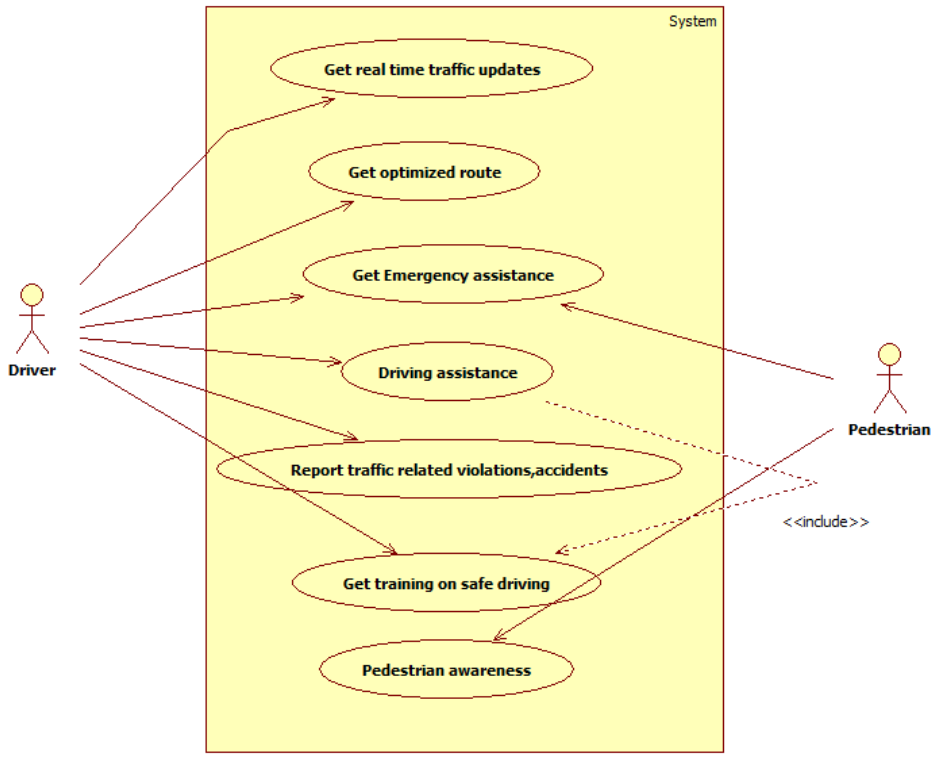
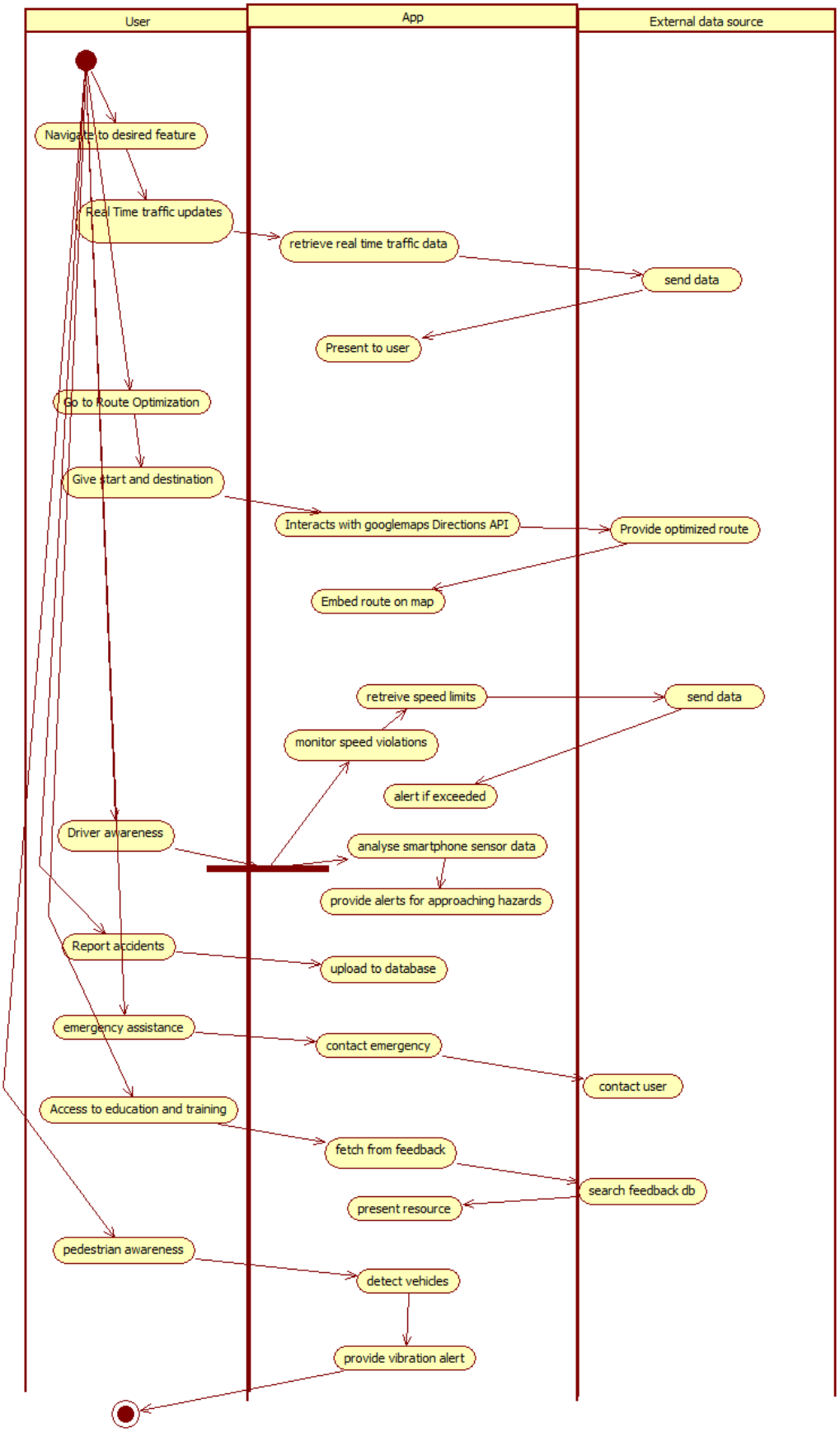
Use Case flow

