EPiCo
Electric Vehicle Propulsion and Control

E-Pico Master's Thesis

Intelligent Lateral Control for Autonomous Driving at the Speed Limit

Much interest has been devoted in recent years to the autonomous driving of road vehicles. Given the involvement of human life, the safety criterion has imposed on the scientific community a sustained development process. Several conventional architectures using lateral or longitudinal control have been used for robust tracking speed control for automated vehicles at the friction limit of the tires. However, driving at the physical limit in a critical manoeuvre and any amount of excessive speed due to overestimating the coefficient of friction or normal load leads to loss of path following states.
The global objective of this project is to contribute to autonomous driving (drive-by-wire) to strengthen the lateral control task for an autonomous vehicle in road conditions at the speed limit using artificial intelligence.

Goals

The specific objectives to be achieved are
i. Develop a dynamic model of an autonomous vehicle.
ii. Study the most popular intelligent controllers for autonomous driving.
iii. Define the neural network architecture: input, hidden and output layers.
iv. Collect the data necessary for the learning of the adopted neural network.
v. Validate the tools developed in simulation in the Matlab / Simulink environment.

- Laurense, V.A., J. Y. Goh, and J. C. Gerdes, "Pathtracking for autonomous vehicles at the limit of friction," in American Control Conference (ACC), 2017, IEEE, 2017, pp. 5586–5591.
- Osman, K., J. Ghommam, et M. Saad. Guidance based lane-changing control in high-speed vehicle for the overtaking maneuver, Journal of Intelligent & Robotic Systems, pages 1–23, 2019.

Requirements

Nonlinear intelligent control background and Matlab/Simulink

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