NETWORKED TRAFFIC CONTROL IN SMART CITY

ESE GROUP 6

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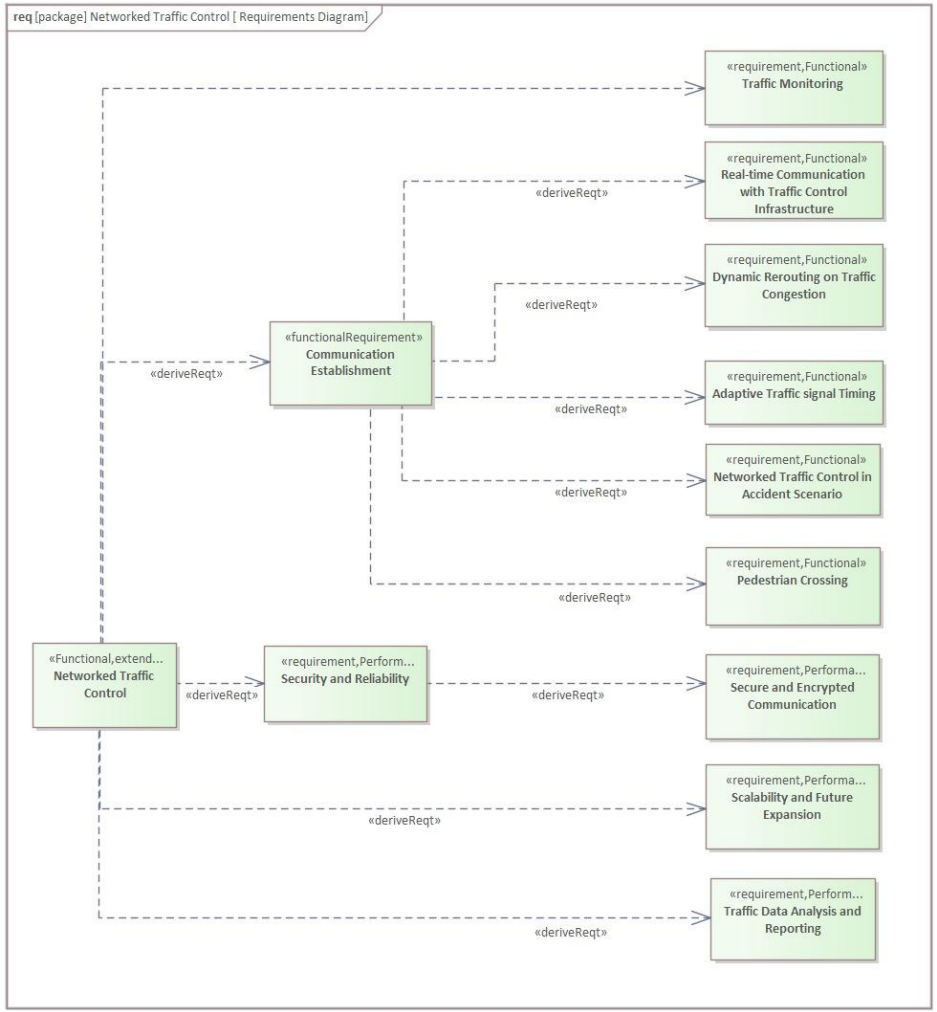
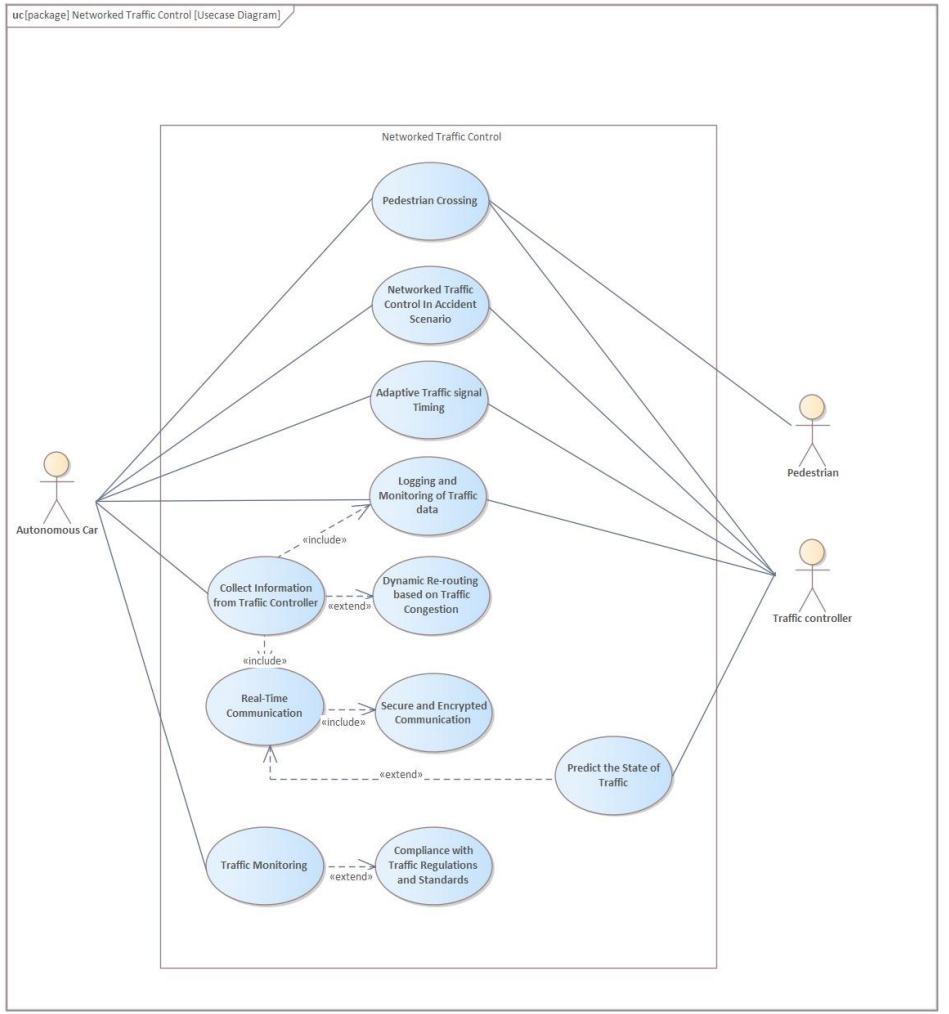
1. Introduction

- Networked traffic control is revolutionizing transportation for autonomous vehicles.
- Integrating V2X communication and AI algorithms, it optimizes traffic flow and safety.
- Leveraging real-time data and communication technologies, it dynamically redirects traffic to alleviate congestion.
- For pedestrians,the system dynamically adapt signal and signal timings, it ensures seamless crossings with safety.
- This system integrates real-time communication and data analytics to dynamically manage traffic during emergencies.