K. Meher Sai (21MCME07)
S. Manikanta (21MCME20)



Swimlane diagram

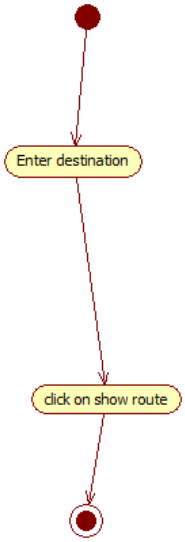

User
App
External data source
Navigate to desired feature
Real Time traffic updates
retrieve real time traffic data
send data
Present to user
Go to Route Optimization
Give start and destination
Interacts with googlemaps Directions API
Provide optimized route
Embed route on map
retreive speed limits
send data
monitor speed violations
alert if exceeded
Driver awareness
analyse smartphone sensor data
provide alerts for approaching hazards
Report accidents
upload to database
emergency assistance
contact emergency
contact user
Access to education and training
fetch from feedback
search feedback db
present resource
pedestrian awareness
detect vehicles
provide vibration alert

Use case specifications

Use Case ID:	3		
Use Case Name:	Route Optimization		
Created By:	K. Meher Sai, S Manikanta	Last Updated By:	K. Meher Sai, S Manikanta
Date Created:	18th February 2024	Date Last Updated:	18th February 2024

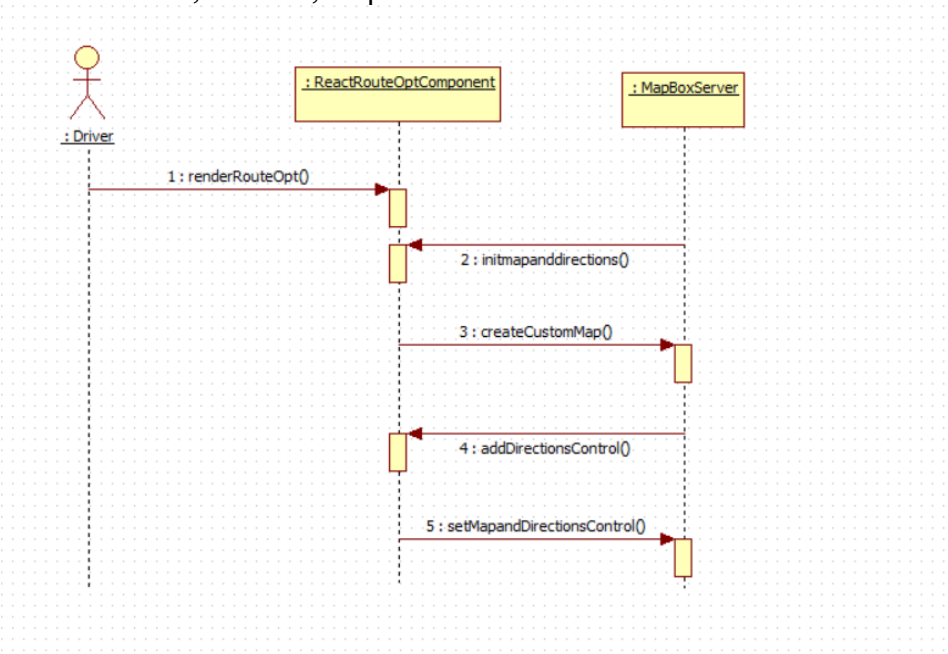
Actors:	Driver
Description:	Route optimization from initial to destination based on traffic updates and incident-aware routing.
Preconditions:	The user should login to the system.
Post conditions:	The optimized route map will be continuously updated as the location of user through GPS is tracked.
Normal Flow:	1. The input location is filled by the current location of user or user can choose an initial location. 2. User enters destination to go. 3. If user clicks on "show route", then the route on the map is displayed and directions are displayed
Alternative Flows:	A-1: If the destination is not entered, the user will be prompted to enter the destination.
Exceptions:	If internet connection is not there then route cant be displayed.
Includes:	
Priority:	High
Frequency of Use:	High
Business Rules:	
Assumptions:	-

Activity Diagram:



Sequence Diagram:

Nouns are user, location, map.



