Titelkopf

EO2 Path Following Documentation

EO2 Intelligent Driving Assistance (IDA)

Steering Control for Autonomous Path Tracking

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Abstract

This report presents the derivation, design, and implementation of the ZUKA project.

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1. Path Following Module

where (x, y) represents the coordinates of the point P located at mid-distance of the actuated wheels, the angle θ characterizes the vehicle chassis orientation, ϕ represents the vehicle steering **wheel** angle, and L is the distance between the rear and front wheels axles.

1.1. Vehicle Model

For the vehicle, the kinematic model used (shown in Fig.1) is:

$$\begin{aligned} \dot{x} &= u_1 \cos\theta \\ \dot{y} &= u_1 \sin\theta \\ \dot{\theta} &= \frac{u_1}{L} \tan\phi \\ \dot{\phi} &= u_2 \end{aligned} \tag{1}$$

where (x, y) represents the coordinates of the point P located at mid-distance of the actuated wheels, the angle θ characterizes the vehicle chassis orientation, ϕ represents the vehicle steering wheel angle, and L is the distance between the rear and front wheels axles.

Figure 1: Configuration variables of the vehicle kinematic model

↬ Law of Large Numbers

To calculate the horizontal position the kinematic differential equations are needed:

$$\dot{n} = u\cos\psi - v\sin\psi \tag{2}$$

$$\dot{e} = u\sin\psi + v\cos\psi \tag{3}$$

A. Appendix Part

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