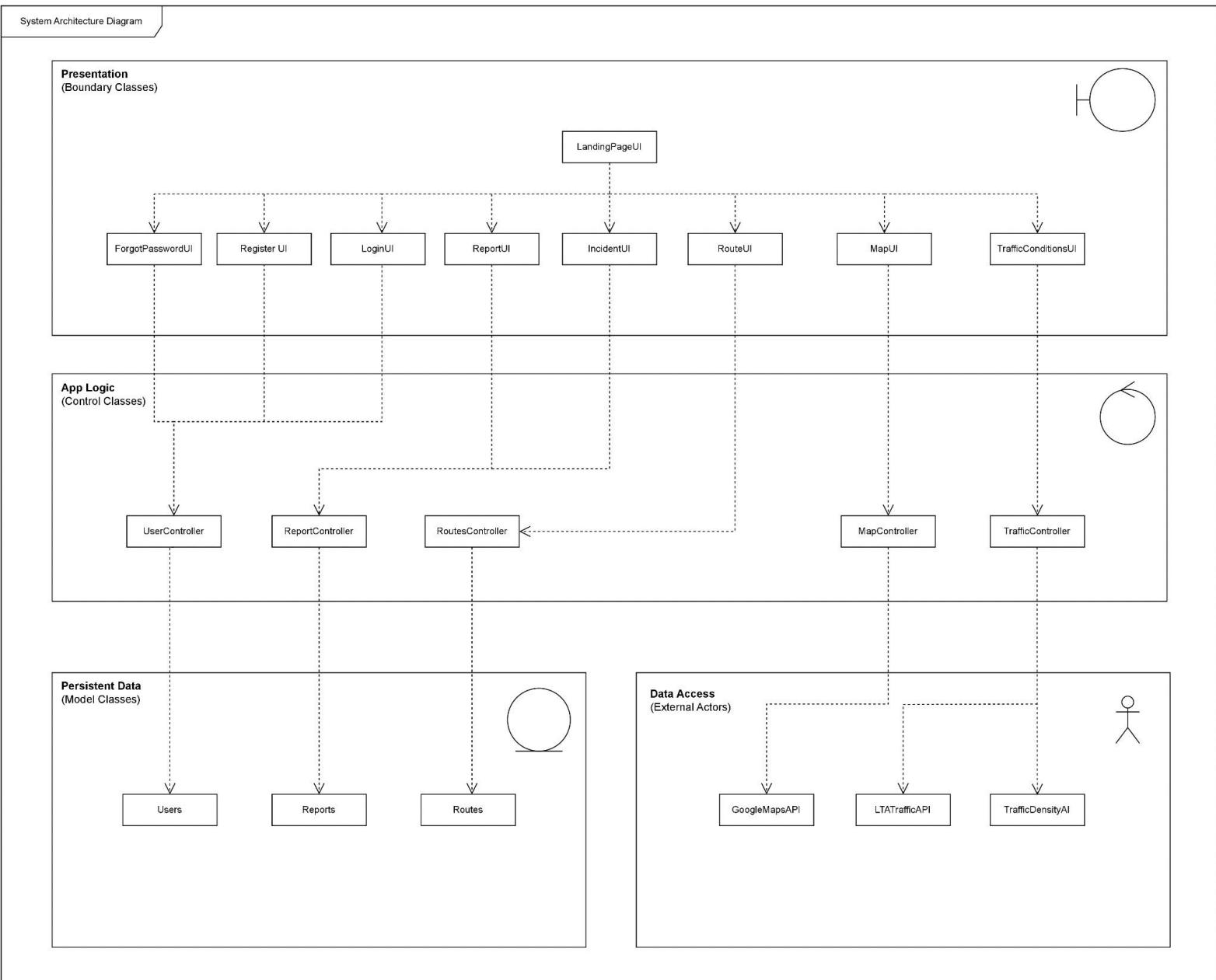
# Show Traffic Trends



# Dialog Map



# System Architecture



# UI Mockups



### USER LOGIN

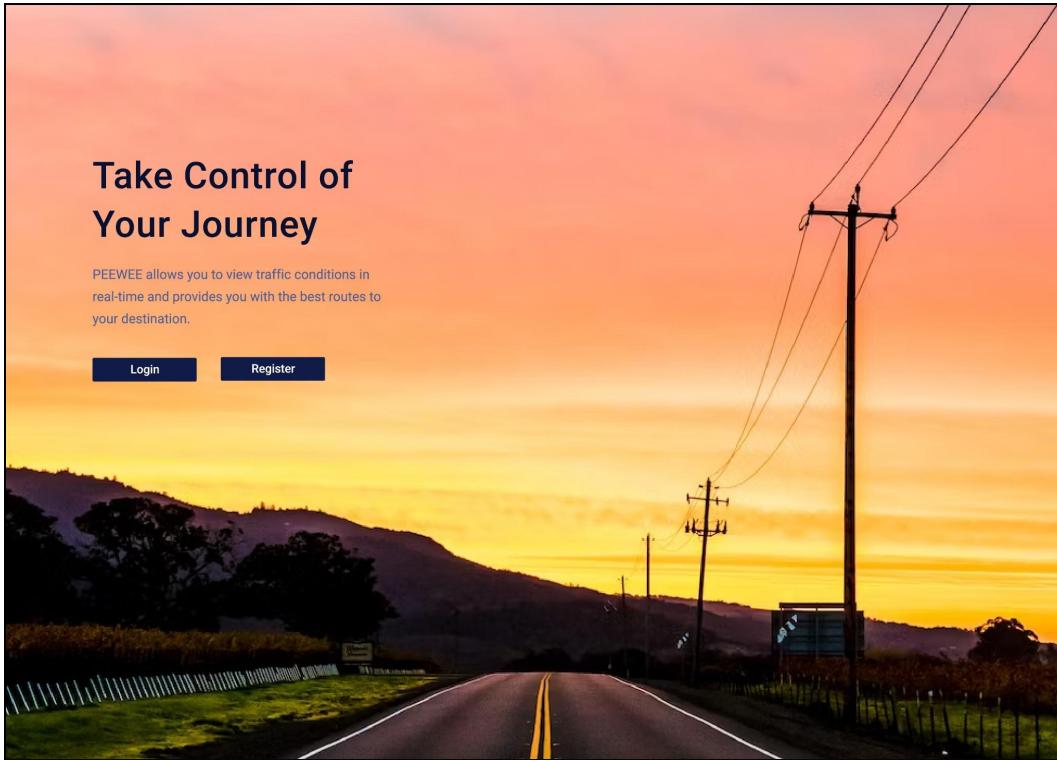
Email Address

Password

Remember Me [Forgot Password](#)

[LOGIN](#)

[SIGN UP](#)





PEEWEE



## Dashboard

Dashboard

Incidents

Map

Road Conditions

Log Out