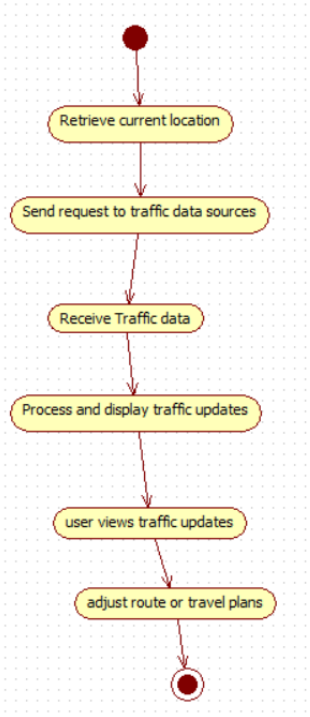
Use Case ID:	71		
Use Case Name:	Real Time Traffic Updates		
Created By:	K. Meher Sai, S. Manikanta	Last Updated By:	K. Meher Sai, S. Manikanta
Date Created:	19th February 2024	Date Last Updated:	19th February 2024

Actors:	Driver
Description:	Integrating with traffic data sources to provide users with real time updates on traffic conditions, accidents, road closures, and other incidents that may affect their route.
Preconditions:	• The user has the smartphone app installed and running.

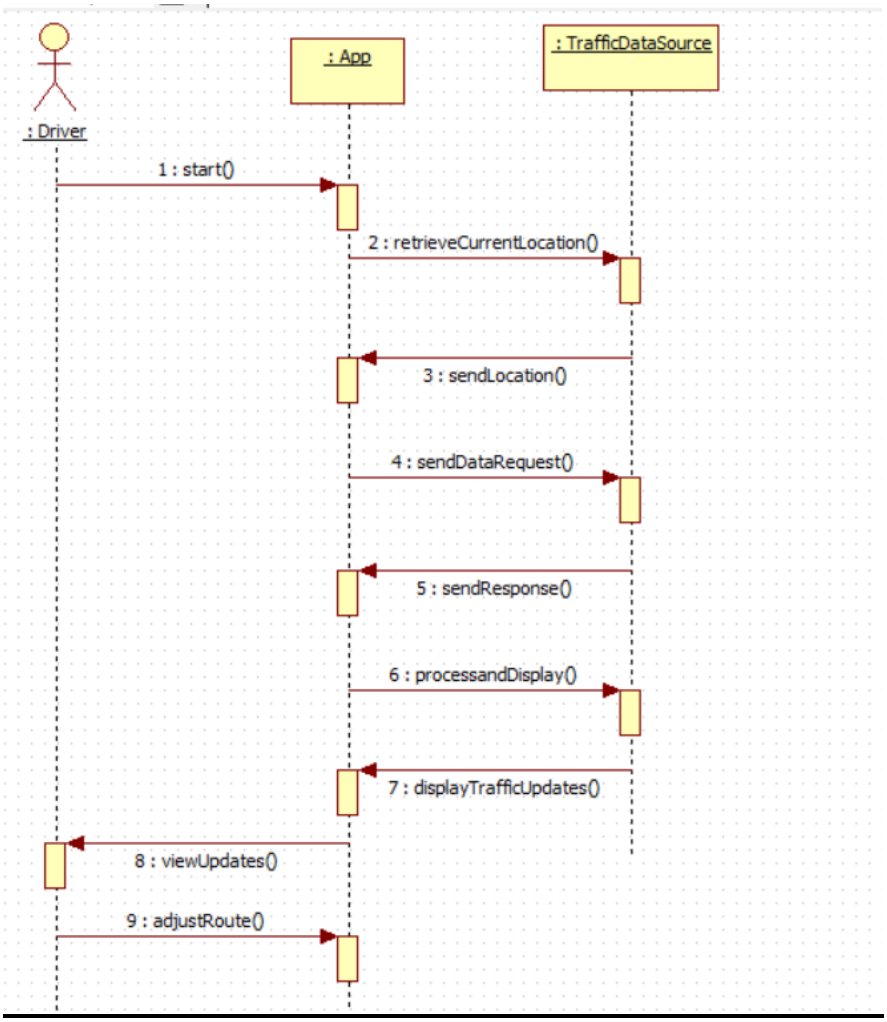
	• The user's smartphone has access to internet connectivity. • Traffic data sources are accessible and up-to-date.
Post conditions:	• The user receives real-time updates on traffic conditions. • The user can make informed decisions regarding their route and travel plans.
Normal Flow:	1. The user launches the smartphone app. 2. The app retrieves the user's current location using GPS data.[A-1] 3. The app sends a request to traffic data sources for real-time updates based on the user's location. 4. Traffic data sources respond with relevant information, including traffic congestion, accidents, road closures, and other incidents.[A-2] 5. The app processes the received data and displays real-time updates on the user's device. 6. The user views the updated traffic information on the app's interface. 7. Based on the received updates, the user adjusts their route or travel plans as necessary to avoid traffic congestion or incidents.[A-3]
Alternative Flows:	1. The user may choose to enable notifications for automatic updates, allowing the app to push real-time traffic updates to the user's device without manual retrieval. 2. The user may interact with the map interface provided by the app to visualize traffic conditions along their route and nearby areas.
Exceptions:	A-1: If the app fails to retrieve the user's current location it displays an error message notifying the user of the issue. A-2: If traffic data sources are inaccessible or fail to respond it notifies the user that real-time updates are unavailable at the moment. A-3: If the user decides to ignore the real-time updates and continues the current route without making adjustments.
Includes:	-
Priority:	High
Frequency of Use:	High
Business Rules:	• The system should prioritize real-time traffic data from reliable sources to ensure accuracy and reliability. • Updates provided to users should be timely and