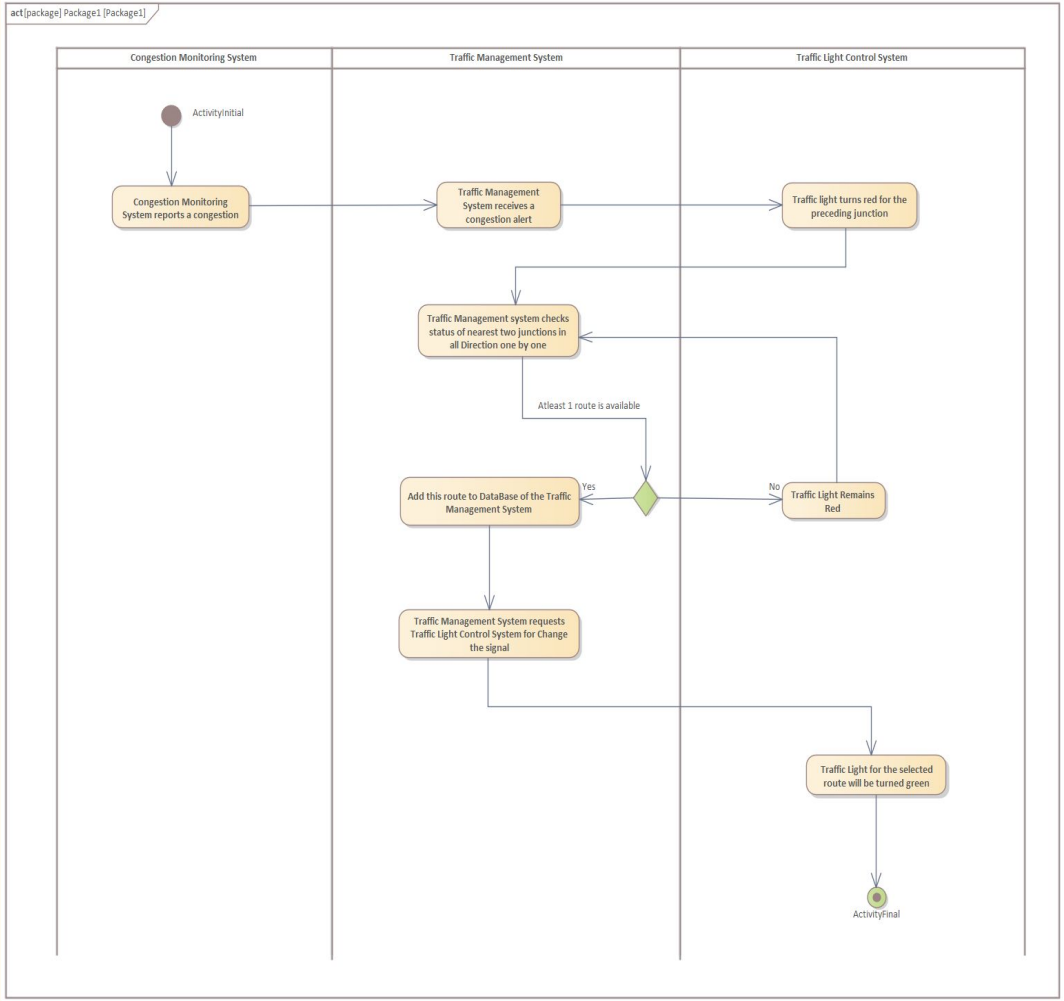
2. Requirements Diagram



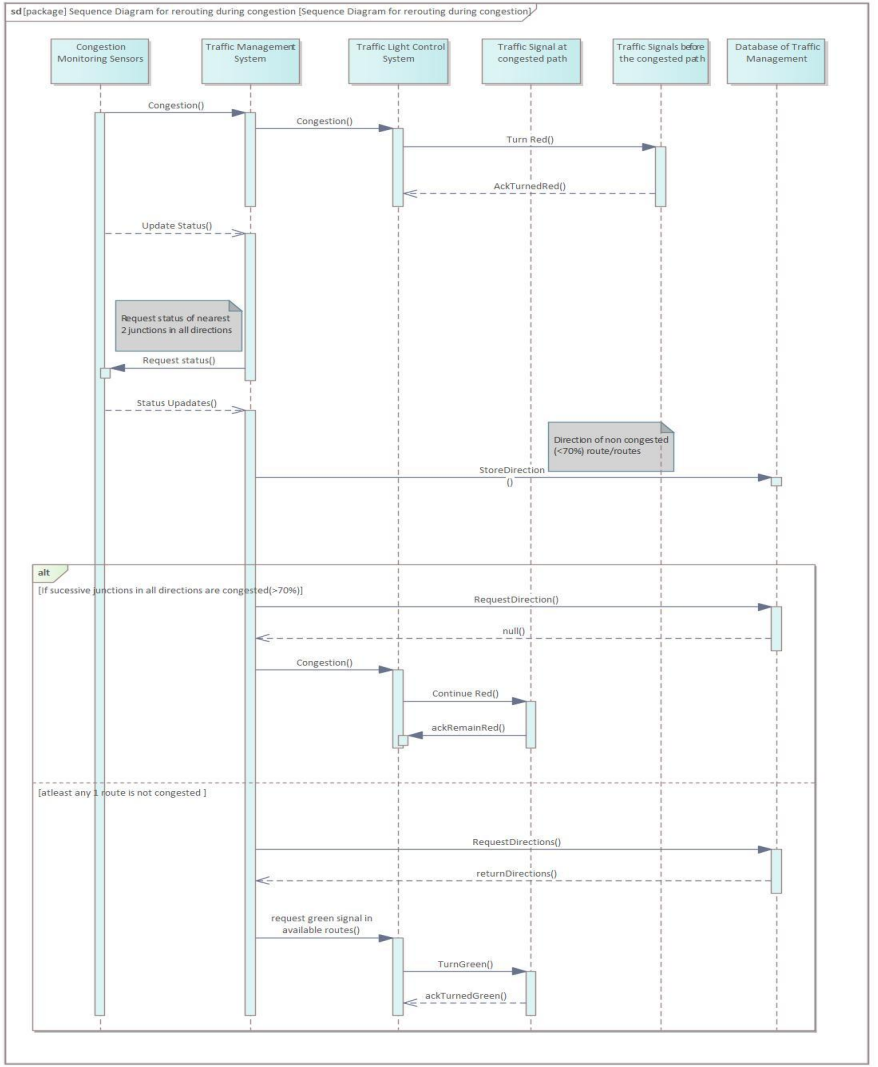
3. Use Case Diagram



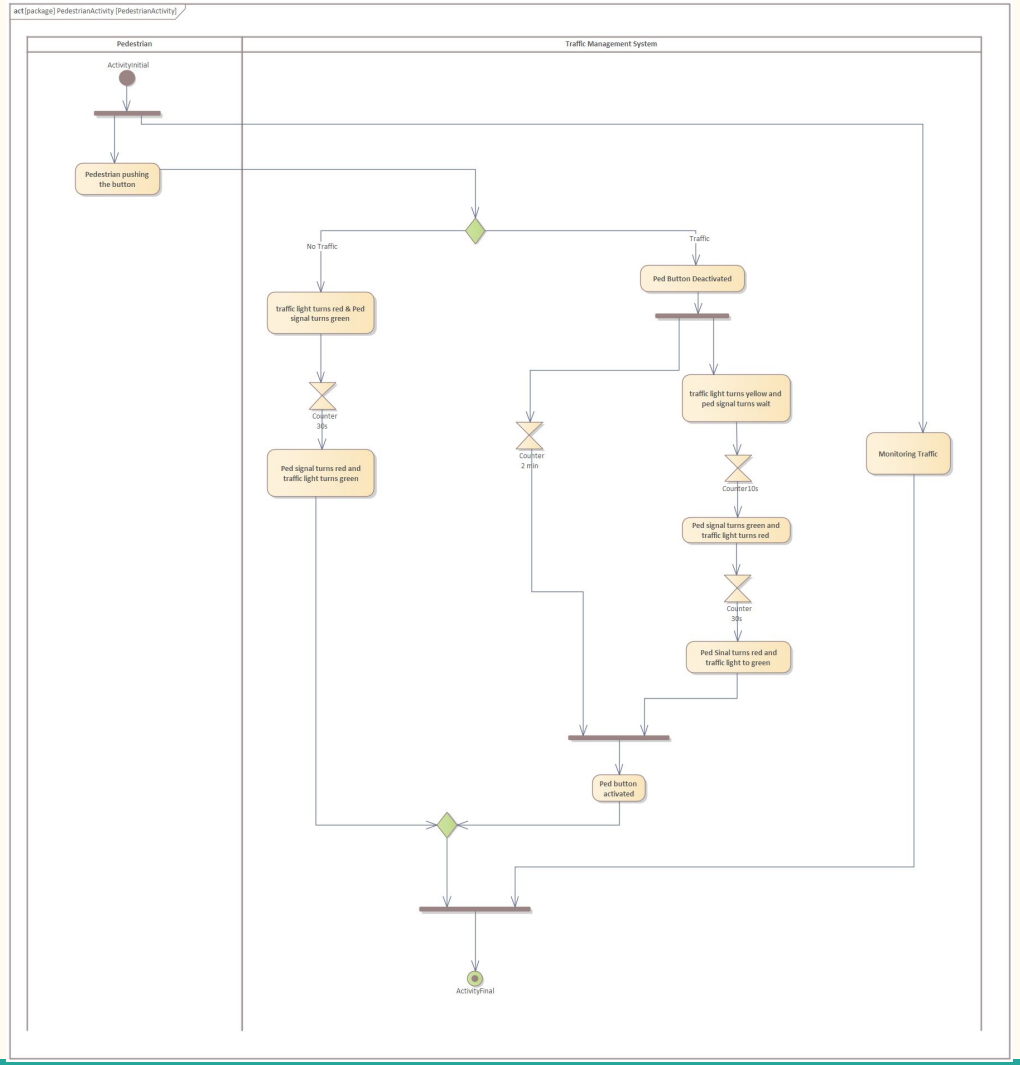
