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# **Introduction:**

Managing transportation is a collaborative activity that is based upon sharing and exchanging information.

Mobile phones are becoming smaller with modern Graphical User Interfaces (GUIs), and are very powerful. In addition, they are now used everywhere and at any time (ubiquitous). The advancements and enhancement of the hardware went through have made mobiles smaller in size and more effective and efficient. Furthermore, it allows us to include many types of peripherals that are not limited with a specific number [[1]](https://docs.google.com/document/d/17yaIiqiIL7kCBDXDRNC-pahryXYWnmdPUlgkoo-Vqcw/edit" \l "heading=h.cpvgpnooedr2). Nowadays, there are three different methodologies to allow smart mobile phones to be capable of utilizing the location and positioning services:

 1) The utilization of Satellite Positioning,

2) The utilization of Wi-Fi Positioning and

 3) The utilization of Cellular Positioning.

## **1.1 Purpose:**

This is an app to be used by both the passenger and the taxi drivers, where the passengers use it to specify their location or position at a given time , whereas the drivers use it to locate the exact location of more passengers.

This can help both drivers and passengers in the following ways:

* It reduces the amount of time passengers have to wait for a taxi
* Drivers can optimize fuel consumption as the app will guide them to move to locations where more potential passengers are available.

### **1.1.1 Problem Statement**

1. **Fuel:**

With the recent increase in the prize of fuel, fuel preservation is sort out by all drivers and transportation companies

1. **Lack of real-time information:**

Many transportation companies face the problem of not being able to provide their passengers with real-time information about vehicle locations and estimated arrival times, which can lead to frustration and dissatisfaction.

1. **Routing:**

Inefficient routing and time delay due to traffic . Drivers turn to get stuck in traffic due to inefficient information about routes with dense population

1. **Management:**

Difficulty in company vehicles distributions across the municipality: Transportation companies with many vehicles struggle with managing and partitioning all of their vehicles Across the city .

# 2. Business and user Requirements:

### 2.1 Business requirements:

After analyzing the system, we were able to come out with the following business requirements

1. **ETA Calculation:** The system should be able to calculate accurate ETA for passengers and provide updates in real-time.
2. **Integration With Transportation Providers**: The system should be able to integrate with transportation provider’s systems to provide seamless communication and data exchange.
3. **Performance And Reliability:** The system should be able to handle a large number of users and provide reliable performance without downtime or outages.
4. **Scalability And Flexibility:** The system should be able to handle large numbers of vehicles and passengers, and be flexible enough to adapt to changing business needs and requirements.
5. **Improved Customer Experience:** The system should enhance the overall customer experience by providing accurate and timely information, easy-to-use interfaces, and efficient transportation services.
6. **Cost-Effectiveness**: The system should be cost-effective, with a reasonable return pricing
7. **Passenger Safety And Security:** The system should have features to ensure passenger safety and security, such as real-time monitoring .
8. **Emergency Response Capabilities:** the system should have ways to indicate passengers under undergoing and emergency so as to get the attention of the nearest vehicle
9. **Fuel:** Reduces fuel consumption since the drivers can avoid unnecessary rides and safe money.

### 2.2 User requirements:

1. **Real-Time Updates**: The app should provide real-time updates on passenger locations and ETA.
2. **Multi-Platform Support:** The app should be available on multiple platforms, including iOS and Android.
3. **Personalization**: The app should be able to provide personalized information and settings for each user.
4. **Security And Privacy**: The app should have secure authentication and data protection mechanisms to ensure user privacy and prevent unauthorized access.
5. **Notifications**: The app should be able to send notifications to users regarding updates, alerts, or other relevant information.
6. **Easy-To-Use Interface:** The system should have a user-friendly interface that is easy to navigate and understand, with clear and concise information about vehicle locations, routes, and estimated arrival times.
7. **Mobile Accessibility:** The system should be accessible through mobile devices, such as smartphones and tablets, including integration with vehicle gps lcd display
8. **Feedback And Ratings:** The system should allow passengers to provide feedback and ratings about their experience

