Longitudinal Speed Control with PID

Course 1, Module 5, Lesson 2

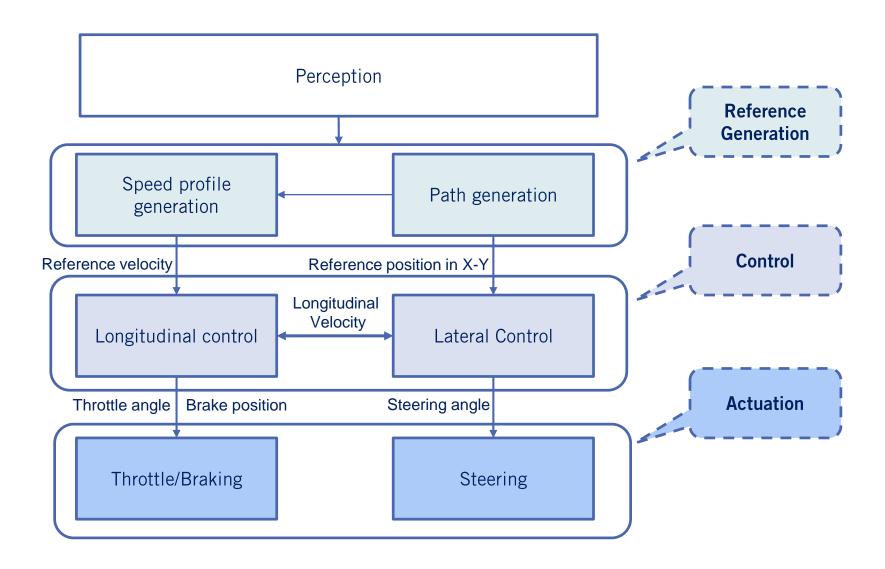


Learning Objectives

In this video, you'll ...

- Define the full vehicle planning and control architecture
- Design a PID controller for cruise control/speed regulation

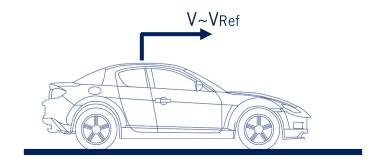
Architecture of Vehicle Control Strategy

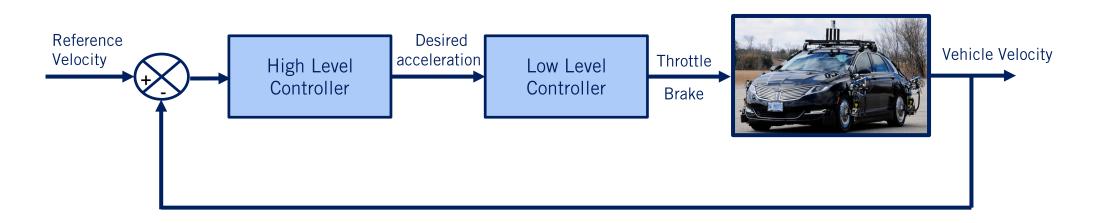


Longitudinal Speed Control

Cruise control:

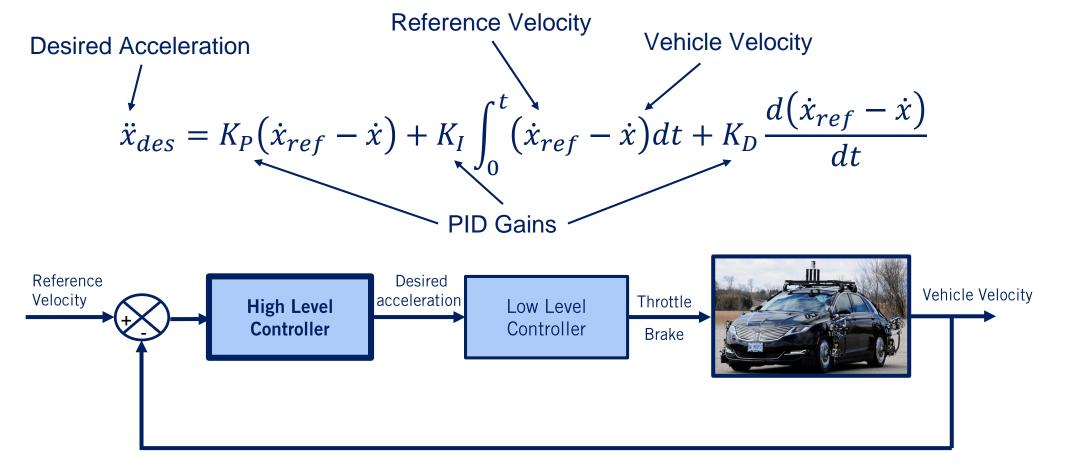
 Speed of the vehicle is controlled (by throttling and braking) to be kept at the reference speed





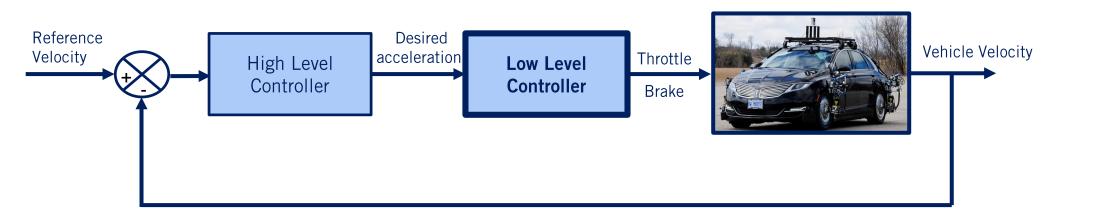
Upper Level Controller

 Determines the desired acceleration for the vehicle (based on the reference and actual velocity).

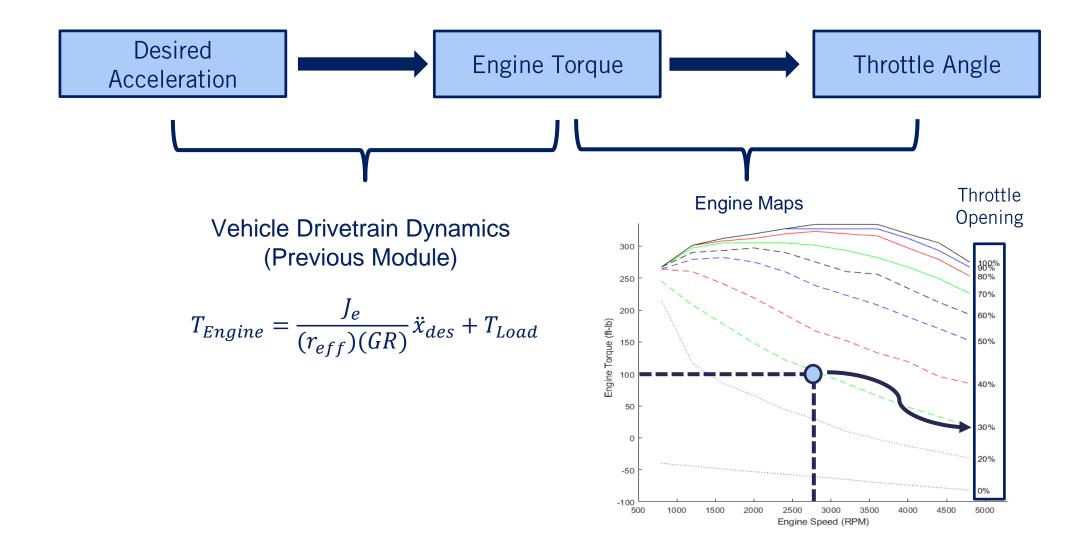


Lower Level Controller

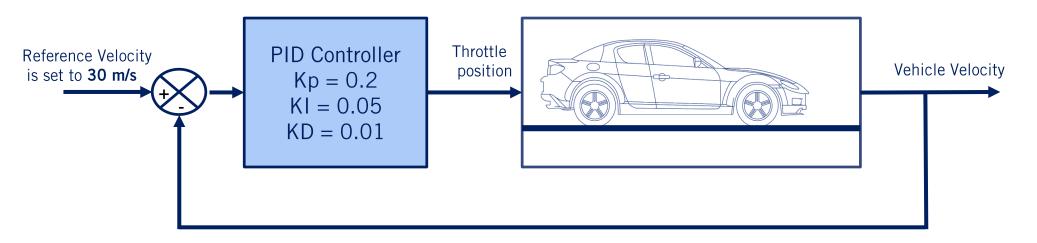
- Lower Level Controller:
 - Throttle input is calculated such that the vehicle track the desired acceleration determined by the upper level controller
- Assumptions:
 - Only throttle actuations is considered (no braking)
 - The torque converter is locked (gear 3+)
 - The tire slip is small (gentle longitudinal maneuvers)

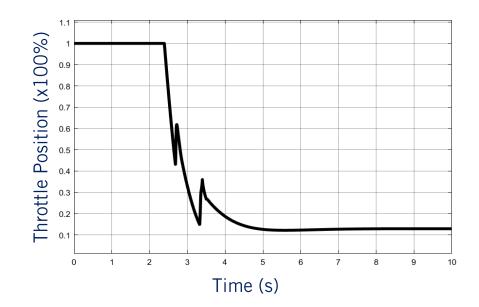


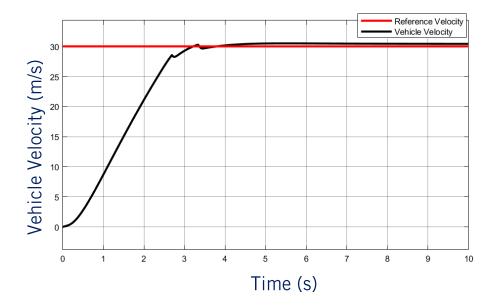
Lower Level Controller



Simulation Example







Summary

What we have learned from this lesson:

- Vehicle longitudinal cruise control
- High and low-level control structure based on PID and engine maps

What is next?

We will go through the vehicle feedforward control design