	reflect the most current traffic conditions available. • User location should be tracked on consent from the user. • In the event of emergencies, such as accidents or road closures, priority should be given to delivering critical information to users to ensure their safety.
Assumptions:	Stable internet connectivity Sufficient hardware support Users expected to follow traffic laws and regulations.

Activity Diagram:



Sequence Diagram:



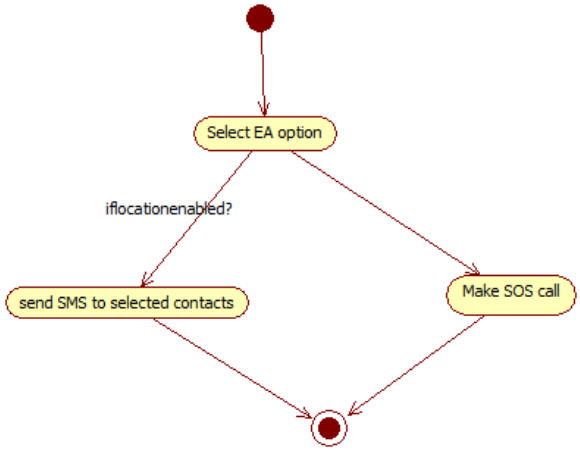
Use Case ID:	82		
Use Case Name:	Emergency Assistance		
Created By:	K. Meher Sai, S. Manikanta	Last Updated By:	K. Meher Sai, S. Manikanta
Date Created:	19th February 2024	Date Last Updated:	19th February 2024

Actors:	Driver, Pedestrian
Description:	Allows users to quickly contact emergency services or roadside assistance in the event of an accident or breakdown.
Preconditions:	1. The user has the smartphone app installed and running. 2. The user's smartphone has access to internet connectivity. 3. The user has encountered an emergency situation such as an accident or breakdown.
Post conditions:	1. The user has successfully contacted emergency services or roadside assistance for help. 2. Relevant information about the emergency situation is conveyed to the appropriate authorities.

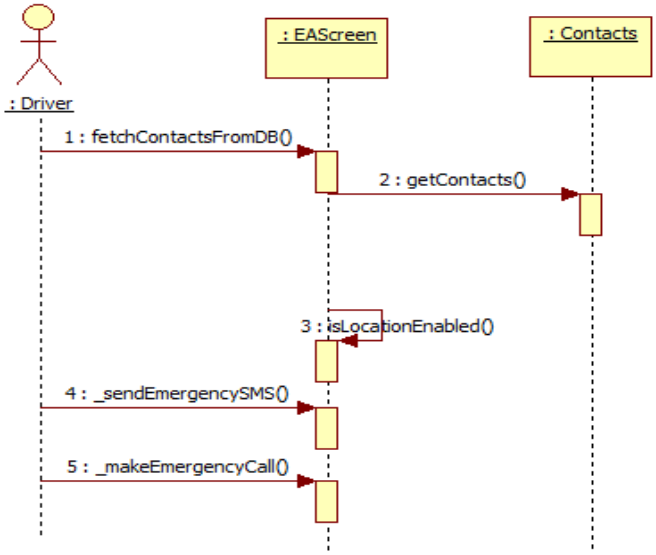
Normal Flow:	1. The user launches the smartphone app. 2. The user will navigate to the emergency assistance feature in the app. [1a] 3. The app gives options for contacting emergency services or roadside assistance. 4. The user selects the appropriate option based on the nature of the emergency: 5. If the user selects send SMS to emergency contacts: a. The app sends SMS to selected emergency contacts.b. The user location details are shared. 6. If the user makes a SOS call the call goes to 112 number and user communicates emergency situation and tells the location. 7. Emergency contacts or SOS acknowledges receipt of the request and dispatches appropriate assistance to the user's location. 8. The user receives assistance from emergency services or SOS resolving the emergency situation.
Alternative Flows:	1. The user may choose to enable automatic location sharing (GPS) with emergency services or roadside assistance providers, allowing them to quickly locate the user in the event of an emergency. 2. The app may include additional features such as sending emergency alerts to predefined contacts or displaying safety tips for handling emergency situations while waiting for assistance.
Exceptions:	1-a. If the user encounters difficulty accessing the emergency assistance feature: 1. The user may navigate to the app's main menu to locate the feature. 2. The app may provide guidance to assist the user in accessing the emergency assistance feature.
Includes:	Login
Priority:	High
Frequency of Use:	Medium(Not frequent)
Business Rules:	1. User consent for location sharing. 2. Location data shared with emergency contacts must be handled in compliance with relevant data privacy laws and regulations. 3. Users will be required to confirm their identity or provide additional information to validate the urgency of the situation.
Assumptions:	Availability of network connection. Correct contact information in the app. User is ready to share location and nature of the

	emergency.

Activity Diagram:



Sequence diagram:



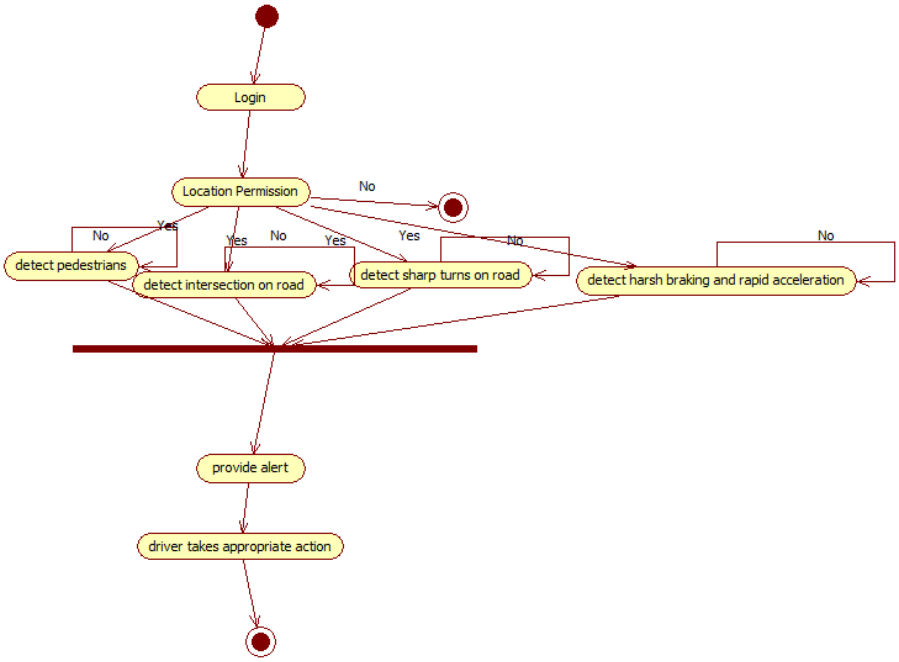
Use Case ID:	95		
Use Case Name:	Driving Assistance		
Created By:	K. Meher Sai, S. Manikanta	Last Updated By:	K. Meher Sai, S. Manikanta
Date Created:	19th February 2024	Date Last Updated:	19th February 2024

Actors:	Driver
Description:	The Driver Assistance feature aims to enhance driver safety and awareness by providing real-time alerts for potential hazards approaching intersections, sharp curves, pedestrian crossings, speed limit violations, and feedback on driving behavior.
Preconditions:	1. The driver has the smartphone app installed and running on their device. 2. The smartphone app has access to location data

