

Requirements for Perception

Module 1, Lesson 2

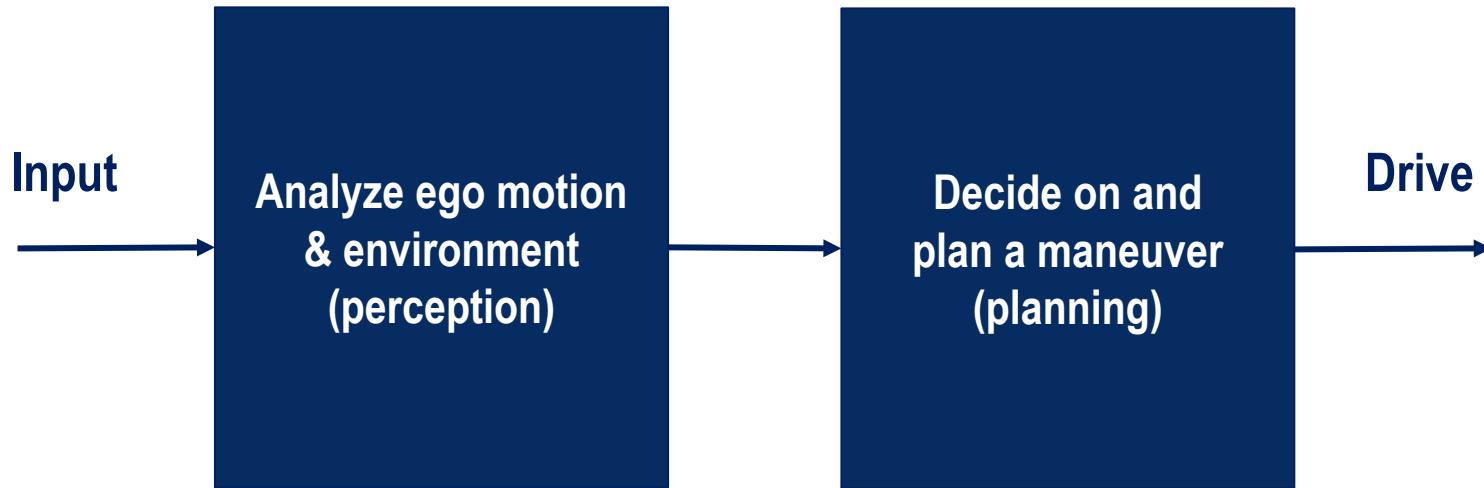


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In this lesson ...

- What is perception
- Goals for perception
 - Static, dynamic objects
 - Ego requirements
- Challenges to perception

Roughly ...



Object and Event Detection and Response (OEDR)

- Recall this is a criterion for automation

What is perception?

- We want to make sense of the environment and ourselves
- Two things:
 - identification
 - understanding motion
- Why?
 - to inform our driving decisions

Goals for perception

Goals for perception

- Static objects

Goals for perception

- Static objects
 - Road and lane markings (on-road)



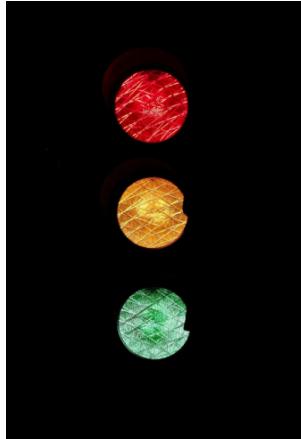
Goals for perception

- Static objects
 - Road and lane markings (on-road)
 - Curbs (off-road)



Goals for perception

- Static objects
 - Road and lane markings (on-road)
 - Curbs (off-road)
 - Traffic lights (off-road)



Goals for perception

- Static objects
 - Road and lane markings (on-road)
 - Curbs (off-road)
 - Traffic lights (off-road)
 - Road signs (off-road)



Goals for perception

- Static objects
 - Road and lane markings (on-road)
 - Curbs (off-road)
 - Traffic lights (off-road)
 - Road signs (off-road)
 - Construction signs, obstructions, and more (on-road)



Cone



Goals for perception

- Dynamic objects (on-road)

*motion
to predict
to inform driving decisions*

Goals for perception

- Dynamic objects (on-road)
 - Vehicles

Goals for perception

- Dynamic objects (on-road)
 - Vehicles
 - 4 wheelers (cars, trucks ...)



Goals for perception

- Dynamic objects (on-road)
 - Vehicles
 - 4 wheelers (cars, trucks ...)
 - 2 wheelers (motorbikes, bicycles, ...)



Goals for perception

- Dynamic objects (on-road) *(Radar, ...)*
 - Vehicles
 - 4 wheelers (cars, trucks ...)
 - 2 wheelers (motorbikes, bicycles, ...)
 - Pedestrians
 - more erratic*



Goals for perception

"my car"
ego vehicle

- Ego localization (IMU, GPS ...)
 - Position
 - Velocity, acceleration
 - Orientation, angular motion

Challenges to perception

- Robust detection and segmentation
- Sensor uncertainty
- Occlusion, reflection
- Illumination, lens flare
- Weather, precipitation

ML methods: reliability in performance
(large data set)
expensive in time consuming.



Summary

- Perception
- Goals for perception
 - Static and dynamic elements, prediction
 - Ego localization
- Challenges to perception