## TRAFFIC TREND

DAY HOUR MIN

## TRAFFIC OVERVIEW

DROP PIN SEARCH SAVE

RECENTS

FAVOURITES



## Maps

[Dashboard](#)[Incidents](#)[Map](#)[Road Conditions](#)[Log Out](#)

Traffic Camera Filters:

[Accident-Prone Zone](#)[City Cameras](#)[Highway Cameras](#)[Show all](#)[Hide all](#)

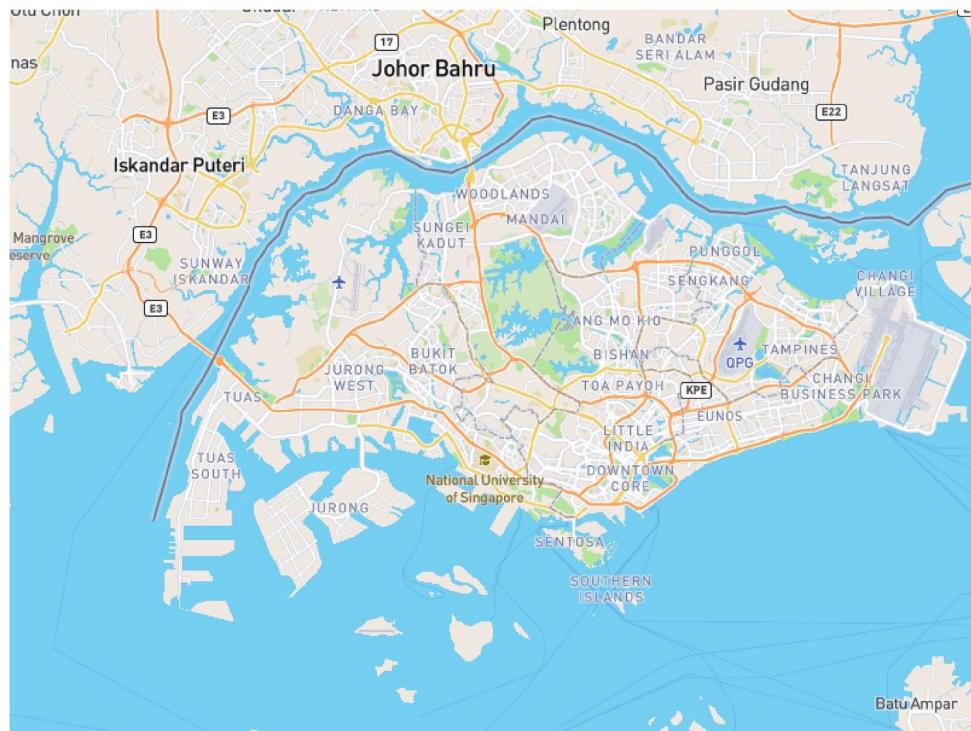
Incidents Filters:

[Accidents](#)[Roadworks](#)[Closure](#)[Slow Traffic](#)[Show all](#)[Hide all](#)

Search Route:

Starting location:

Destination:

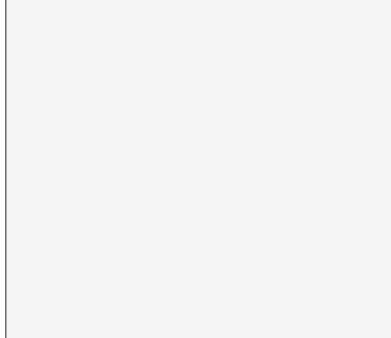
[Search](#)[Save Route](#)[Favourite Routes](#)

# PEEWEE

## Road Conditions

- Dashboard
- Incidents
- Map
- Road Conditions
- Log Out

### Traffic Trends



Minute Hour Day

### Traffic Images

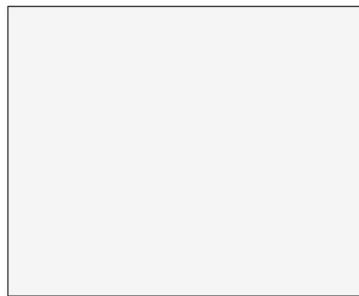


# PEEWEE

## Road Conditions

- Dashboard
- Incidents
- Map
- Road Conditions
- Log Out

### Traffic Trends



Minute Hour Day



Location: Causeway  
Camera ID: 2701  
Timestamp: 2023-09-04 23:15:00  
Traffic Level: HIGH



## Favourite Routes

Dashboard

Incidents

Map

Road Conditions

Log Out

Start: Blk 366A Yio Chu Kang Ave 8  
End: Nanyang Technological University

[View on Map](#)

[Unfavourite](#)

Start: Nanyang Technological University  
End: Blk 366A Yio Chu Kang Ave 8

[View on Map](#)

[Unfavourite](#)

[Back to Map](#)



## Incidents

Dashboard

Incidents

Map

Road Conditions

Log Out

### ACCIDENT

12:45

KJE Exit 5

A car collided with a bicycle at the leftmost lane, slight congestion due to traffic redirection.

### ROADWORK

18:30

PIE Exit 26A

Construction works on the rightmost lane, lane is partially closed, traffic is heavy near the area.

[Report](#)

 PEEWEE



### Report Incidents

-  Dashboard
-  Incidents
-  Map
-  Road Conditions
-  Log Out

Incident Type
Accident
Roadworks
Closure
Slow Traffic

**Next**

 PEEWEE



### Report Incidents

-  Dashboard
-  Incidents
-  Map
-  Road Conditions
-  Log Out

Allow PEEWEE to access your current location?

**No, cancel**   **Yes, confirm**

 PEEWEE



## Report Incidents

Current Location: KJE Exit 5

-  Dashboard
-  Incidents
-  Map
-  Road Conditions
-  Log Out

**Next**

 PEEWEE



## Report Incidents

Failed to detect current location.  
Proceed to detect current location again?

**No, cancel**   **Yes, confirm**

-  Dashboard
-  Incidents
-  Map
-  Road Conditions
-  Log Out

 PEEWEE



### Report Incidents

 Dashboard

 Incidents

 Map

 Road Conditions

 Log Out

Incident Description:

I



 PEEWEE



### Report Incidents

 Dashboard

 Incidents

 Map

 Road Conditions

 Log Out



**Successfully submitted!**

Thank you for reporting the incident.