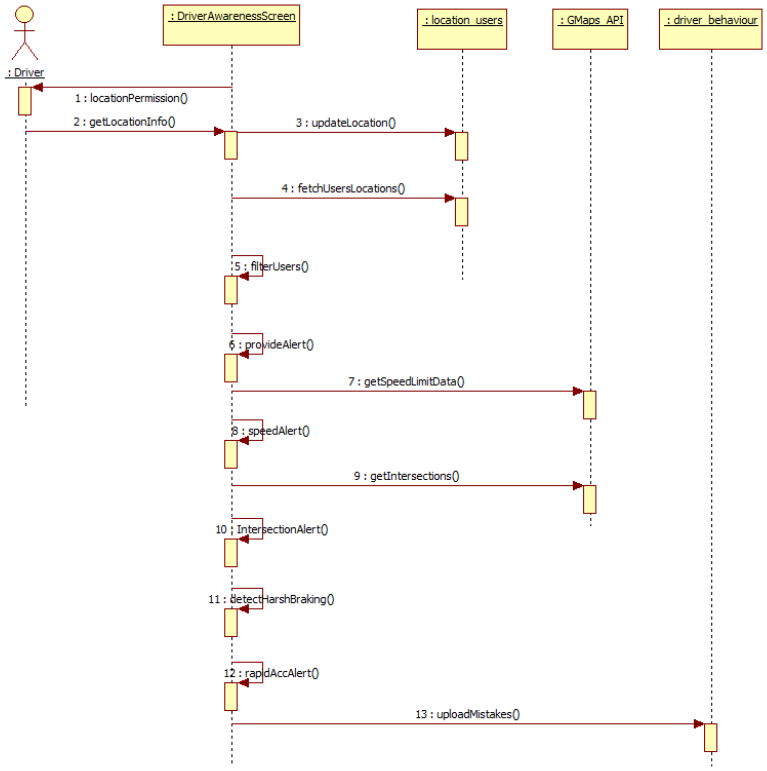
	for monitoring the driver's location and driving behavior.
Post conditions:	The driver receives timely alerts when pedestrians are approaching speed limit violations, at sharp turns, harsh braking, sudden acceleration promoting safer driving habits and reducing the risk of accidents. Through this feature the driver behaviour is analysed and, in the **Education and Training** feature the safety measures and driving guidelines are provided.
Normal Flow:	1. The driver initiates the Driver Assistance feature within the app. 2. The app continuously monitors the driver's GPS location and driving behaviour. [1a] 3. As the driver approaches intersections, sharp curves, pedestrian crossings, or other potential hazards, the app provides sound alerts to notify the driver and encourage attentiveness. [2a,3a] 4. If the driver exceeds the speed limit, the app triggers a speed limit notification alert using speed to inform the driver and encourage safer driving habits. [2a,3a] 5. The app analyzes driving behavior, including harsh braking, rapid acceleration, and sharp turns, using accelerometer and GPS data. 6. Based on the analysis, the app provides feedback to the driver, highlighting areas for improvement in driving habits and promoting safer driving practices. 7. The driver acknowledges the alerts and feedback provided by the app and adjusts their driving behavior accordingly.
Alternative Flows:	• The driver may choose to customize the settings for alerts and feedback within the app, such as adjusting alert sensitivity levels or opting out of specific notifications. • The app may integrate with in-car systems or wearable devices to provide hands-free access to alerts and feedback, minimizing distractions for the driver while on the road.
Exceptions:	1a. If the app fails to access location or accelerometer, speed data: • The app notifies the driver of the technical issue and notifies the driver to be safe. 2a. If the driver ignores or dismisses the alerts and

	feedback: • The app may escalate the alert level or provide more frequent notifications to draw the driver's attention to potential hazards or driving behavior issues. • The app may prompt the driver to confirm their acknowledgment of the alerts and commitment to safer driving practices. 3a. If the driver experiences difficulty understanding or responding to the alerts and feedback: • The app may provide **voice alert** to better understand the alert message. • The app may offer resources such as articles, videos, or quizzes to educate the driver about safe driving practices and the importance of attentiveness and adherence to speed limits.
Includes:	Education and Training
Priority:	High
Frequency of Use:	High
Business Rules:	1. Driver should adhere to traffic laws and regulations. 2. The results of potential hazards should be accurate. 3. Alerts should be clear and concise without causing distraction to user. 4. User are responsible for their actions, the app is just a guide to safe driving habits.
Assumptions:	1. Internet connectivity. 2. User hasn't disable location permission from the app.

Activity Diagram:



Sequence Diagram:



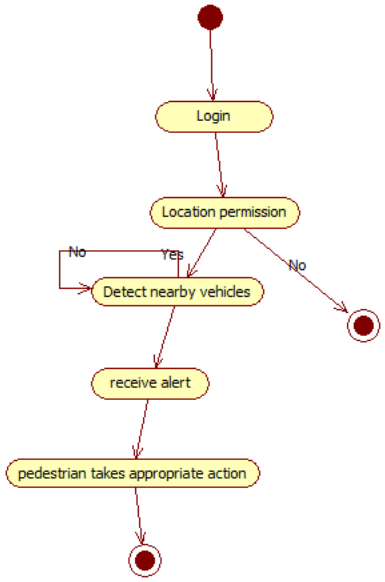
Here GMaps API provide info on speed limit data, road intersections data.

Use Case ID:	62		
Use Case Name:	Pedestrian awareness		
Created By:	K. Meher Sai, S. Manikanta	Last Updated By:	K. Meher Sai, S. Manikanta
Date Created:	19th February 2024	Date Last Updated:	19th February 2024

Actors:	Pedestrian
Description:	Indicating pedestrians when vehicles are approaching through the vibration alerts, enhancing pedestrian safety at crosswalks.
Preconditions:	1. Pedestrian has a smartphone or wearable device capable of receiving vibration alerts. 2. The pedestrian has logged into the app and has internet and location enabled.
Post conditions:	1. The pedestrians receiving vibration alert when vehicles are approaching at certain threshold distance.
Normal Flow:	1. Pedestrian has logged into app 2. The pedestrian's mobile device or wearable device asks for location permissions [2a]. 3. The system monitors for approaching vehicles using sensors or communication with nearby vehicles and calculates the distance with other drivers approaching. [3a] 4. When a vehicle approaches the pedestrian, the system will give a vibration alert on the pedestrian's device. 5. The pedestrian receives the vibration alert, indicating the presence of an approaching vehicle.[5a] 6. The pedestrian takes appropriate action to ensure safety, such as pausing before crossing or waiting for the vehicle to pass.
Alternative Flows:	2a: If the location permission are disables the app cannot calculate distance with other drivers and hence pedestrian has to look for his/her safety. 3a: If the app fails to detect approaching vehicles then it should provide some voice message to look for vehicles that approaching. 5a: Due to external environmental disturbances, the vibrations may not be experienced by the pedestrians so the alert intensity can be increased in case of that.
Exceptions:	False positive vibration alerts leading to unnecessary alerts.
Includes:	Login
Priority:	High (Pedestrian safety is critical at traffic junctions, during blind turn points)
Frequency of Use:	Depends on volume of traffic and number of zebra crosswalks.
Business Rules:	1. The vibration alerts should be sufficiently strong to attract the pedestrian's attention without causing discomfort.

