

# Machine learning for high precision state estimation for truck and trailer systems

Oskar Ljungqvist

October 13, 2017

## 1 Background

Linköping university and Scania CV are partners in a research project related to autonomous driving for complex vehicle configurations. An important task within this project is to develop a research platform for autonomous driving of a truck and trailer system, see Figure 1. An important part of the framework is to accurately control the system with a very high precision. To achieve this a high performing observer needs to be developed. A big issue related to this is that on today's trailers there exists no sensor for measuring the relative angles between the truck and the trailer. Additionally, the trailers are not equipped with any GPS receiver which increases the complexity of the problem.

## 2 Problem description

Today's solution is based on an Extended Kalman Filter (EKF) that uses information from onboard sensors mounted on the truck. We are now interested in testing alternative methods for obtaining alternative virtual measurements by applying machine learning techniques. The sensor information we are interested to use for this specific purpose are images from the rear camera and the point cloud from the real LIDAR that are both mounted on the truck. A full-scale truck with a dolly-steered trailer will be used as test platform in this thesis work.



Figure 1: The full-scale truck and trailer system that will be used as test platform in this thesis work.

### **3 Who are you?**

We are looking for two students with strong academic results from the program Applied Physics. You have a strong background and interest in control and sensor fusion. Machine learning and computer vision skills are also desirable, but not a requirement.

### **4 Application**

For application or details, contact Oskar Ljungqvist ([oskar.ljungqvist@liu.se](mailto:oskar.ljungqvist@liu.se)) or Daniel Axehill ([daniel.axehill@liu.se](mailto:daniel.axehill@liu.se)).