### 2.3 Functional requirements:

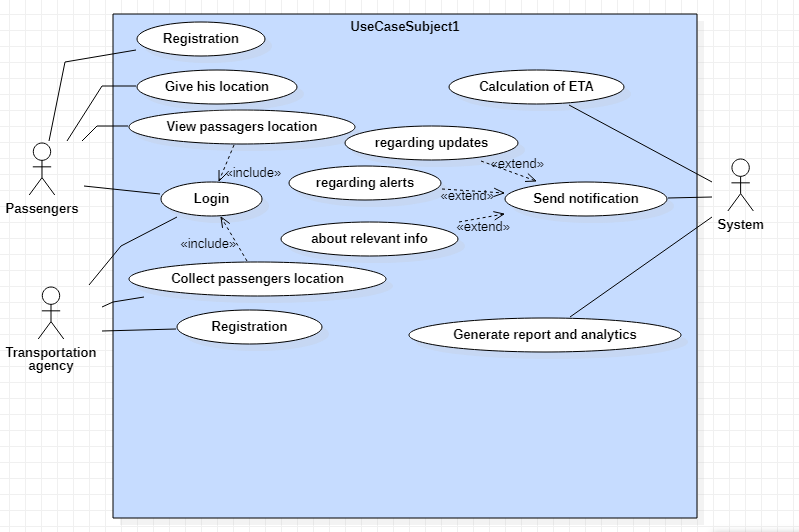
From analysis of the system we can deduce the following functional requirements.

* **User registration and login:** The system should allow users to create an account and login securely.
* **Location tracking:** The system should be able to track the location of passengers using GPS or other location-based technologies.
* **ETA calculation:** The system should be able to calculate accurate ETA for passengers based on their location and the transportation route.
* **Real-time updates:** The system should provide real-time updates on passenger locations and ETA to both users and transportation providers.
* **Route optimization:** The system should be able to optimize transportation routes based on passenger demand and traffic conditions.
* **Push notifications:** The system should be able to send push notifications to users regarding updates, alerts, or other relevant information.
* **Analytic and reporting:** The system should be able to generate reports and analytic on passenger behavior, route performance, and other relevant metrics.
* **Integration with transportation providers:** The system should be able to integrate with transportation providers' systems to provide seamless communication and data exchange.

### 2.4 Non-functional requirements

* **Payment integration:** The system should be able to integrate with payment systems to allow users to pay for transportation services directly through the app.
* **Personalization:** The system should be able to provide personalized information and settings for each user, such as preferred routes or modes of transportation.
* **Performance**: The system should be able to handle a large number of users and provide reliable performance without downtime or outages.
* **Scalability**: The system should be able to scale up or down depending on the number of users and the demand for transportation services.
* **Security:** The system should have secure authentication and data protection mechanisms to ensure user privacy and prevent unauthorized access.
* **Usability:** The app should have an intuitive user interface that is easy to use, even for non-technical users.
* **Accessibility**: The app should be accessible to users with disabilities and provide support for assistive technologies.
* **Reliability:** The system should be highly available and provide reliable performance even under heavy load or adverse conditions.
* **Availability**: The system should be available 24/7 to meet the needs of users and transportation providers.
* **Maintainability:** The system should be easy to maintain and upgrade over time, with minimal disruption to users.
* **Compatibility:** The app should be compatible with a wide range of devices, operating systems, and browsers.
* **Data management:** The system should be able to manage and store large amounts of data, such as passenger locations and transportation routes, in a secure and efficient manner.

# 3. Use Case diagram



The passenger can interact with the system by registering an account, logging in, and viewing their location on the map. The system can calculate the ETA for the passenger and optimize the transportation route based on traffic conditions and passenger demand. The system can also send notifications to passengers regarding updates or alerts.

The transportation provider can interact with the system by integrating their system with the passenger positioning system, which allows for seamless communication and data exchange. The system can also integrate with payment systems to allow passengers to pay for transportation services directly through the app.

This is just a high-level overview of a potential use case diagram for a passenger positioning system. The specific use cases and interactions will depend on the goals and objectives of the system, as well as the needs and preferences of the users and transportation providers.

Regenerate response

# 3. Technical requirements:

Some technical requirements needed for our system are as follows:

* **Mobile application development:**

The system requires developing a mobile application that supports both Android and iOS platforms.

* **Location-based services:**

The system should be able to use GPS and other location-based technologies to track the location of passengers.

* **Real-time data processing:**

The system should be able to process large amounts of data in real-time to provide accurate passenger location and ETA information.

* **Mapping and routing software:**

The system should use mapping and routing software to optimize transportation routes based on traffic conditions and passenger demand.

* **Push notification services:**

The system should integrate push notification services to send alerts and updates to users and transportation providers.

* **API development:**

The system should develop APIs that enable communication between the passenger positioning system and transportation provider systems.

* **Cloud infrastructure:**

The system requires a scalable and reliable cloud infrastructure that can support a large number of users and provide high performance.

* **Data storage and management:**

The system requires a robust data storage and management system to store passenger data, transportation routes, and other relevant information.

* **Security and privacy:**

The system should have secure authentication and data protection mechanisms to ensure user privacy and prevent unauthorized access.

* **Testing and quality assurance:**

The system should undergo rigorous testing and quality assurance processes to ensure that it is functioning properly and meeting user needs

# 4. Design requirements:

* **Responsive design:**

The system should be designed with responsive design principles to ensure that it can be accessed on different devices, such as smartphones, tablets, and desktops.

* **Visual design:**

The system should have a visually appealing design that is consistent with the branding and image of the transportation provider.

* **Accessibility:**

The system should be designed to be accessible to users with disabilities, with support for assistive technologies and compliance with accessibility standards.

* **Consistent design language:**

The system should have a consistent design language across all screens and pages, with a focus on clarity and simplicity.

* **Performance optimization:**

The system should be designed to optimize performance, with efficient code, minimal page load times, and reduced server requests.

* **Scalability:**

The system should be designed with scalability in mind, with a flexible architecture that can handle a large number of users and a growing amount of data.

* **Security and privacy:**

The system should be designed with strong security and privacy measures, with encryption and authentication protocols, secure storage of user data, and compliance with relevant regulations.

* **Integration with other systems:**

The system should be designed to easily integrate with other transportation provider systems, payment gateways, and third-party services.

* **Analytic and reporting:**

The system should be designed to track user behavior and generate reports and analytics that provide valuable insights to transportation providers.

# 5. TECHNOLOGY WE WILL USE

Browsing on the specifications of our system we were able to come out with the most probable technologies we would use for building up the system

**- Global Positioning System (GPS):**

This technology uses satellite signals to determine the user's location. It can be used to provide real-time location updates and track the user's movement.

**- WiFi and Bluetooth:**

These technologies can be used to determine the user's location indoors, where GPS signals may not be available. By using signals from nearby WiFi access points or Bluetooth beacons, the app can estimate the user's location.

**- Mobile networks:**

Mobile network operators can use a technique called triangulation to estimate the user's location based on the strength of the signals received from nearby cell towers.

**- Mapping APIs:**

Mapping APIs, such as Google Maps or Apple Maps, can be integrated into the app to provide a visual representation of the user's location and route.

**- Cloud services:**

Cloud services can be used to store and process location data, as well as to provide real-time updates to other users of the app.

**Augmented Reality (AR):**

AR technology can be used to overlay real-time location information onto a camera view of the user's surroundings.

**Python (Django Framework):**

This a python framework that will be used mainly for the backend of our application and it provides the following advantages:

* Django is Powered by Python
* Django has the Model View Template Architecture
* Django is Highly Secure
* Django Provides a Default Admin Panel
* Django has a Great Set of Libraries
* Django is Good for Search Engine Optimization (SEO)
* Django Provides Object Relational Mapper(ORM)

**html, css, Javascript:** These are languages that would be used for the front end and user interface implementation of the system.

**MySQL:** This is the language that will be use to store our data in the database of the system

# 6. Legal and Compliance Requirement

Here are some potential legal and compliance requirements for a

passenger positioning system :

* Data privacy regulations:

The system should comply with data privacy regulations, such as GDPR or CCPA, to protect the privacy of users' personal data.

* Payment processing regulations:

The system should comply with payment processing regulations, such as PCI DSS, to ensure the security of payment transactions.

* Intellectual property rights:

The system should comply with intellectual property rights, such as copyright and trademark laws, to avoid infringing on the rights of others.

* Liability and insurance:

The transportation provider should ensure that they have liability insurance coverage for accidents and incidents that may occur during transportation services provided through the system.

* Tax and regulatory compliance:

The transportation provider should comply with applicable tax and regulatory requirements, such as obtaining necessary permits and licenses.

* Security and fraud prevention:

The system should have security measures in place to prevent fraud and protect against security breaches, such as implementing encryption, two-factor authentication, and monitoring for suspicious activity.

* Consumer protection laws:

The system should comply with consumer protection laws, such as the Federal Trade Commission Act, to ensure that users are not subjected to deceptive or unfair practices.

* Dispute resolution:

The system should have a dispute resolution process in place to address any disputes that may arise between the transportation provider and users.

# 7. Conclusion

The passenger positioning system app is an essential technology that can improve the travel experience for passengers and drivers.

The app should be accurate, reliable, user-friendly, secure, and cost-effective.