	2. The system should prioritize accuracy in detecting approaching vehicles to minimize false alerts and ensure pedestrian trust in the system. 3. Pedestrians should be educated about the meaning of the vibration alerts and instructed on how to respond appropriately when receiving them.
Assumptions:	Pedestrians have smartphone or wearable devices capable of receiving vibration alerts. The app has access to location and internet.

Activity Diagram:



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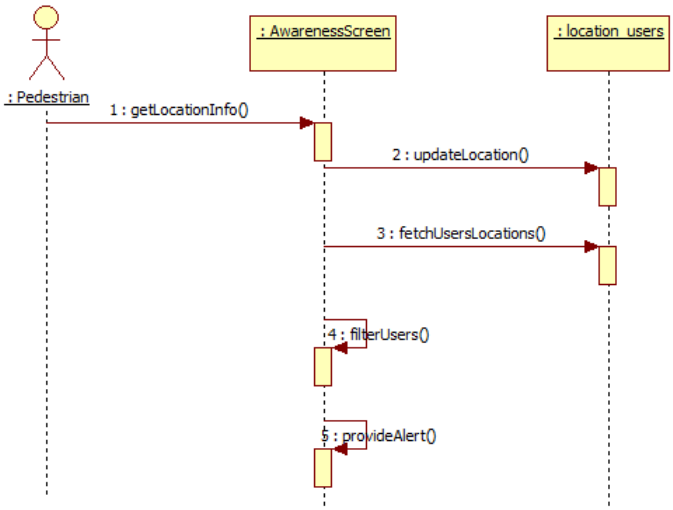


Use Case ID:	43		
Use Case Name:	Education and Training		
Created By:	K. Meher Sai, S.	Last Updated	K. Meher Sai, S.

	Manikanta	By:	Manikanta
Date Created:	19th February 2024	Date Last Updated:	19th February 2024

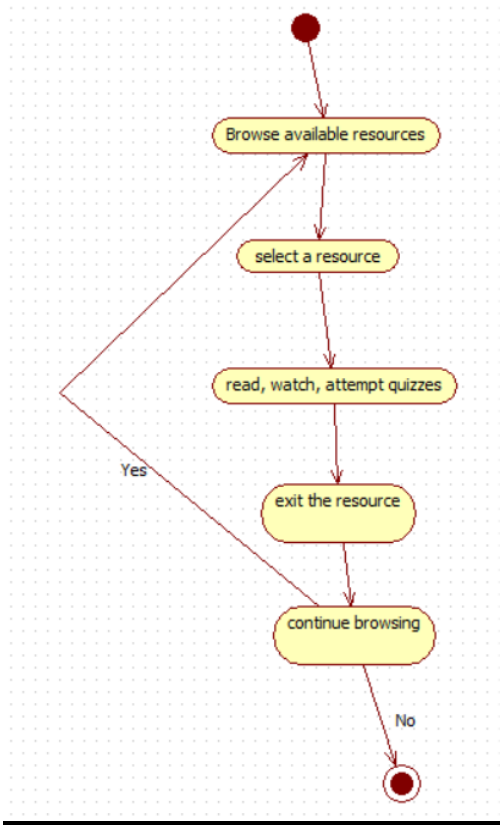
Actors:	Driver
Description:	Providing resources such as articles, videos, and quizzes to educate users about safe driving practices, traffic laws, and emergency procedures.
Preconditions:	• The user has logged into mobile app. • User has used the driver awareness feature.
Post conditions:	• The user has accessed educational resources and potentially gained knowledge about safe driving practices, traffic laws, and emergency procedures based on the analysis done in the driver awareness feature.

Normal Flow:	1. The user navigates to the Education and Training section within the mobile app.
	2. The user browses through available resources, including articles, videos, and quizzes.
	3. The user selects a specific resource to view or interact with.
	4. The system presents the selected resource to the user.
	5. The user reads, watches, or interacts with the resource to learn about the relevant topic.
	6. After reviewing the resource, the user may choose to:
	  • Continue browsing other resources.
	  • Exit the Education and Training section.

Alternative Flows:	If the user encounters technical issues while accessing or interacting with educational resources, they may choose to report the issue to the app support team or retry accessing the resources later.
Exceptions:	If there are no educational resources available due to maintenance or updates, the system may display a notification informing the user of the temporary unavailability and prompt them to check back later.
Includes:	Driver Awareness
Priority:	Medium priority, as providing education and training resources contributes to enhancing user knowledge and promoting safer driving practices.
Frequency of Use:	Depends on the user's interest in learning about safe driving practices, traffic laws, and emergency procedures.
Business Rules:	1. Educational resources should be regularly updated to ensure that users have access to current and relevant information. 2. The app may track user interactions with educational resources to personalize

	recommendations and improve the user experience.
Assumptions:	Users have access to a stable internet connection.