4. Activity Diagram for Dynamic Rerouting on Traffic congestion



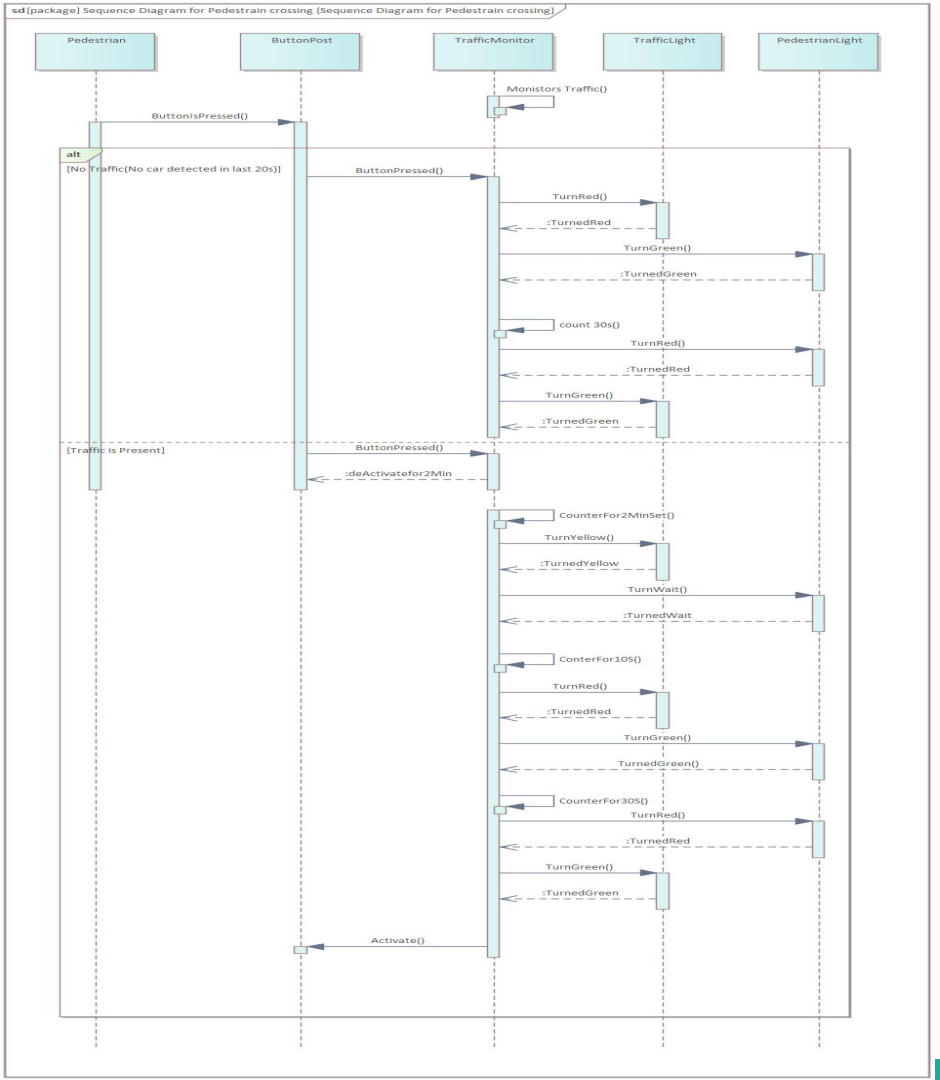
Sequence Diagram for Dynamic Rerouting on Traffic congestion



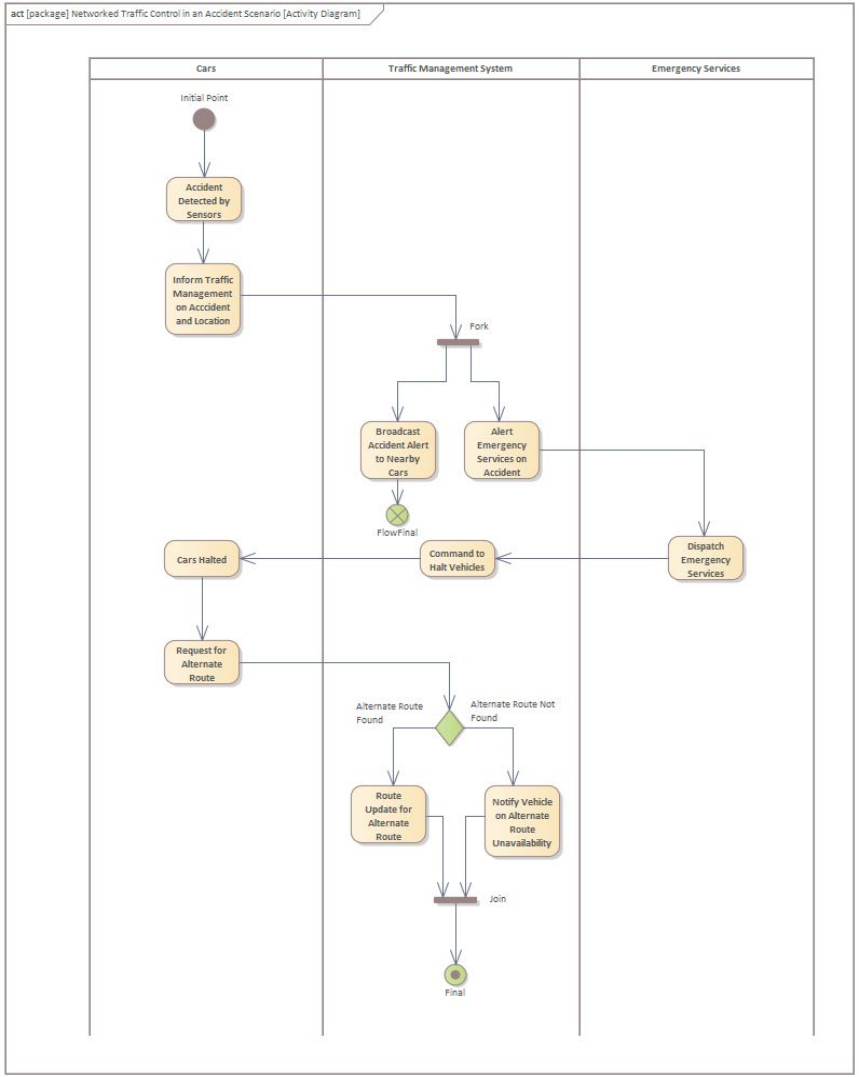
5. Activity Diagram for Pedestrian Crossing



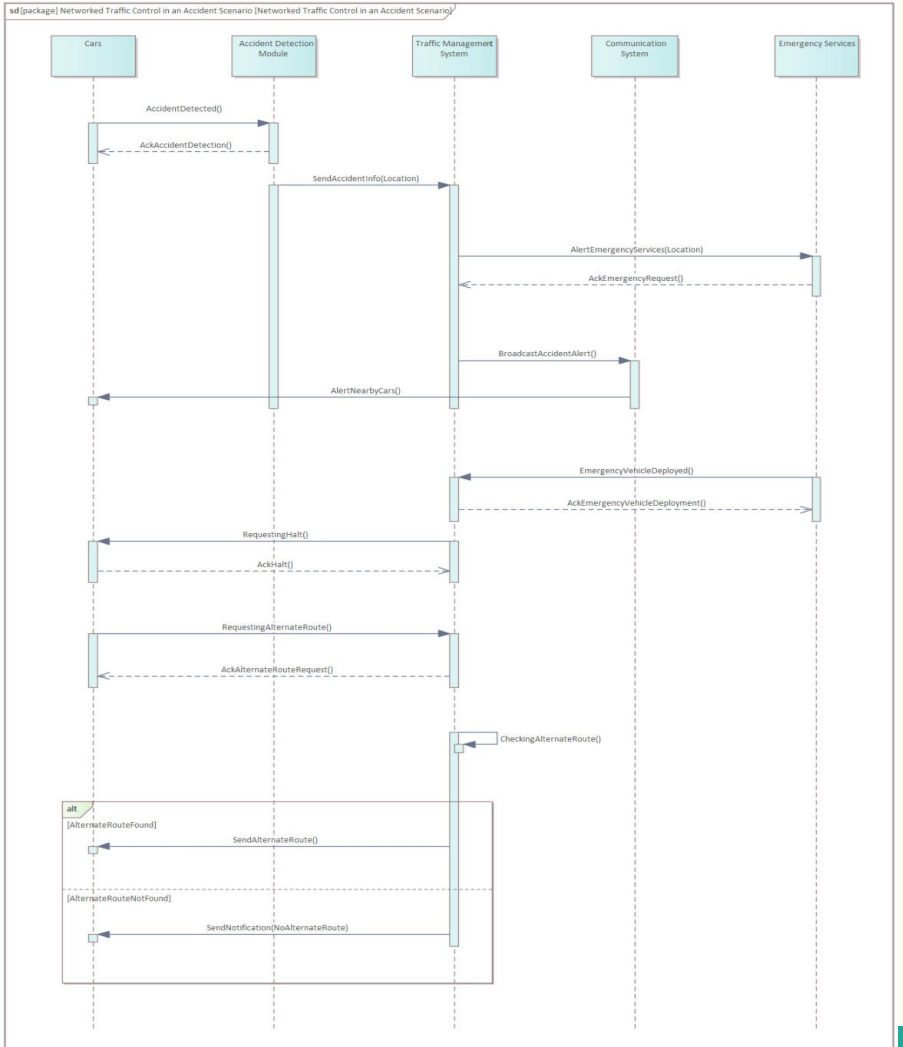
Sequence Diagram for Pedestrian Crossing



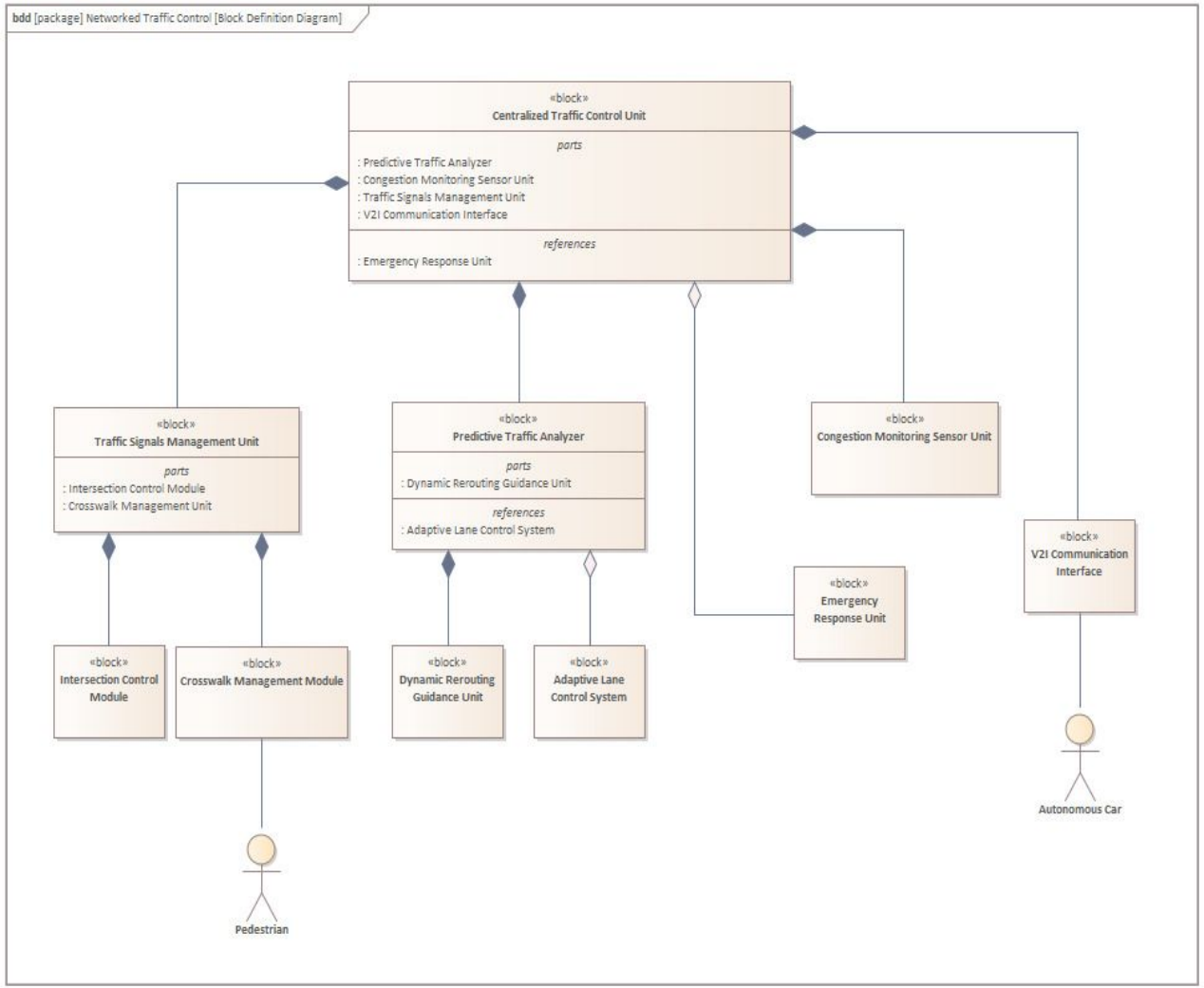
6. Activity Diagram for Networked Traffic Control in an Accident Scenario



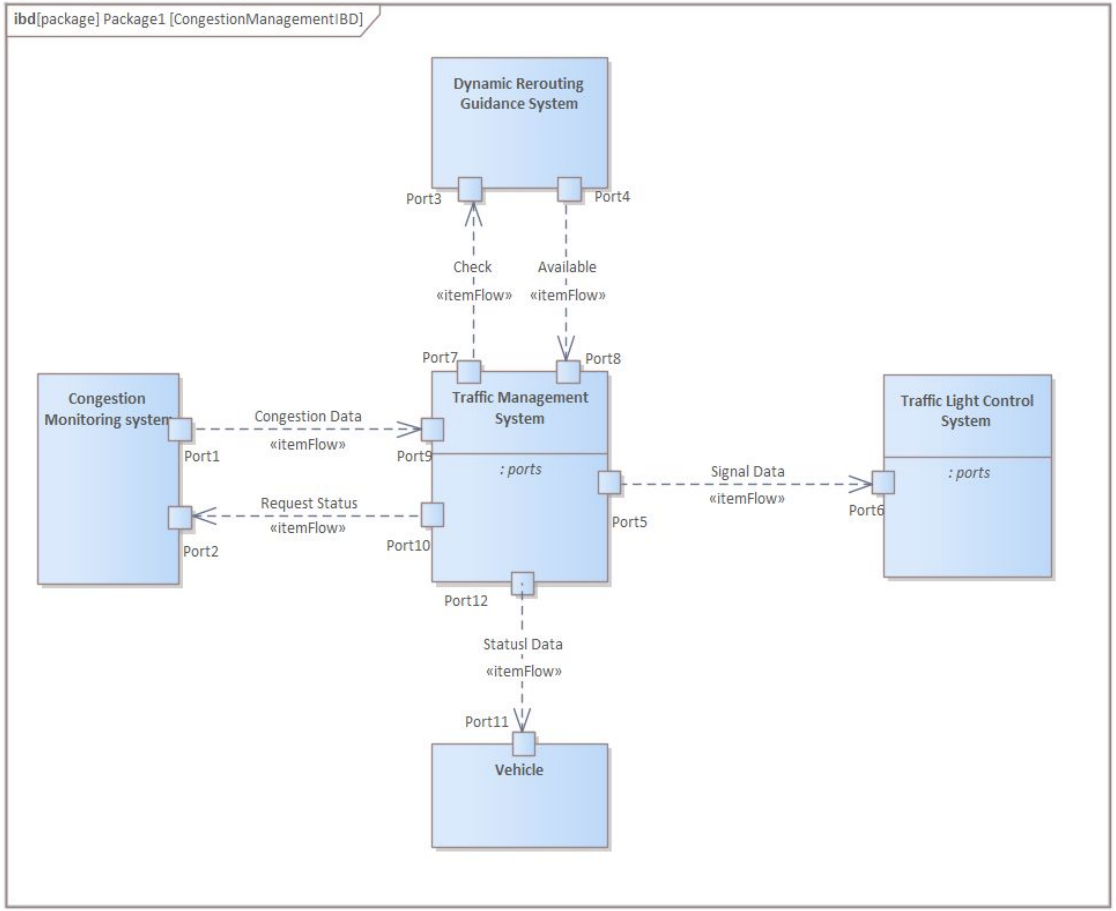
Sequence Diagram for Networked Traffic Control in an Accident Scenario



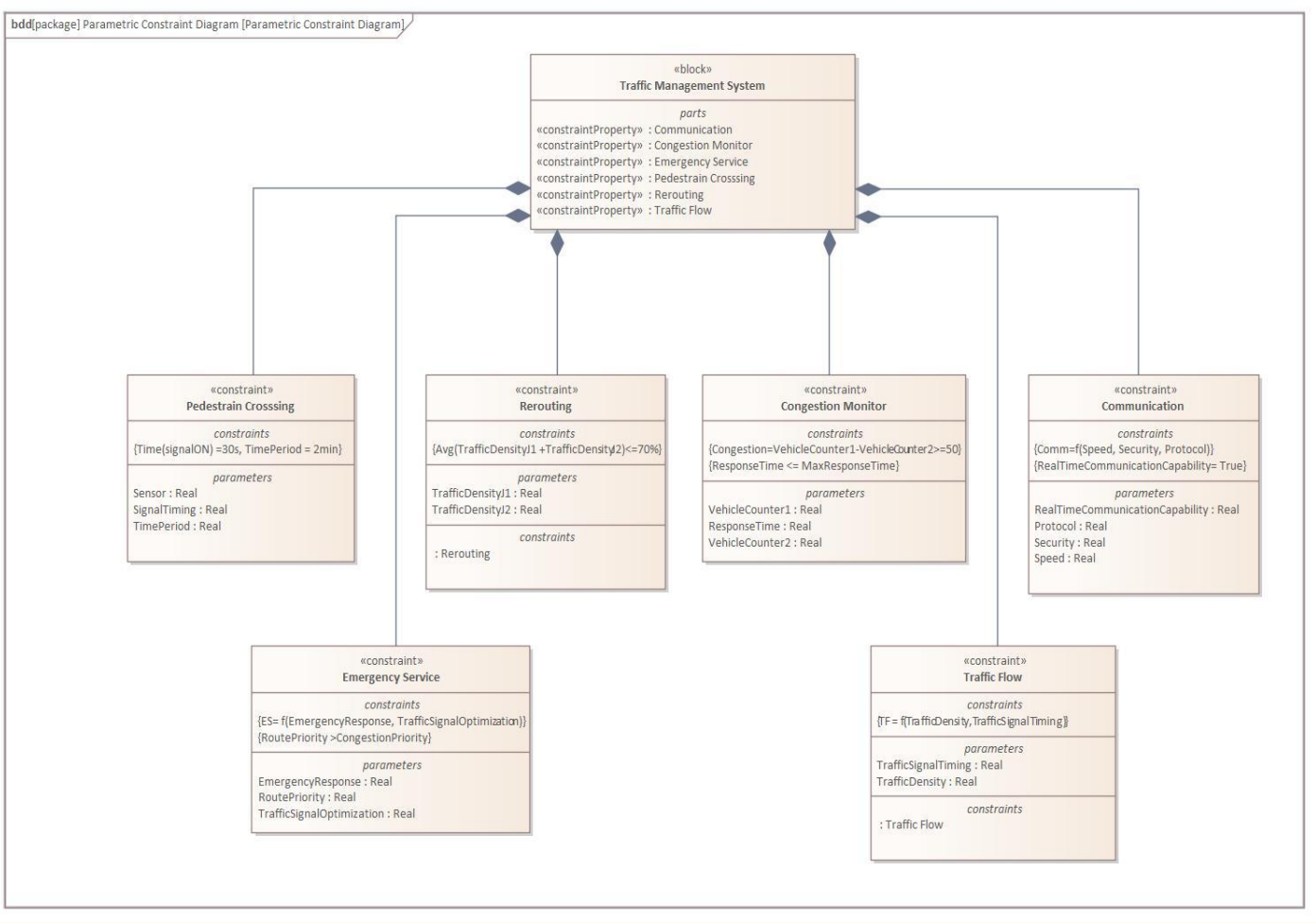
7. Block Diagram



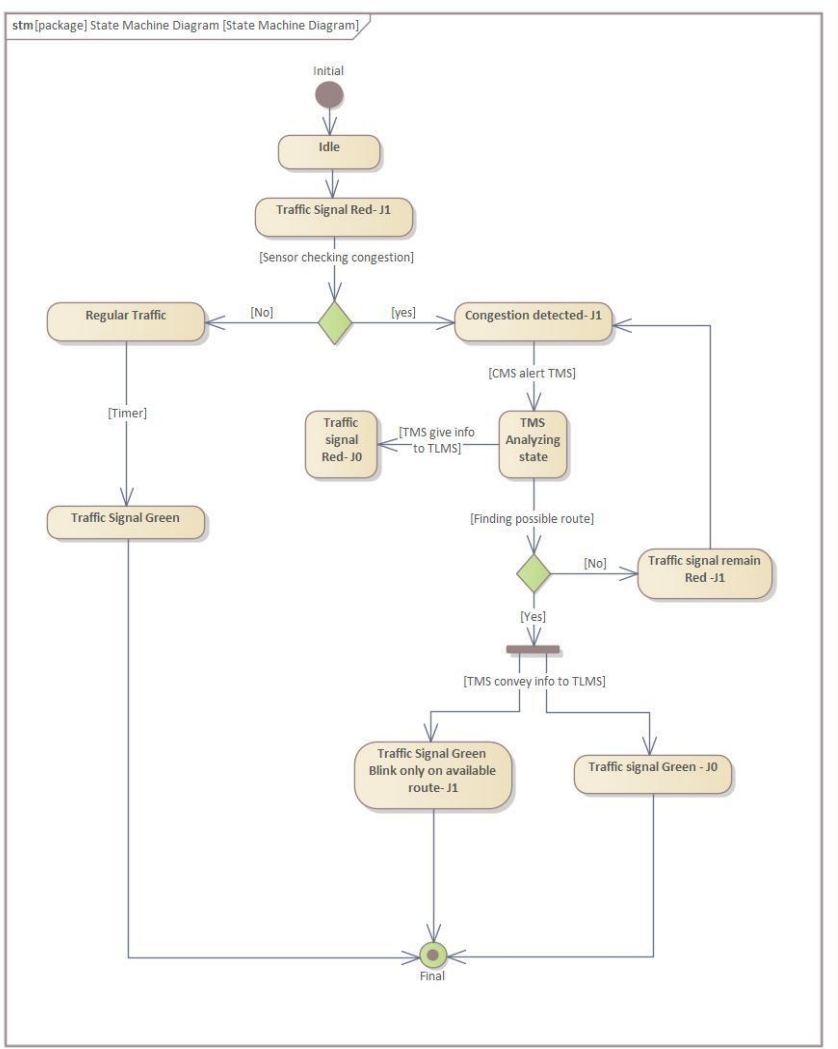
8. Internal Block Diagram



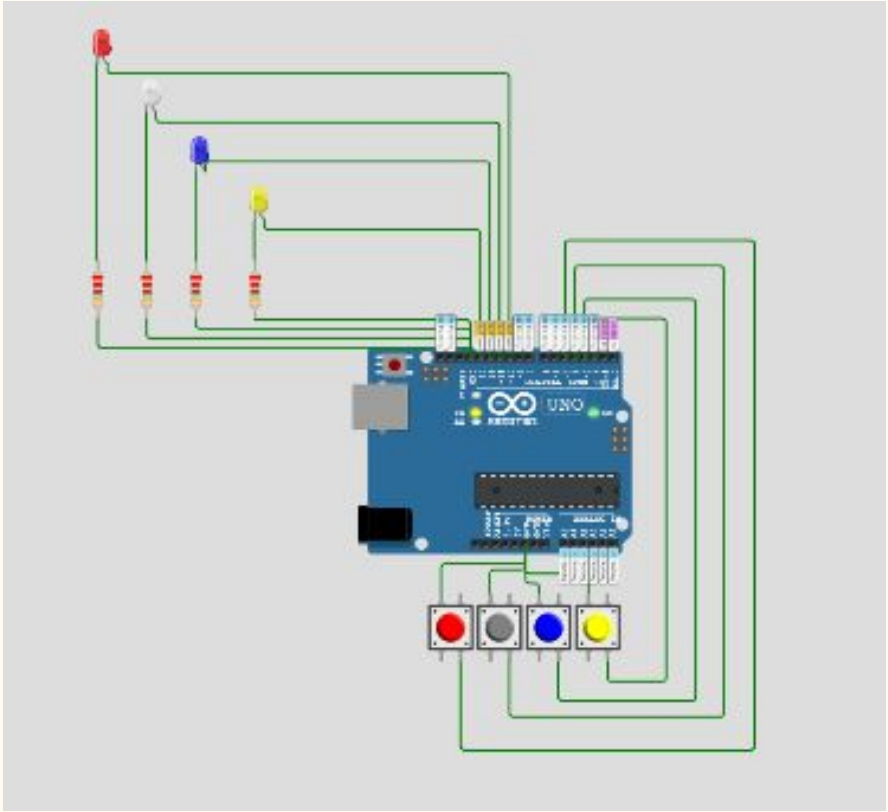
9. Parametric Constraint Diagram



10. State Machine Diagram



11. Implementation



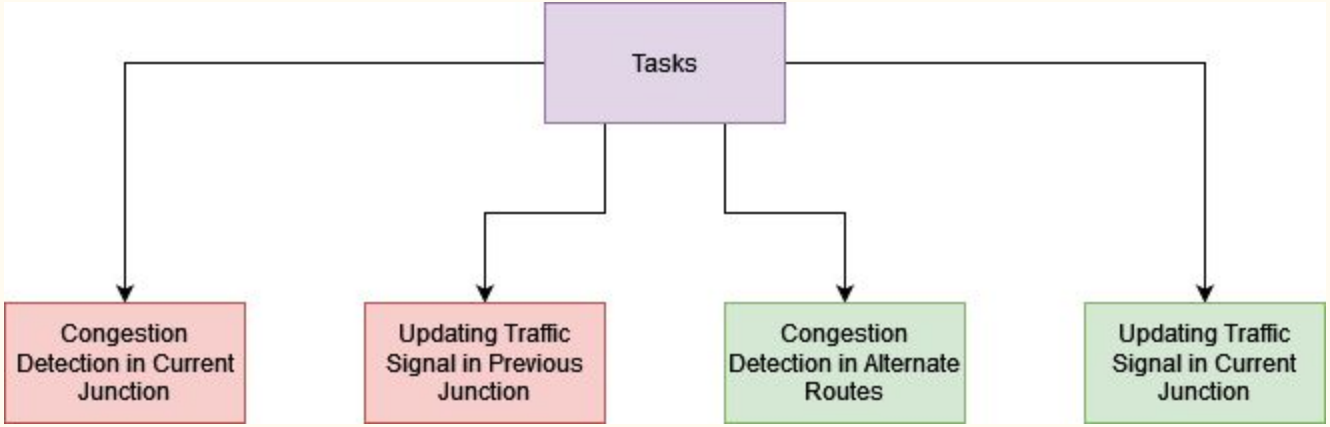
Congestion in Current Junction

Congestion in Route 1

Congestion in Route 2

Congestion in Route 3

12. Task Scheduling



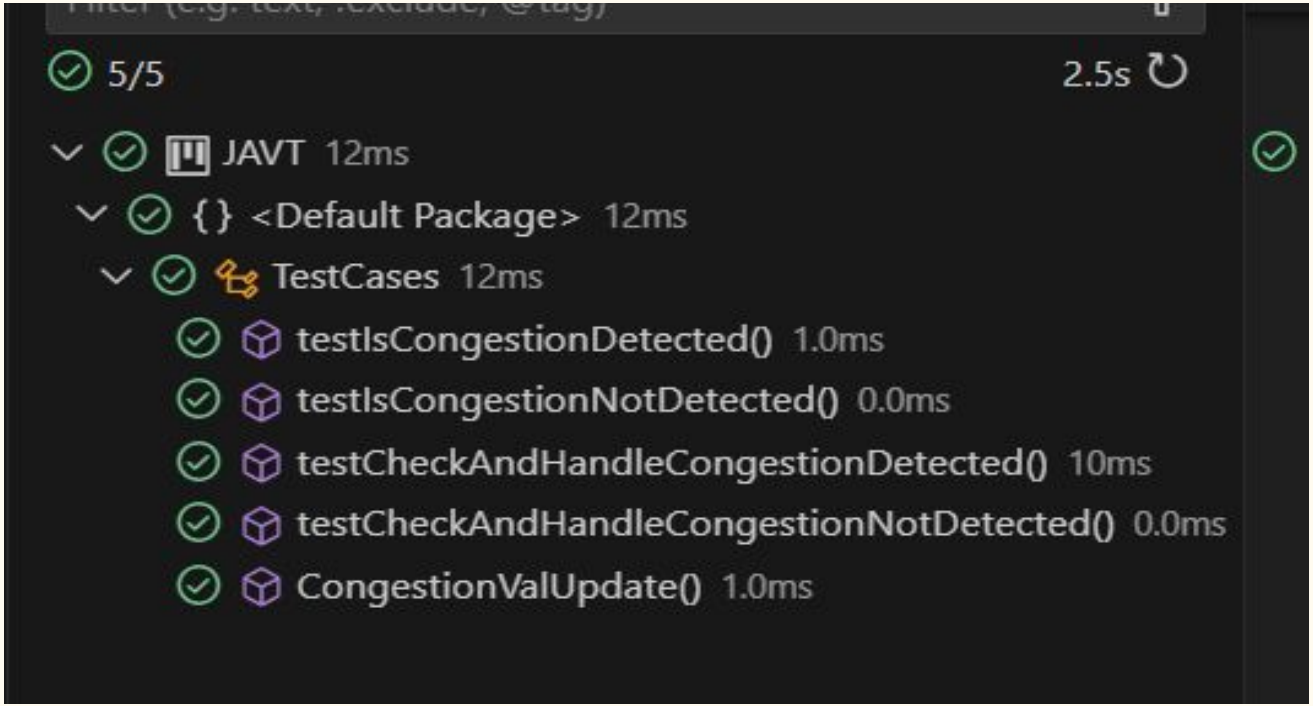
13.Testing

Output of Tested Java Code

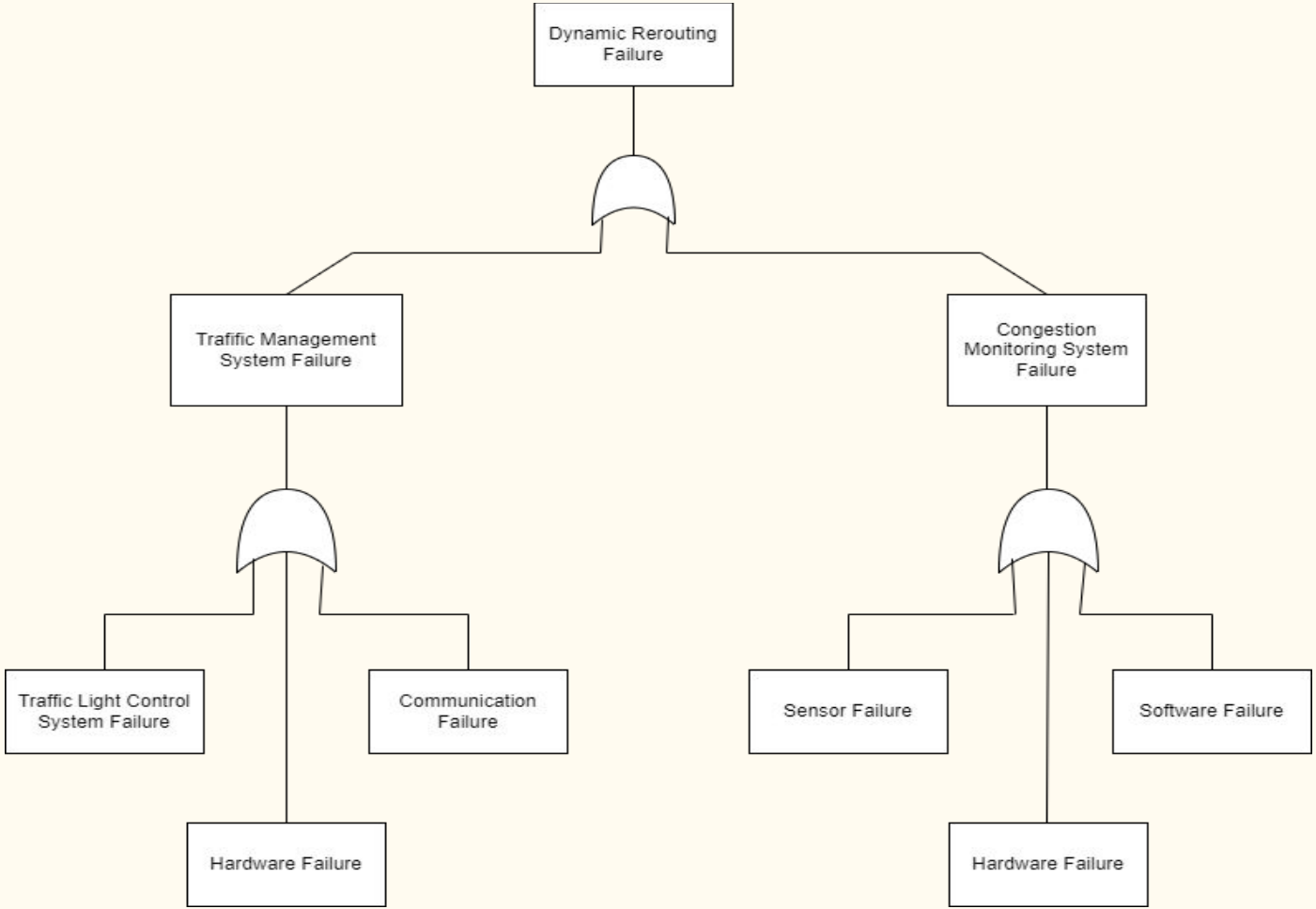
```
PS C:\Users\achua\OneDrive\Desktop\JAVT> java Main
Changing Junction A's Signal to RED and checking for congestion in Junction A
Junction: Junction A, Congestion Level: 44%
No congestion detected. Changing signal to green.
Changing Junction A's Signal to RED and checking for congestion in Junction A
Junction: Junction A, Congestion Level: 11%
No congestion detected. Changing signal to green.
Changing Junction A's Signal to RED and checking for congestion in Junction A
Junction: Junction A, Congestion Level: 45%
No congestion detected. Changing signal to green.
Changing Junction A's Signal to RED and checking for congestion in Junction A
Junction: Junction A, Congestion Level: 78%
Congestion detected in Junction Junction A!
Checking congestion in Junction B... Congestion detected! Changing the junction's signal to red.
Checking congestion in Junction C... No congestion detected. Changing signal to green.
Checking congestion in Junction D... No congestion detected. Changing signal to green.
Changing Junction A's Signal to RED and checking for congestion in Junction A
```

13. Testing

Test Case results(JUnit)



14. Hazards


Dynamic Rerouting Failure
Trafific Management System Failure
Congestion Monitoring System Failure
Traffic Light Control System Failure
Communication Failure
Hardware Failure
Sensor Failure
Software Failure
Hardware Failure

How to overcome hazards?

- Regularly monitor and test the system hardware
- Redundancy and backup system
- Uninterruptible power supply
- Fault Tolerant System
- Backup and Recovery Systems
- Testing and Quality Assurance:
- Error Handling and Logging:
- Redundant Communication Channels

REFERENCE

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- https://www.freertos.org/FreeRTOS-quick-start-guide.html
- https://www.sciencedirect.com/science/article/pii/S2046043023000321

Thank you