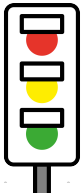
Four way intersection traffic simulation



Group 5: rxa614, srj59, sxp1417

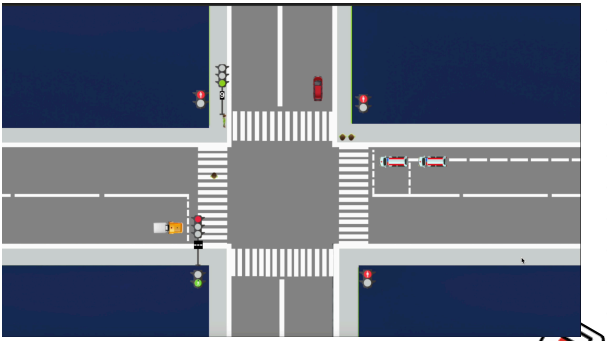
Requirements

Design a traffic signal simulation that accounts for the following

- Mutual Exclusion: Only one set of lights facing cross-streets (north-south or east-west) can be green for vehicles at a time, preventing collisions.
- Pedestrian Safety: The pedestrian signals allows for safe passage in all directions.
- Clear Transition: Colors cycle through a predictable sequence: green (for x seconds) allowing movement, followed by yellow (for y seconds) as a warning, and red (for z seconds) for stopping, before returning to green.
- State Management: The system anticipates all possible traffic states, both secure and non-secure, and implements appropriate traffic light sequences to maintain a safe and controlled environment at the intersection.

Graphical User Interface

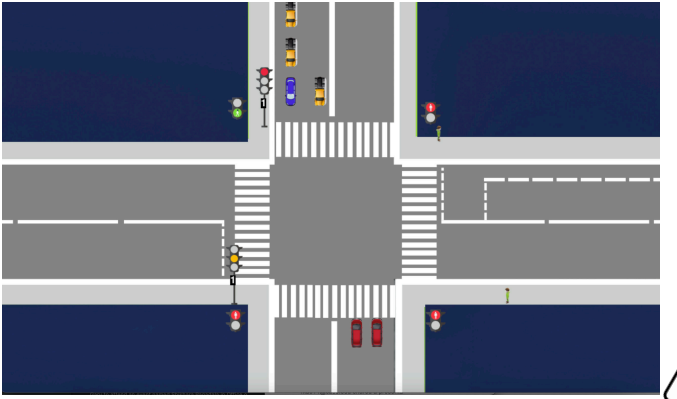
- Two vehicle traffic signals: One for the north-south lanes and another for the east-west lanes, ensuring clear visual communication for drivers in different directions.
- Four pedestrian crossing signals: Dedicated signals for pedestrians on each side of the intersection, promoting pedestrian safety by indicating designated crossing times.
- Vehicle movement: Cars and trucks will be used to represent the flow of traffic through the intersection.
- Pedestrian movement: Pedestrians will be depicted walking across designated crosswalks



Secured State

Yellow light duration:

The yellow light provides sufficient time for vehicles already in the intersection to safely exit before the red light appears, preventing dangerous last-minute stops.



Secured State

Pedestrian and Vehicle signals synchronization

The pedestrian crossing signal activation is synchronized with the red light phase of the intersecting traffic movement.

Secured State

Avoid Traffic Light Conflict:
Traffic light change from red to green in one direction while vehicles are still crossing from the other direction

Secured State

Avoid Collisions When Making a Right Turn

Ensure that the vehicle doesn't intersect with oncoming traffic when executing a right turn at a crossroads.

Unmonitored Unsecure State

- Variable Speeds:
  Both pedestrians and cars travel at different speeds, impacting reaction time and safe stopping distances.

- Environmental Factors:
  Weather hazards like rain, snow, or fog can affect visibility and driving conditions.

- Human Behavior:
  Drivers may disregard red lights or accelerate at yellow lights.
  Pedestrians may jaywalk or cross outside designated areas.

Demo: