John Vitali
Brennan Pike
Isaya Danice

Collaborative Control Of Autonomous Cars

Milestone 3 Report

Overall Progress

Analysis of Autopilot Agent - 80% complete

Refinements to Collaborative Control - 98% complete

Adjustments to Autopilot Agent - 20% complete

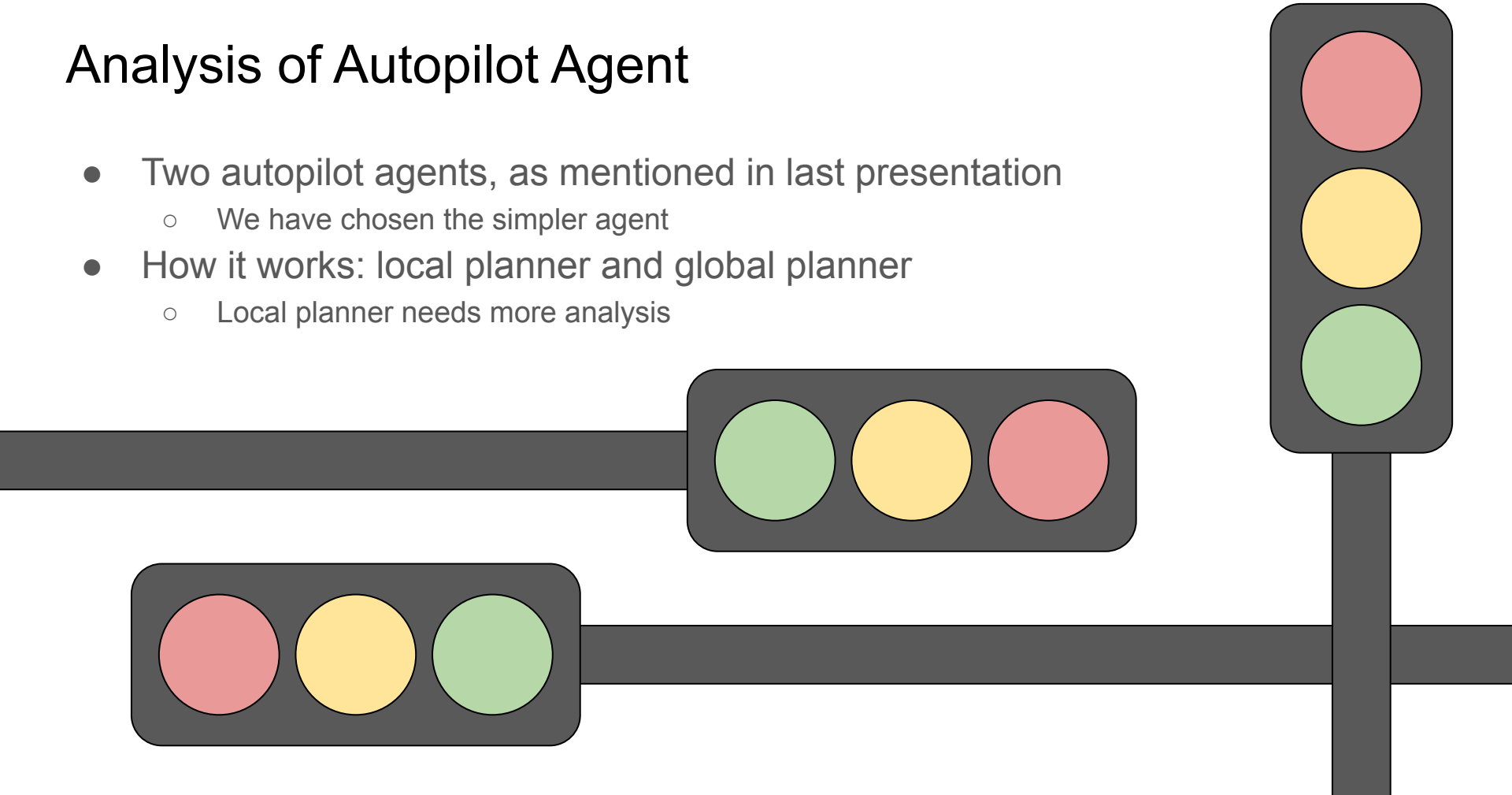
Overtaking Scenarios with Collaborative Control - 80% complete

Creation of Highway Scenarios - 100% complete

Reactive Dashboard Additions - 95% complete

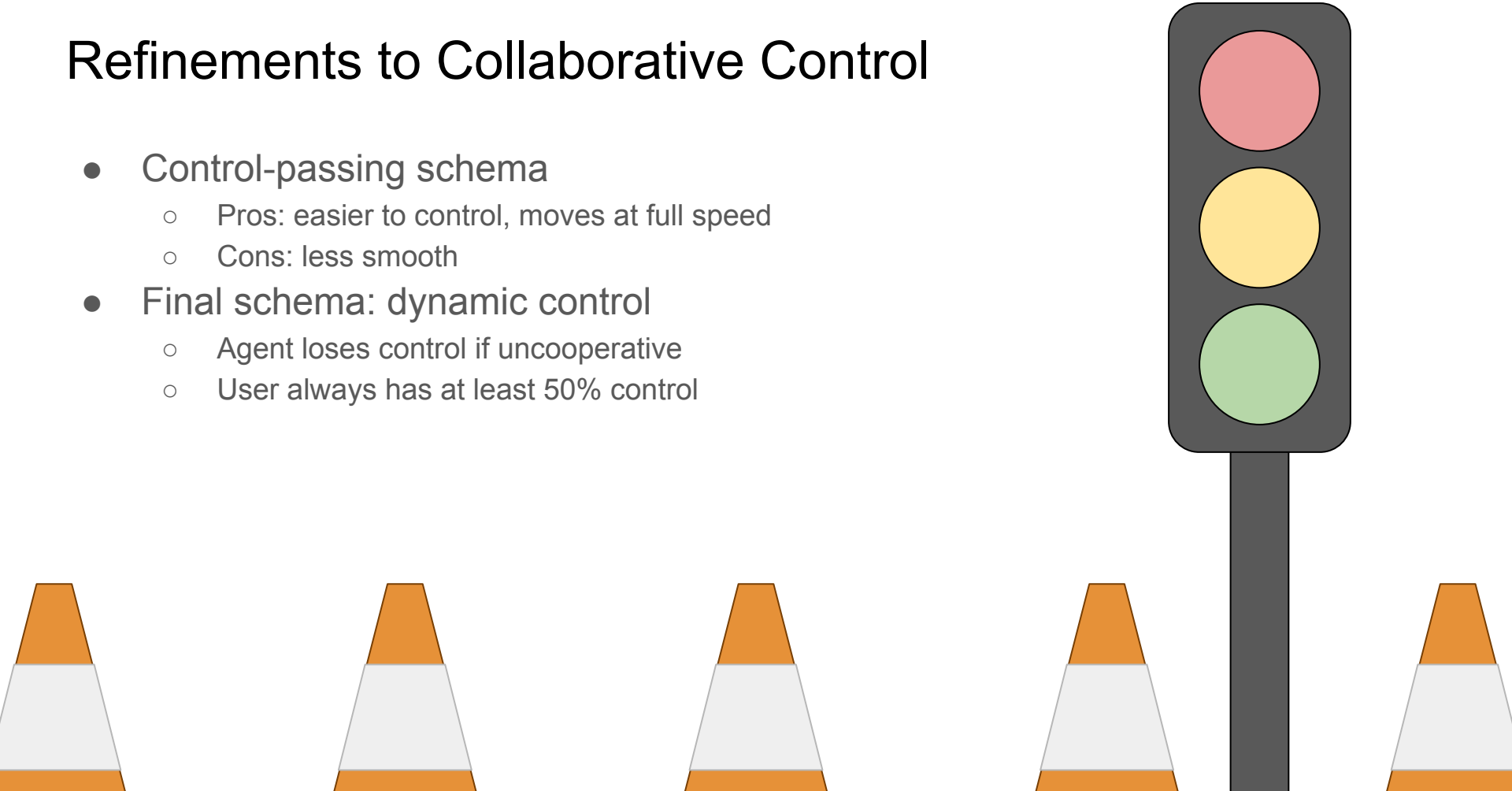
Analysis of Autopilot Agent

- Two autopilot agents, as mentioned in last presentation
  - We have chosen the simpler agent
- How it works: local planner and global planner
  - Local planner needs more analysis



Refinements to Collaborative Control

- Control-passing schema
  - Pros: easier to control, moves at full speed
  - Cons: less smooth
- Final schema: dynamic control
  - Agent loses control if uncooperative
  - User always has at least 50% control



Adjustments to Autopilot Agent

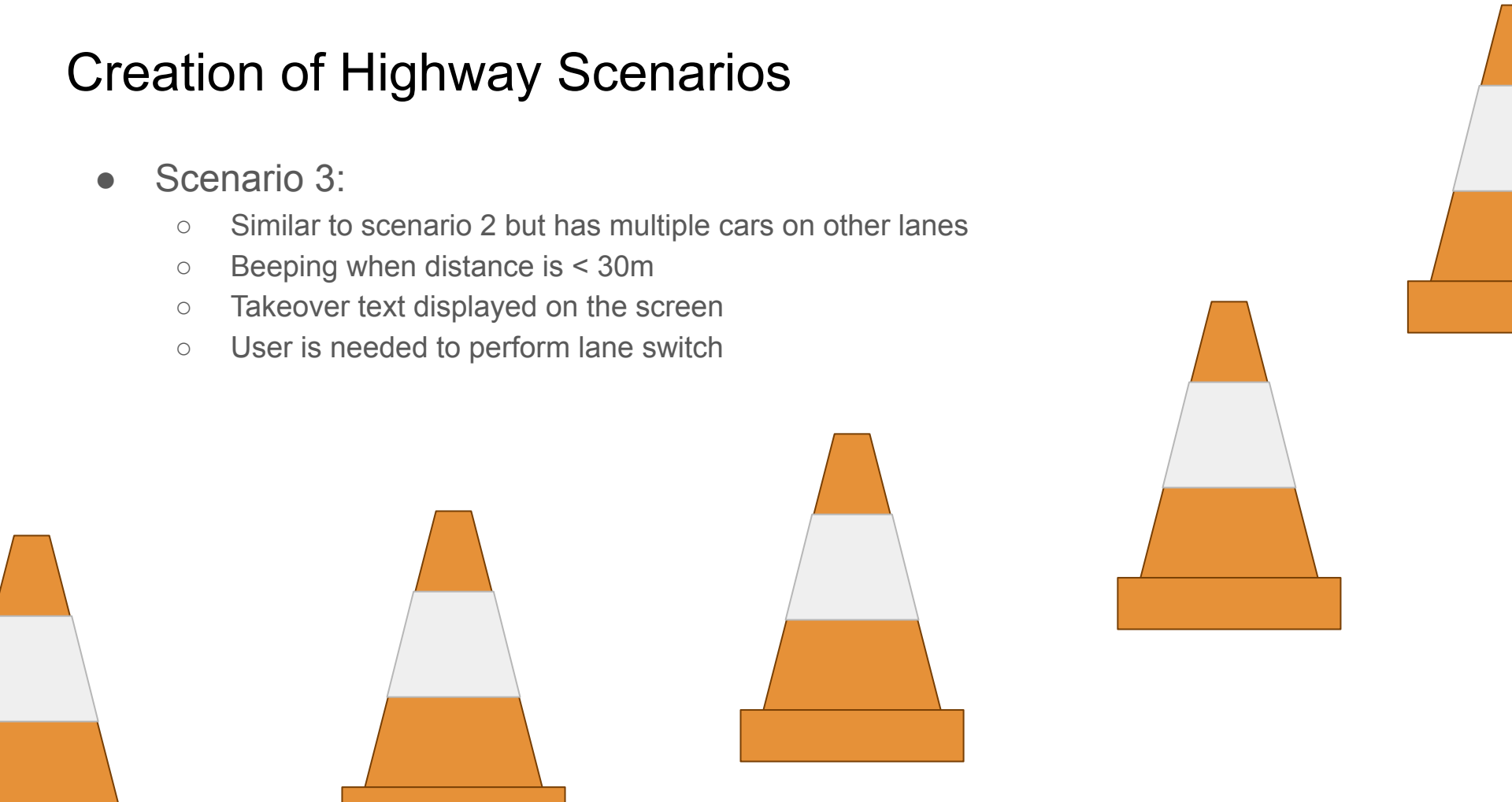
- Autopilot agent uses waypoint system to navigate city
  - Navigates to random destinations in the city, doesn’t wander fully randomly
- Fully random autopilot confirmed possible
- Waypoint system works locally; agent still fights user to reach next waypoint
- System of refreshing waypoints necessary, but not implemented
  - Autopilot works for current testing; refresh system pushed back to next semester

Creation of Highway Scenarios

- Scenario 1:
  - Stationary car in front of the ego vehicle (same lane)
  - No human input or intervention required
  - Lane switch is done autonomously
- Scenario 2:
  - Moving car in front of ego vehicle (same lane)
  - Collaborative control used
  - Human does not apply input
  - Beeping when distance is < 30m, lane switch initiated

Creation of Highway Scenarios

- Scenario 3:
  - Similar to scenario 2 but has multiple cars on other lanes
  - Beeping when distance is < 30m
  - Takeover text displayed on the screen
  - User is needed to perform lane switch



Overtaking Scenarios with Collaborative Control

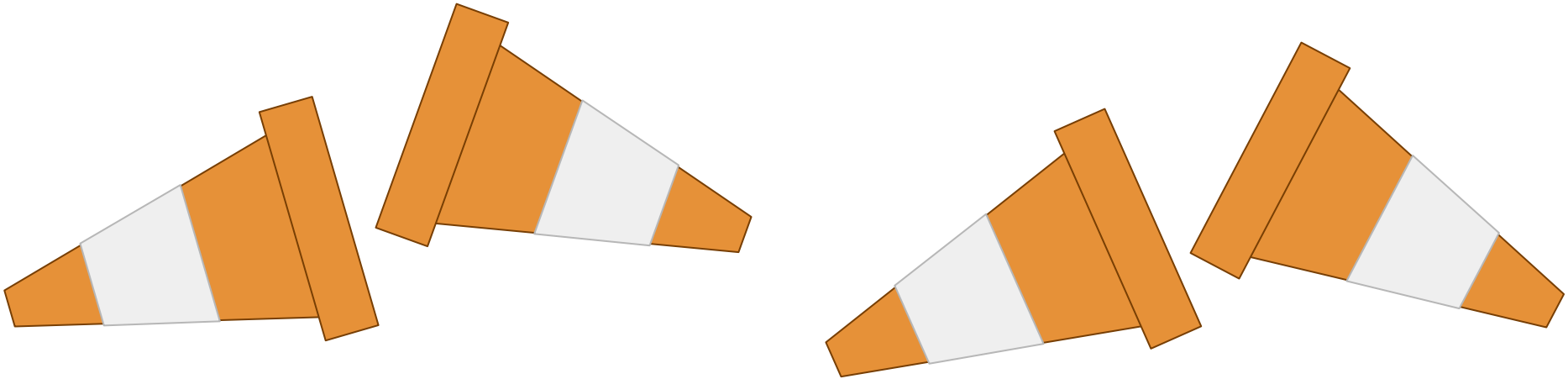
- Scenario 2:

Overtaking Scenarios with Collaborative Control

- Scenario 3:

Reactive Dashboard Additions

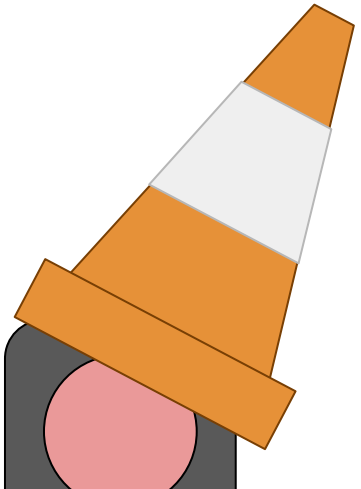
- Fully working within CARLA
  - Steering wheel and lights are in. The lights just blink now, but will be coded to only turn on in emergency situations
- Additions
  - Side & rear view mirrors



Dashboard Demo

Plans For Next Milestone

- Begin real-world testing
  - Enlist people to go through the created scenarios on the simulator
- Combine disparate elements
  - (collaborative control, scenario runner, dashboard)
- Test more scenarios



Questions?