

CS331: SOFTWARE ENGINEERING LAB

Assignment 2:

USE CASES :

- **Capture Camera Feed:**
The system receives live video input from the traffic camera installed at the intersection. This video feed is used for further traffic analysis.
 - **Control Traffic Lights:**
The system controls traffic light signals by switching between red, yellow, and green based on decisions made by the signal timing logic.
 - **Monitor Traffic Hardware:**
The system continuously monitors traffic light hardware to detect faults or malfunctioning signals.
 - **Override Signal Manually:**
The traffic officer can manually override automatic signal control during special situations such as accidents, roadblocks, or public events.
 - **Display System Status:**
The system displays real-time information including camera feed, vehicle count, signal state, and timers for monitoring purposes.
 - **Trigger Emergency Mode:**
When an emergency vehicle such as an ambulance or fire truck is detected, the system activates emergency mode to give priority passage.
 - **Count Vehicles:**
The system analyzes camera feed to count vehicles such as cars, trucks, and bikes present in each traffic lane.
 - **Activate Fail-safe Mode:**
If the system detects a camera failure or hardware issue, it automatically switches to a fixed-timer signal mode to ensure uninterrupted traffic control.
 - **Adjust Signal Timing:**
The system dynamically adjusts green light duration based on traffic conditions, emergency situations, manual override, or fail-safe operation.
 - **Detect Vehicle Density:**
The system calculates traffic density using vehicle count data to support intelligent signal timing decisions.
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ACTOR:

- **Traffic Camera:**
A hardware device that captures live video feed of traffic at road intersections and provides input to the system.
- **Traffic Light Hardware:**
The physical traffic signal equipment that executes signal control commands issued by the system.
- **Traffic Officer:**
A human user authorized to monitor system status and manually override traffic signals when required.
- **Emergency Vehicle:**
An external entity such as an ambulance or fire truck that triggers emergency signal priority.
- **AI Agent:**
An intelligent software module responsible for counting vehicles, detecting vehicle density, adjusting signal timing, activating emergency mode, enabling fail-safe mode, and updating system status.

RELATIONSHIP EXPLANATION :

- **Adjust Signal Timing** <<include>> **Detect Vehicle Density** (mandatory behavior)
- **Trigger Emergency Mode, Override Signal Manually, and Activate Fail-safe Mode** <<extend>> **Adjust Signal Timing** (conditional behaviors)

UML:

