

# Handling An Intersection Scenario With Dynamic Objects

Course 4, Module 5, Lesson 3



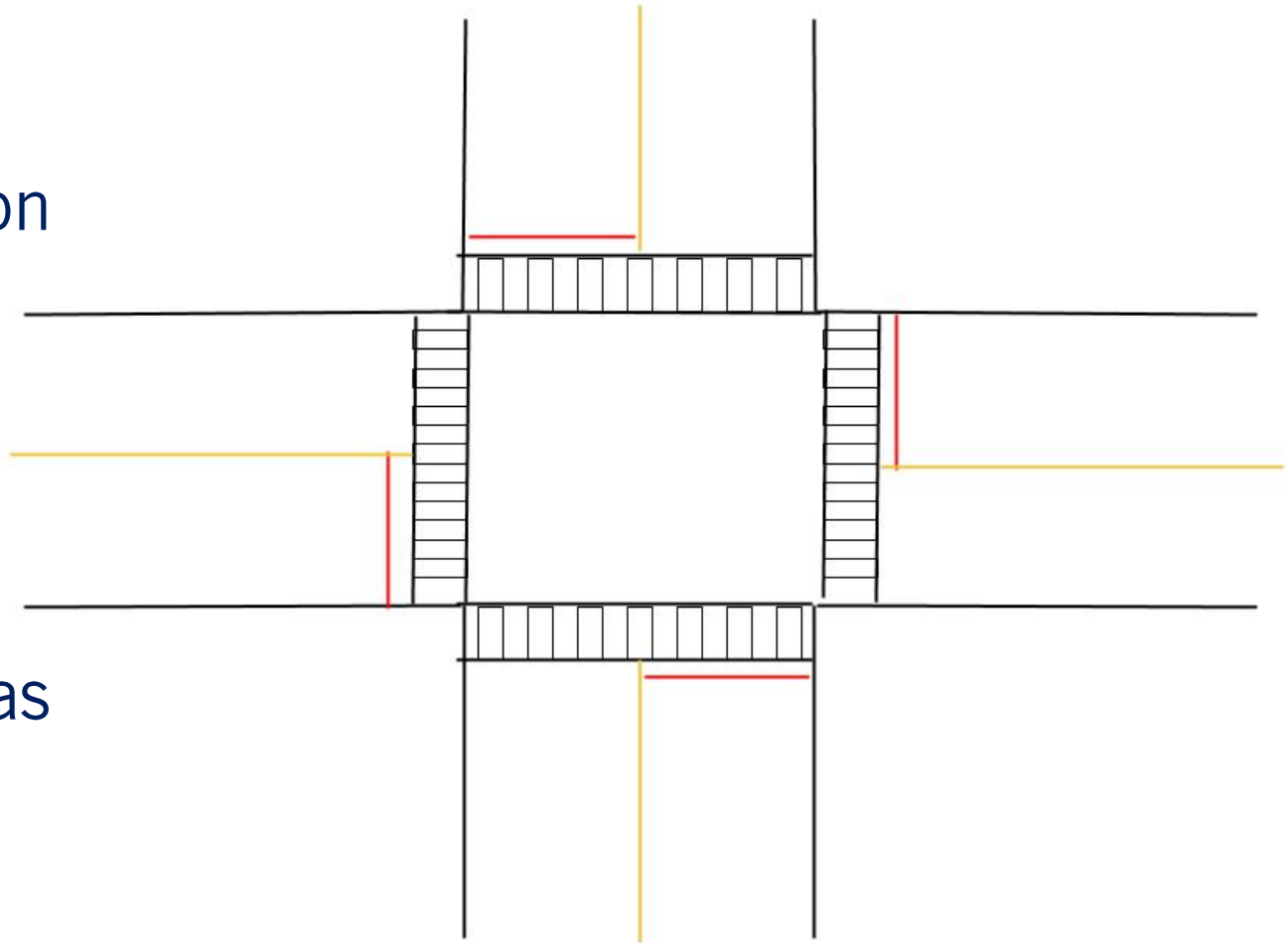
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# Learning Objectives




- Review interactions with dynamic object
- Build upon the previous lesson to include dynamic objects as part of the state machine
- Develop an understanding of the complexities and edge cases when dealing with dynamic objects

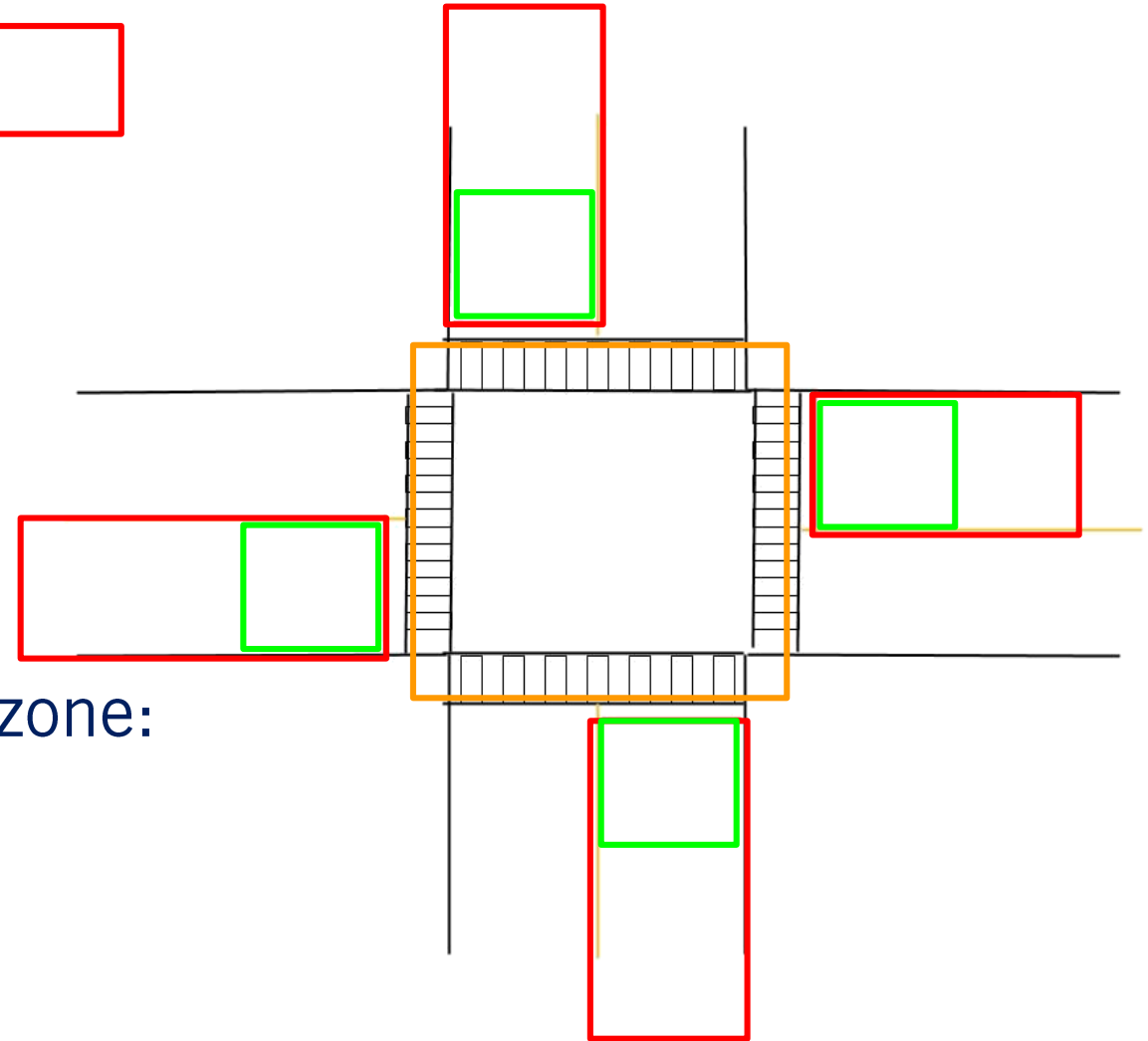
# Review – Scenario Evaluation

- 4 way Intersection
- Two lane
- Stop Sign for every direction
- Be able to travel:
  - Through the intersection
  - Left at the intersection
  - Right at the intersection
- Interactions with vehicles as dynamic objects



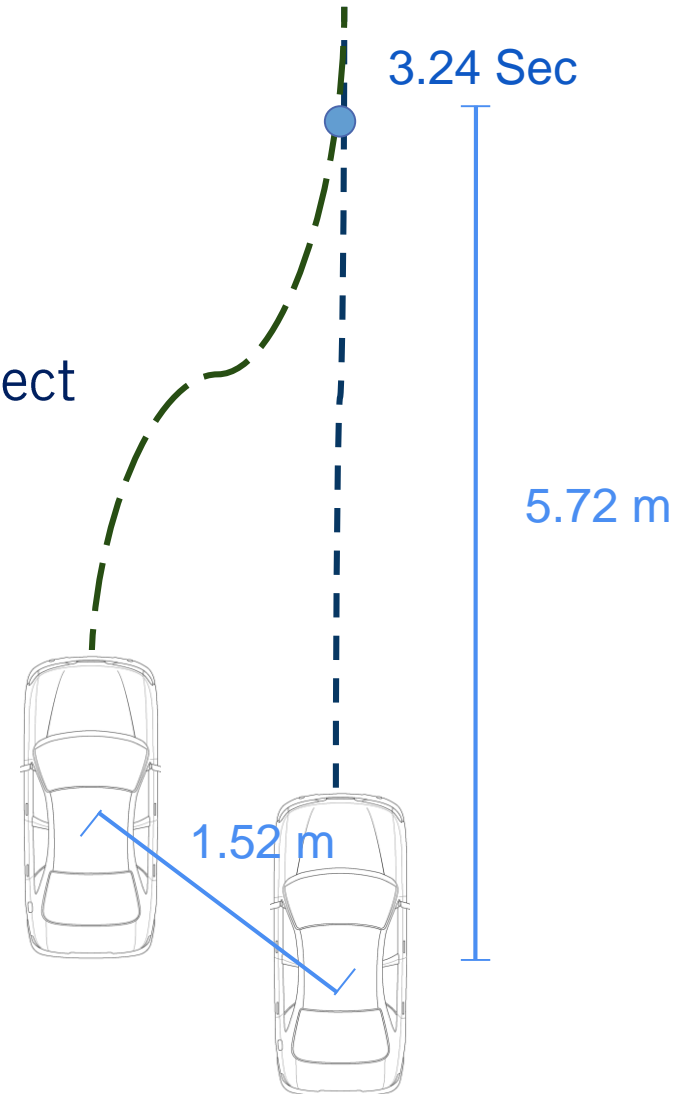
# Review – Discretizing the Intersection

- Approaching an intersection 
- At an intersection 
- On an intersection 
- Determining the size of each zone:
  - Ego vehicle velocity
  - Size of the intersection
  - Dynamic vehicle velocity



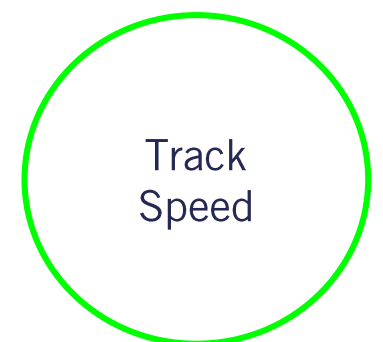
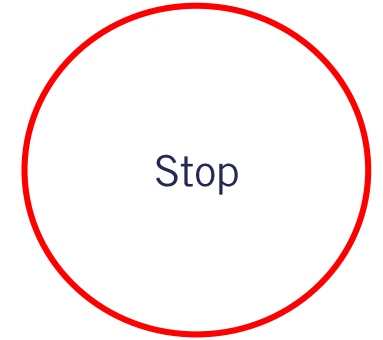
# Review – Interaction With Dynamic Objects

- **Distance to dynamic object**
  - distance to the center of any dynamic object
- **Distance to collision point**
  - distance to the collision point with another dynamic object
- **Time to collision (TTC)**
  - time to collision between any two dynamic objects

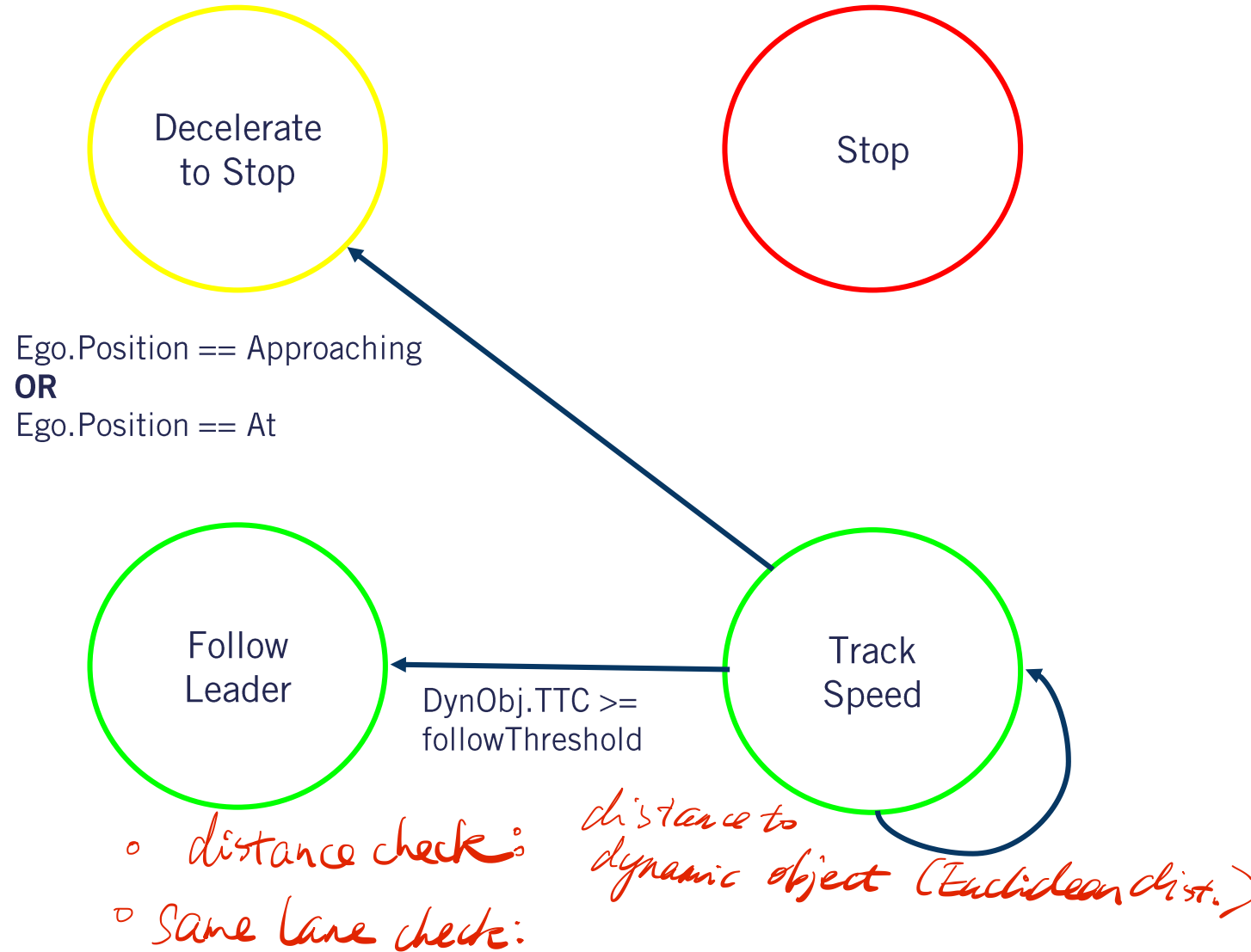
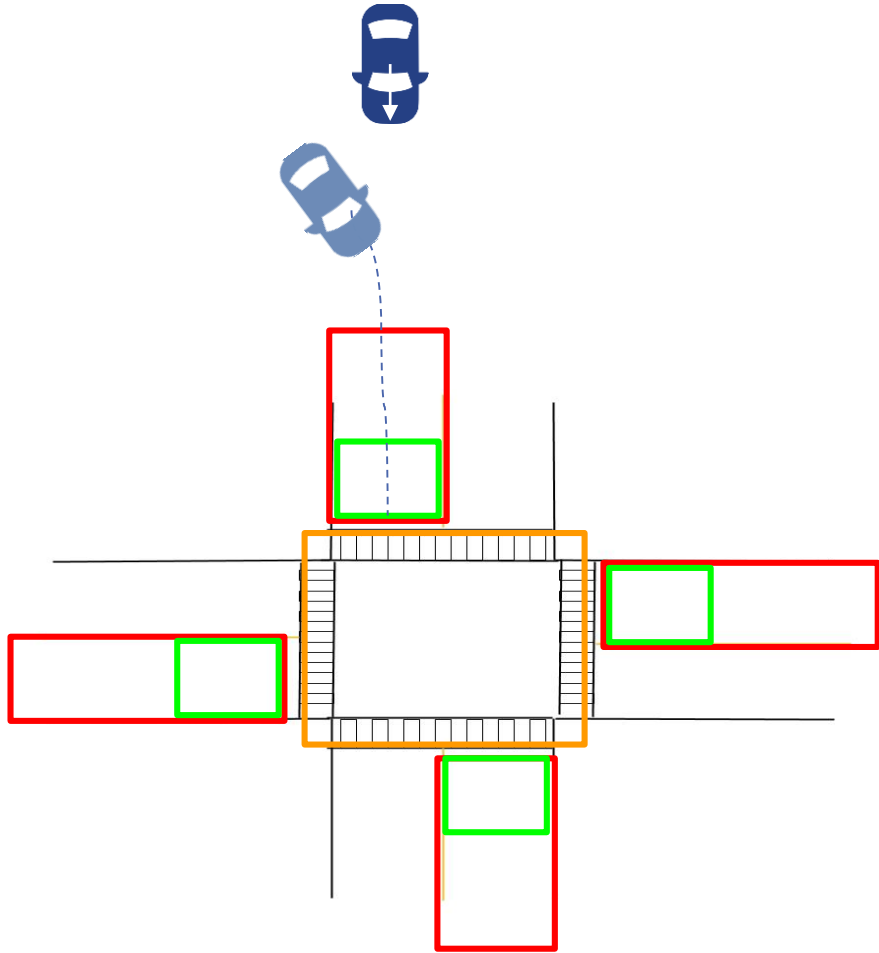


# State Machine States

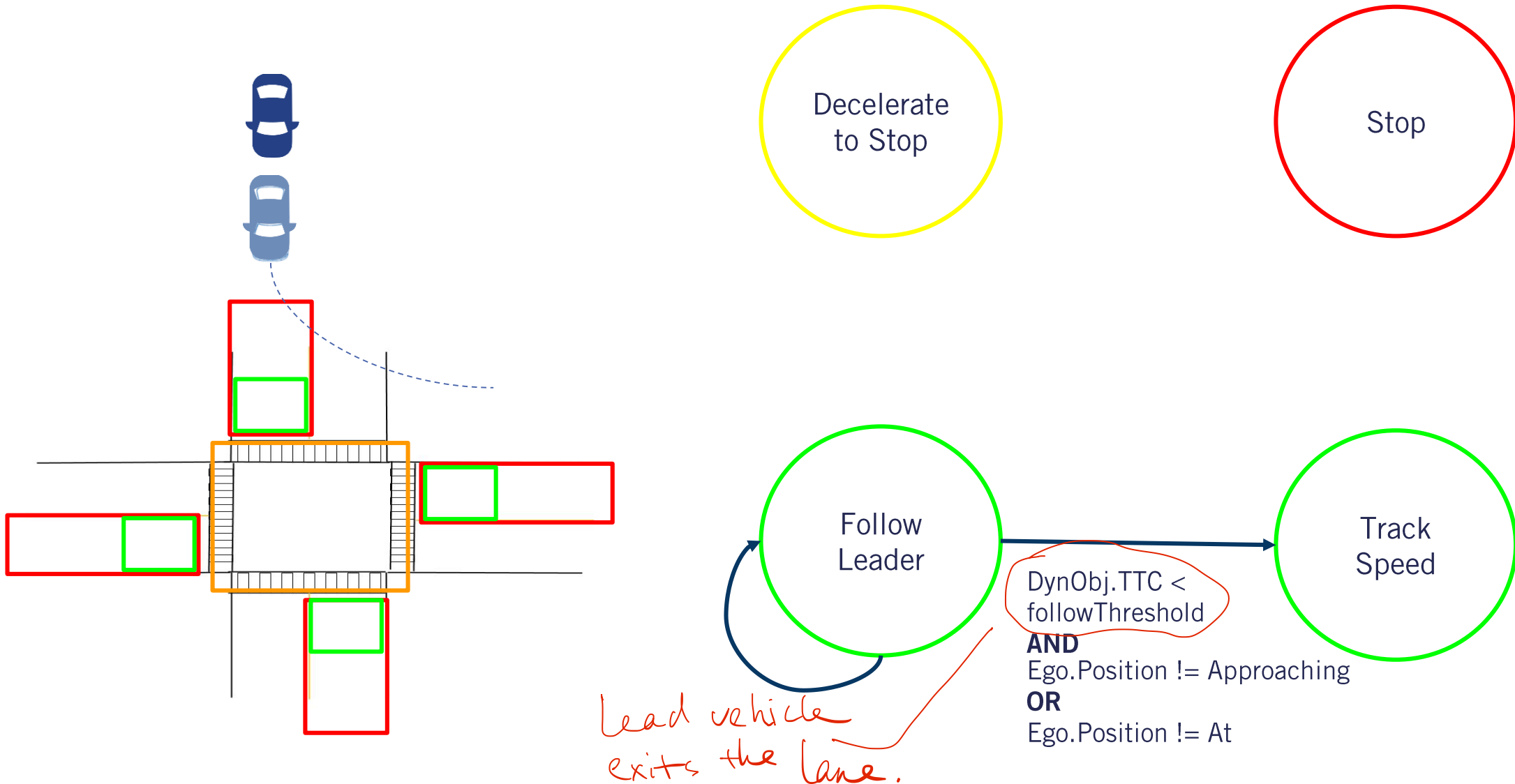
- Track Speed
  - Follow the current speed limit
- Follow Leader
  - Match the speed of the dynamic object in front
- Decelerate to Stop
  - Stop to a particular point
- Stop
  - Stay stopped at the current location



# State Machine Transitions - Track Speed

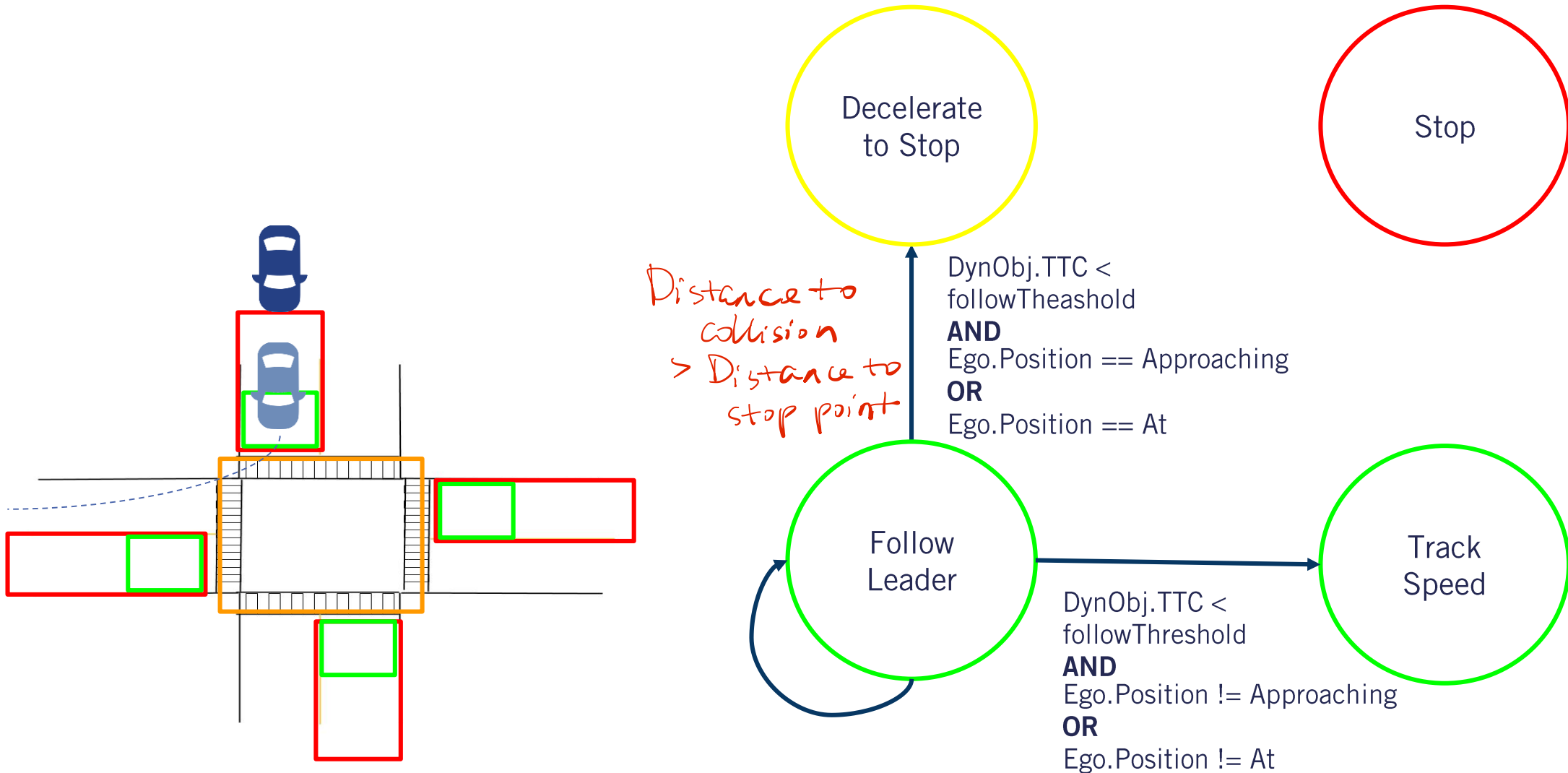


# State Machine Transitions - Follow Leader

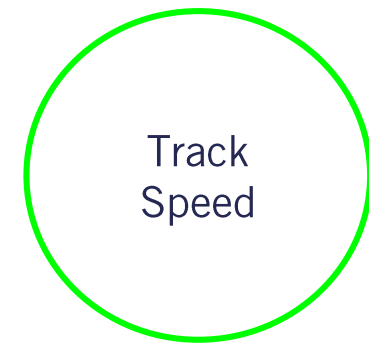
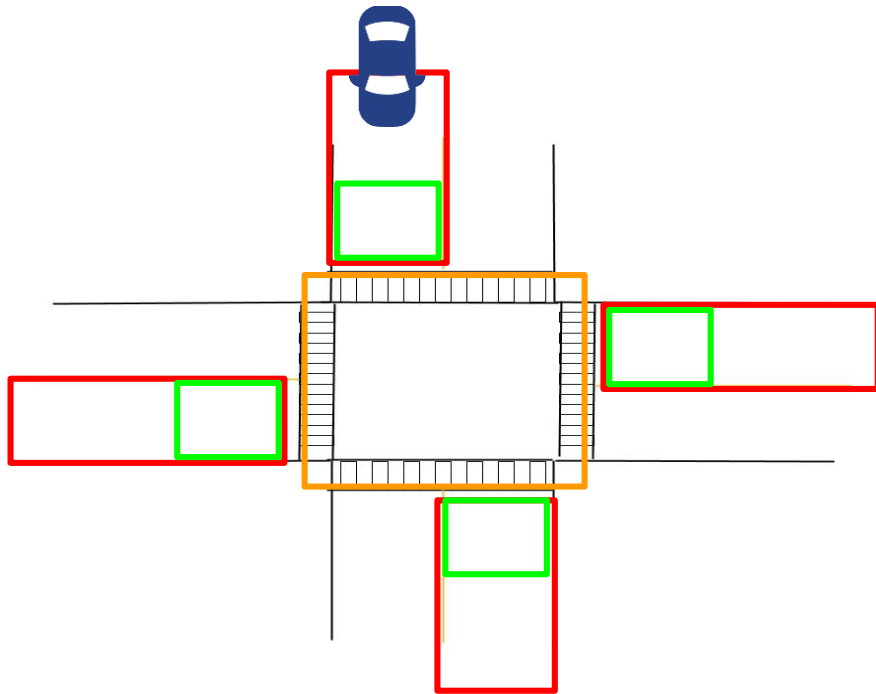
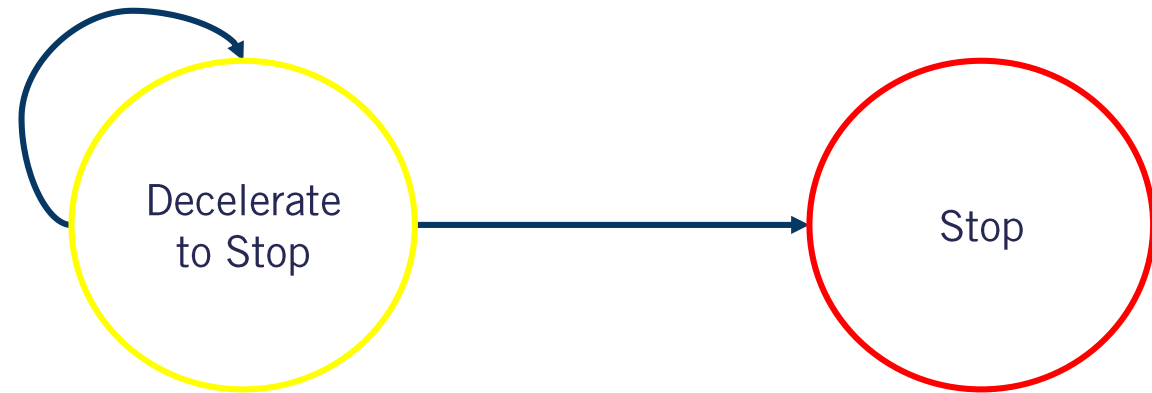




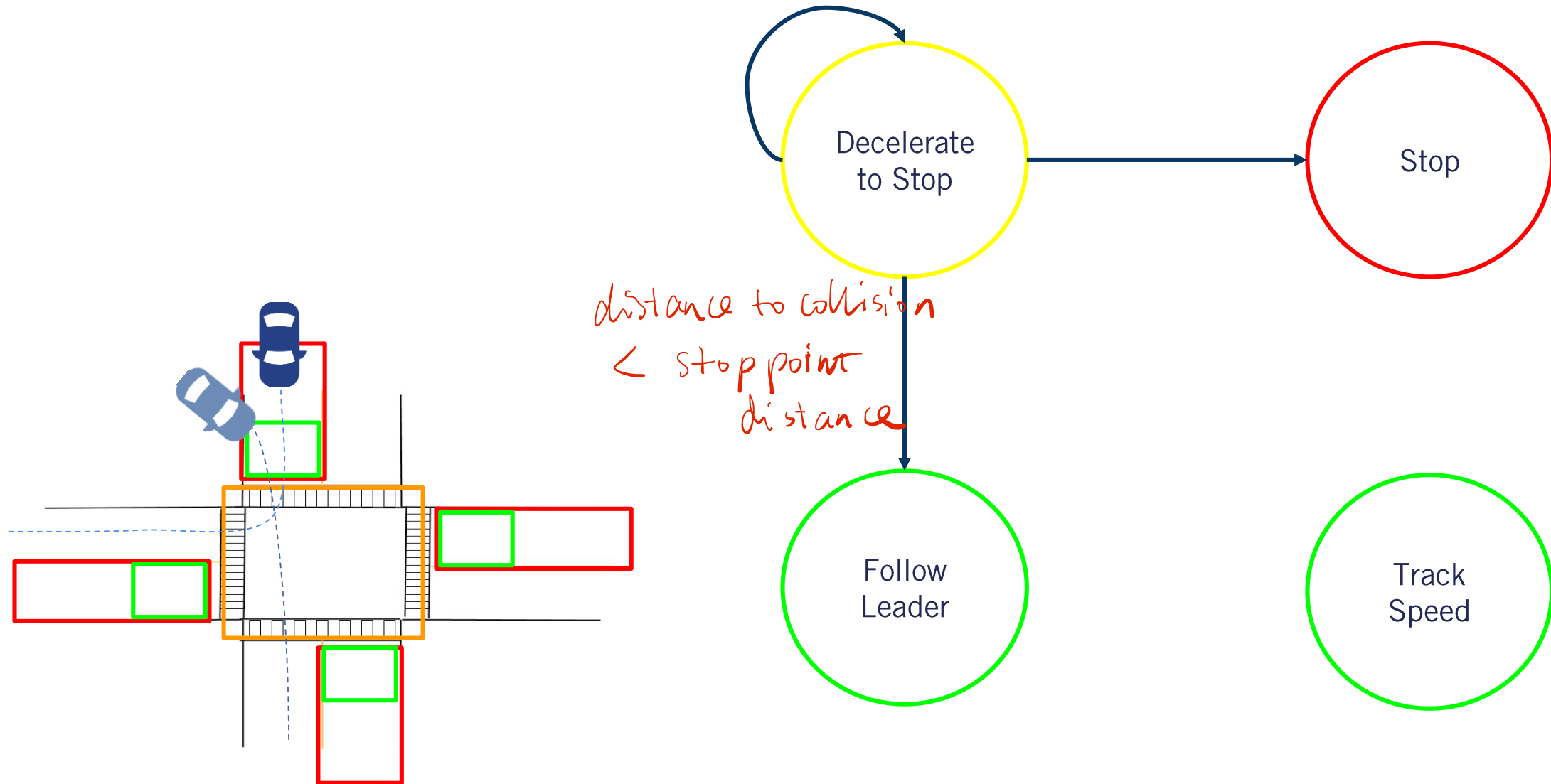
# State Machine Transitions - Follow Leader



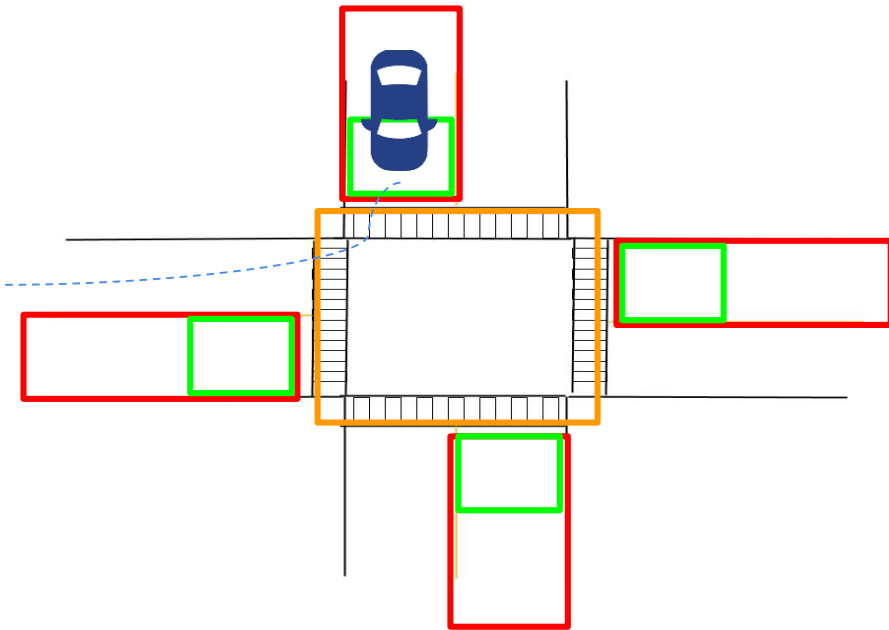
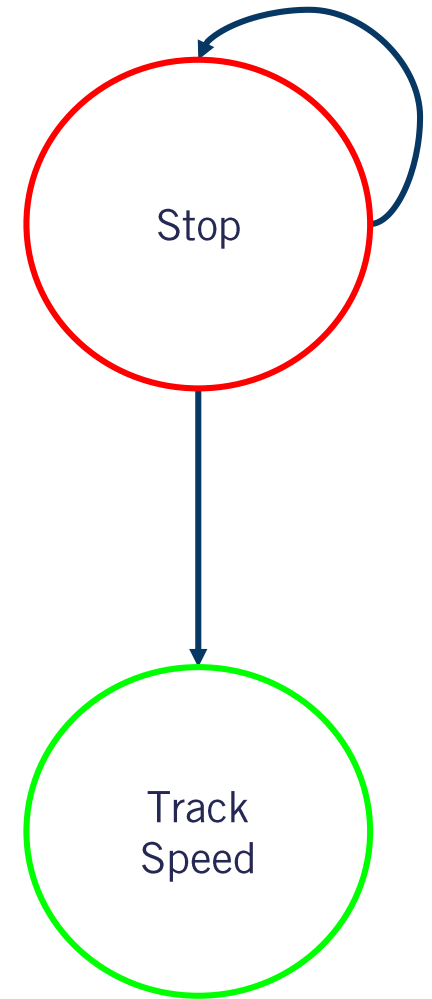
# State Machine Transitions - Decelerate to Stop



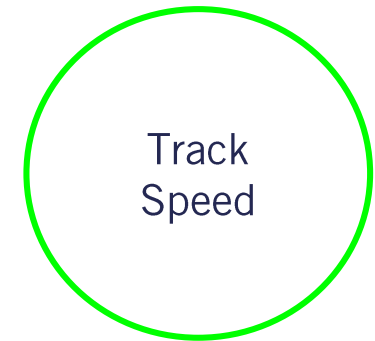
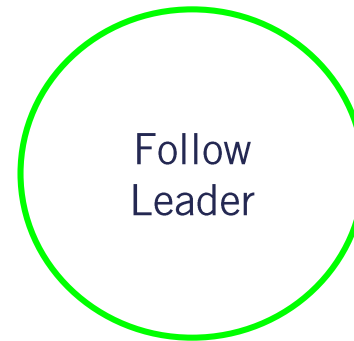
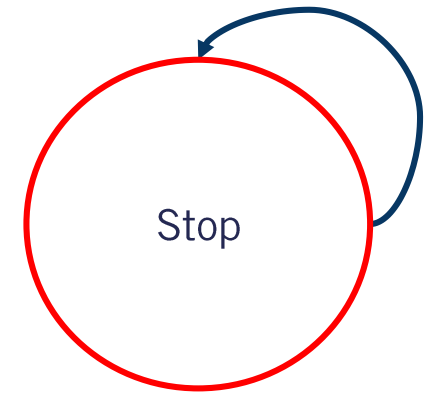
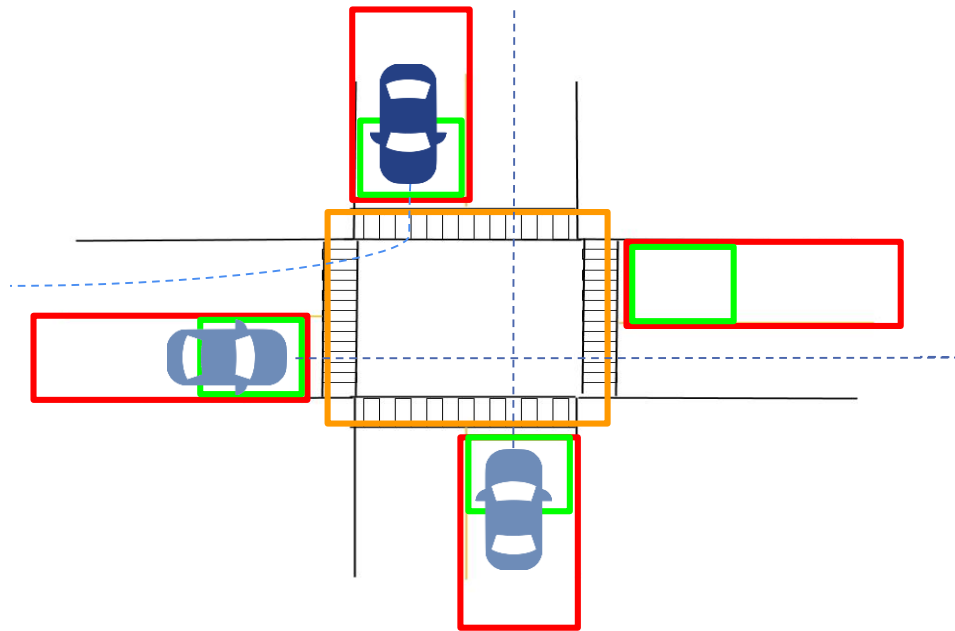
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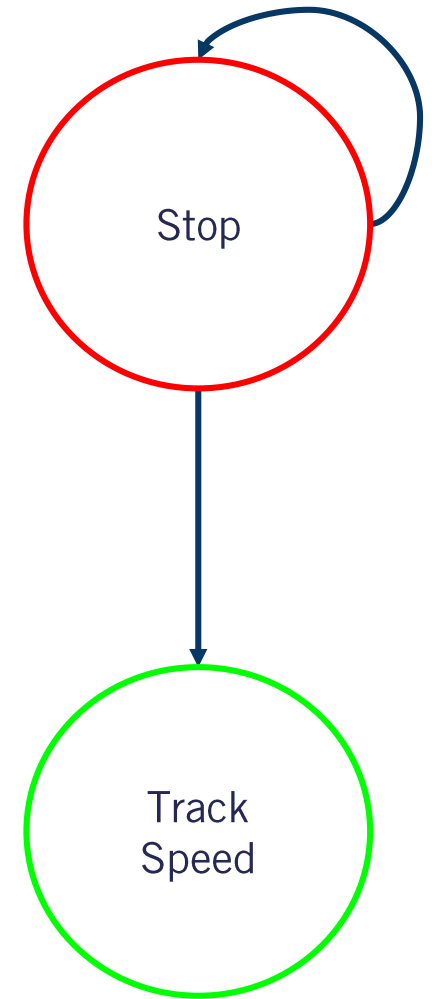
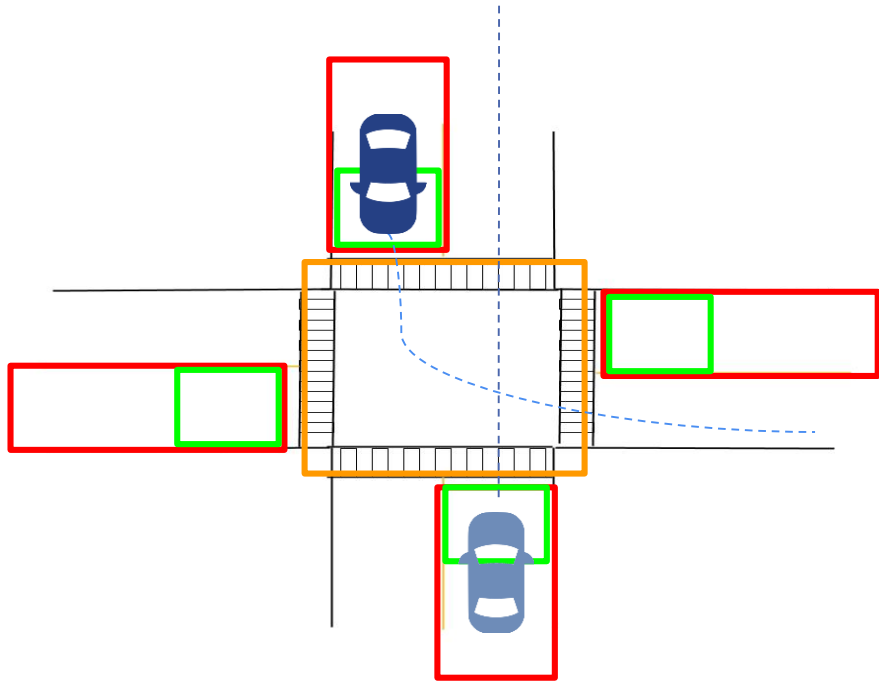
# State Machine Transitions - Stop



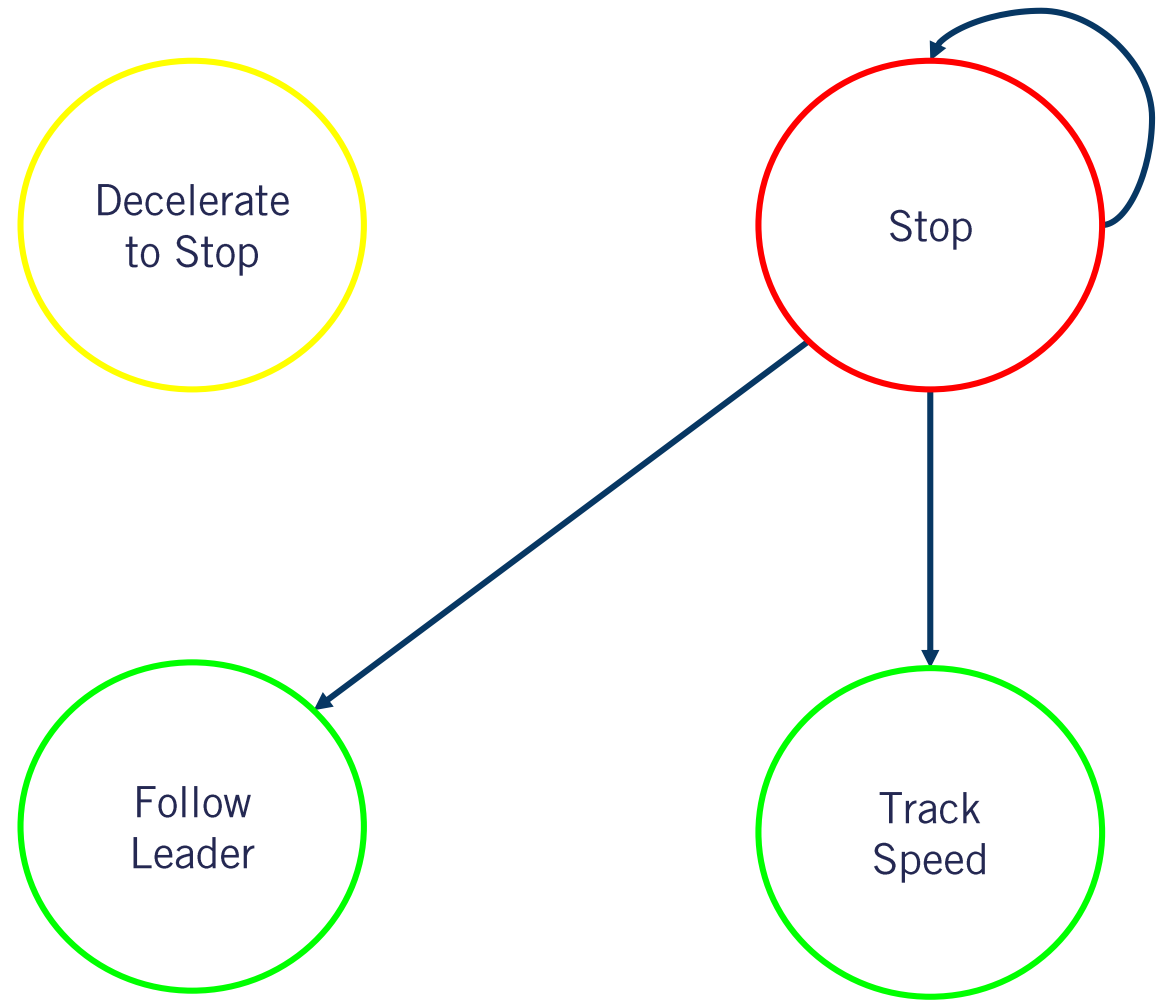
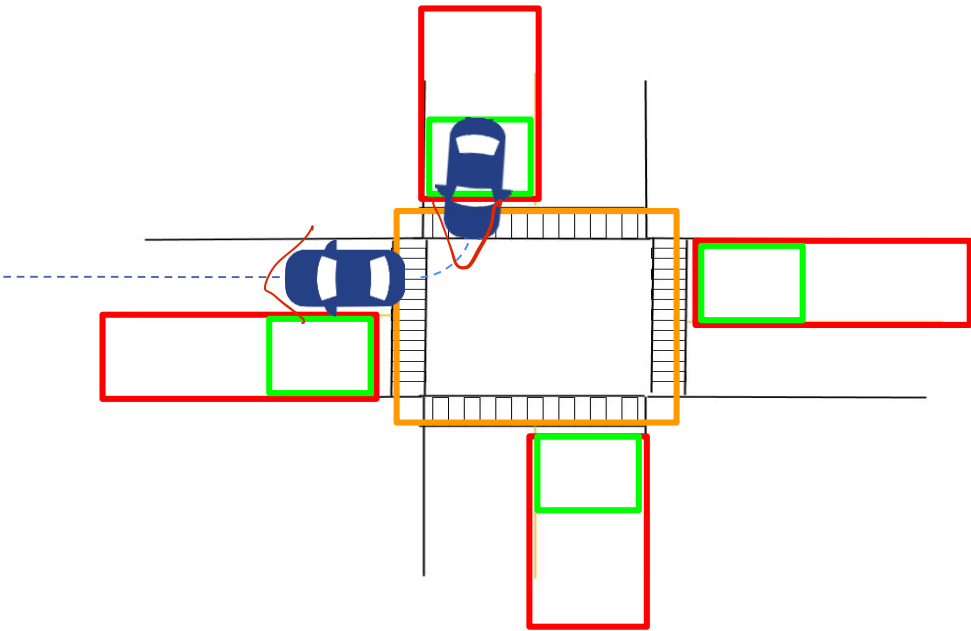
# State Machine Transitions - Stop



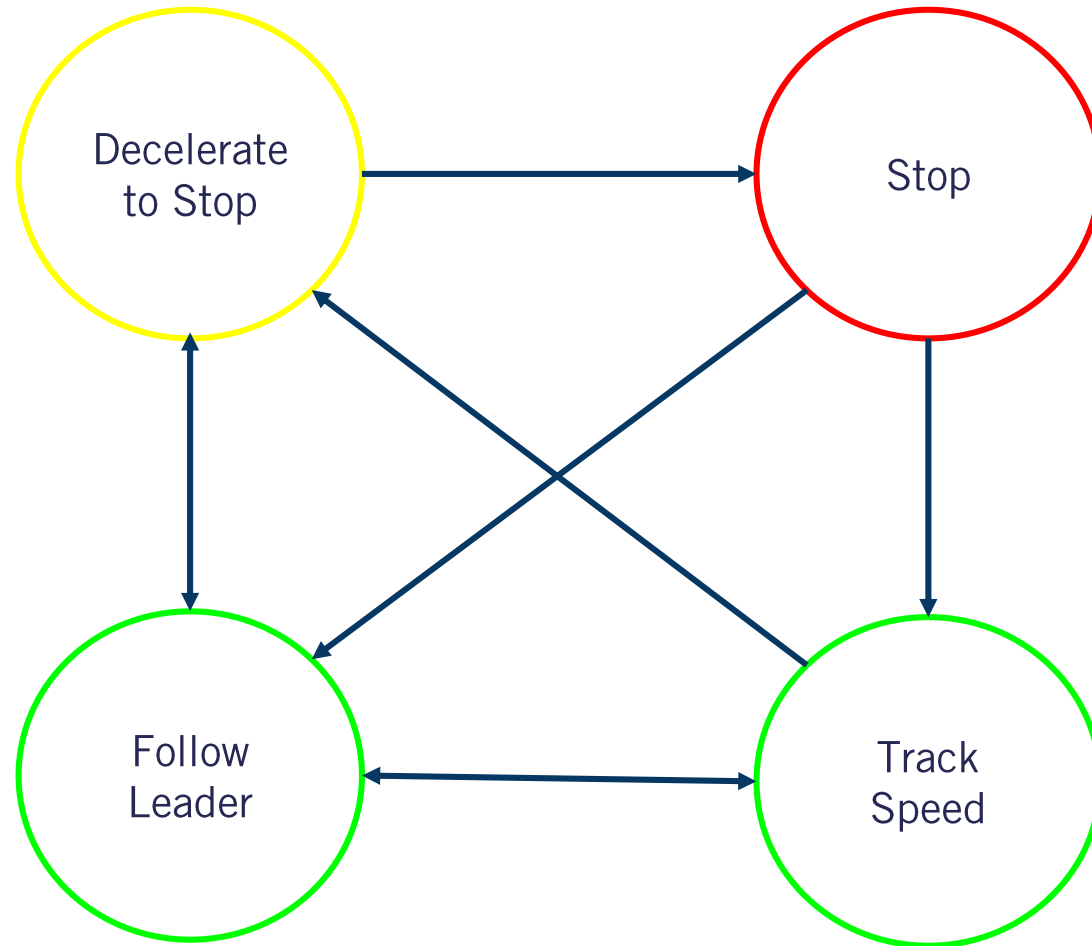
# State Machine Transitions - Stop



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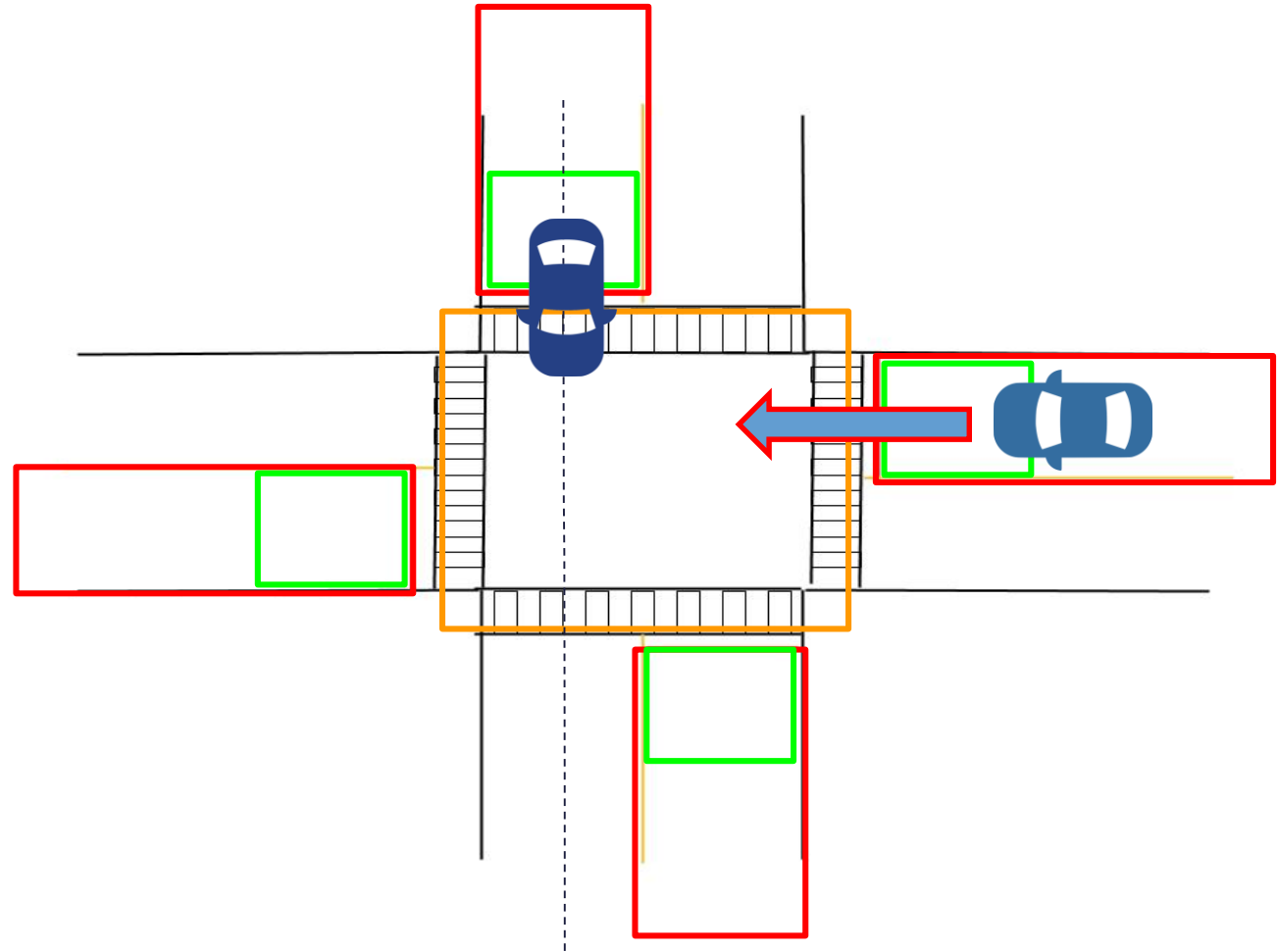
# State Machine Transitions





# Dynamic Object Edge Cases Not Handled

- Assumption:
  - All dynamic obstacles obey rules of the road
- Not always the case!



# Summary

- Build upon the previous lesson to include dynamic objects as part of the state machine
- Developing an understanding of the complexities and edge cases when dealing with dynamic objects
- **Next:** Handling multiple scenarios

**Extra**

# State Machine Hyperparameter Tuning

