

BSc thesis/Kandidatarbete-Spring 2020

Design of side-slip measuring one-wheel trailer

Background:

To develop vehicle control, measurements of the motion such as vehicle speed over ground, yaw velocity and side-slip angle are essential. In particular, side-slip of the vehicle body is difficult to measure. The proposed work aims to develop a measurement device capable of measuring both speed and side-slip angle. The basic idea is to use a trailer wheel connected the ego vehicle, as shown in the figure below. By measuring the articulation angle, the side-slip angle could be estimated in the vehicle's center of gravity.

Background:

To understand the usefulness of a trailer wheel as a measuring device for velocity and side-slip

Deliverables:

1. A hardware design of the measurement device, e.g. trailer length, mass, suspension.
2. An algorithm that transfer articulation angle and angular wheel speed to longitudinal and lateral speed and side-slip angle in the ego vehicle's center of gravity.
3. A simulation model of the motion of the ego vehicle including the measurement device.
4. A physical small-scale prototype to verify the hardware design and the algorithm.
5. A method to measure ground truth of speeds and side-slip on the physical small-scale prototype.

Method:

The physics of the trailer wheel will be modelled and simulated. Validation will take place with the prototype.

Previous knowledge & target group & group size:

Mechatronics and mechanics. M, F, Z, E, D. 3-5

The work will be supervised by Mats Jonasson (mats.jonasson@chalmers.se) and Bengt Jacobson (bengt.jacobson@chalmers.se) is the examiner.

