

Architecture & Design Document

Description of the Software Architecture

Components

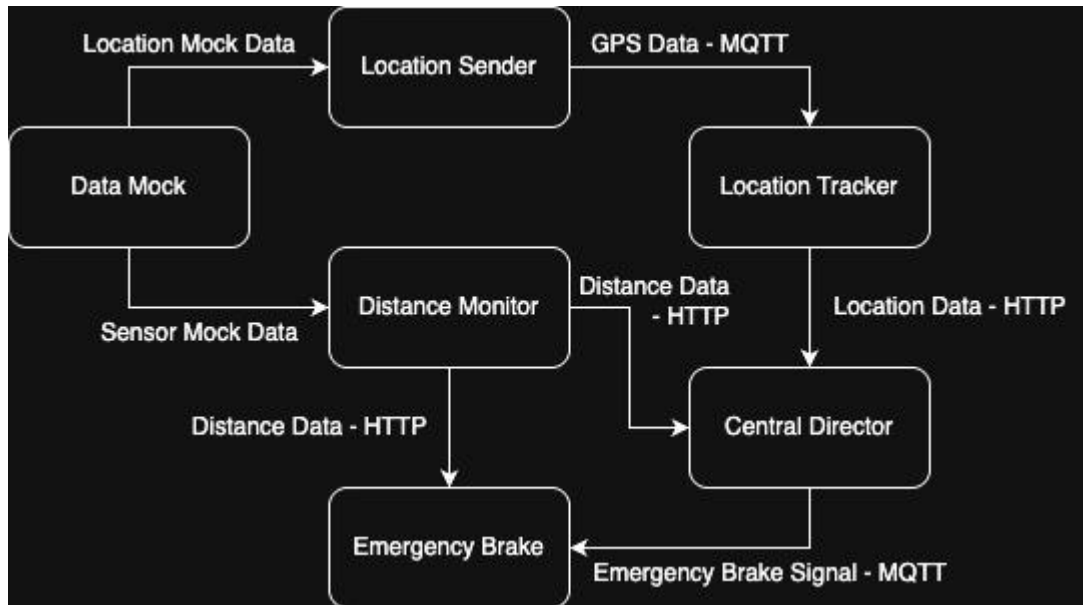
- **Passenger API Gateway:** Entry point for all clients, exposes REST endpoints
- **Message Broker (RabbitMQ):** Manages asynchronous messaging between microservices
- **Visor Web Application:** Browser-based UI displaying live vehicle positions, event logs, and microservice data
- **Location Sender:** Reads GPS from vehicle and publishes location messages to the Message Broker
- **Location Tracker:** Subscribes to location messages, persists vehicle positions in LTDB, and provides query API
- **Distance Monitor:** Uses fused sensor data to compute distance and velocity delta, then publishes distance message
- **Emergency Break:** Listens for emergency break commands and triggers vehicle braking system
- **Central Director:** Orchestrates control logic by consuming location and distance messages, evaluates conditions, and issues Emergency Break commands
- **DataMock:** Simulates vehicle sensor outputs for testing and demo scenarios
- **Databases:**
 - LTDB: Stores historical GPS data for each vehicle
 - CDDDB: Stores Central Director events and decision logs

Interfaces

- API Gateway Interfaces:
 - **[GET] /lt/api/vehicles/latest-locations** - returns list of latest vehicle locations
 - **[GET] /cd/api/vehicles** - returns list of vehicle information
 - **[GET] /cd/api/logs** - returns list of 100 latest log events
- Message Broker Topics:
 - **[gps_data]** - Location Sender publishes vehicles current position
 - **[brake_commands]** - Central Director publishes emergency brake message
 - **[brake_status]** - Emergency Brake publishes successful braking message
 - **[events]** - Central Director consumes event messages from all microservices
- Microservice APIs:
 - **[POST] emergency-brake/processed-data** - receive processed sensor data
 - **[POST] distance-monitor/sensor-data** - processes data mock sensor data and forwards it to appropriate services
 - **[GET] location-tracker/api/vehicles/latest-locations** - get latest locations for all vehicles
 - **[GET] central-director/api/vehicles** - get brake status for all vehicles

- **[POST] central-director/processed-data** - receive processed data from distance monitor, processes and evaluates emergency brake rules

Logical View



Physical View