Activity Diagram:



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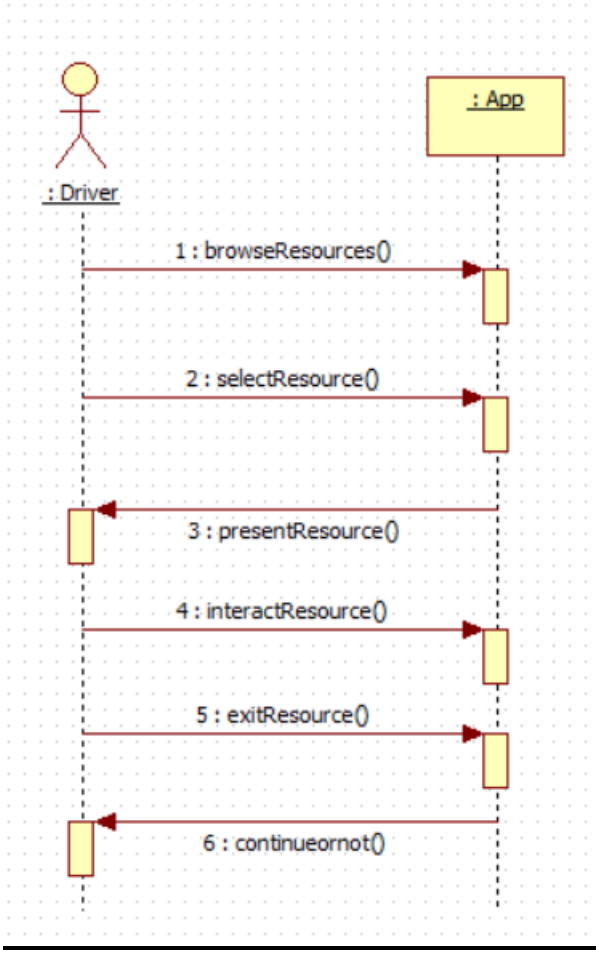
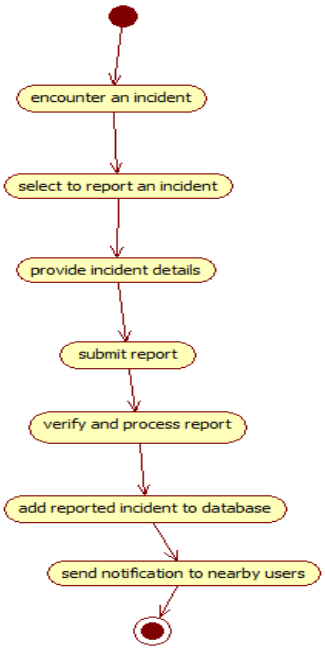


Use Case ID:	48		
Use Case Name:	Report traffic accidents and violations		
Created By:	K. Meher Sai, S. Manikanta	Last Updated By:	K. Meher Sai, S. Manikanta
Date Created:	19th February 2024	Date Last Updated:	19th February 2024

Actors:	Driver
Description:	Allowing users to report accidents, hazards, or traffic violations they encounter while traveling. These reports contribute to a real-time database that benefits other users by providing them with up-to-date information about road conditions.
Preconditions:	• The user has access to the mobile app with the feature enabled. • The user is currently traveling or observing road conditions.
Post conditions:	• The user's report is successfully submitted to the crowdsourced database. • Other users may access and benefit from the reported data.
Normal Flow:	1. The user encounters an accident, hazard, or traffic violation while traveling on the road. 2. The user accesses the Crowdsourced Data

	Reporting section within the mobile app. 3. The user selects the option to report an incident. 4. The user provides details about the incident, including its type (accident, hazard, or traffic violation), location, description, and any additional relevant information. 5. The user submits the report. 6. The system verifies and processes the report. 7. The reported incident is added to the real-time crowdsourced database and notification is sent to the nearby users.
Alternative Flows:	If the user encounters technical issues or connectivity problems while trying to submit a report, they may choose to retry the submission or save the report as a draft for later submission.
Exceptions:	• If the reported incident does not meet certain criteria or is deemed irrelevant or false by the system, it may be rejected or flagged for further review by moderators. • In case of abuse or misuse of the reporting feature, such as submitting fraudulent reports or spam, the user may be subject to account suspension or other penalties.
Includes:	-
Priority:	Medium to high priority, as providing crowdsourced data contributes to enhancing user safety and improving the overall quality of the app's services.
Frequency of Use:	The frequency of use depends on the user's travel patterns and the prevalence of incidents encountered on the road.
Business Rules:	1. User-reported incidents should be verified and validated before updating database. 2. Users should be encouraged to provide detailed and factual information when reporting incidents to enhance the usefulness of the crowdsourced data. 3. The crowdsourced database should be regularly updated and maintained
Assumptions:	Users have access to a stable internet connection.

Activity Diagram:



Sequence Diagram: