Master thesis: Leveraging multi-camera setup for semantic segmentation

The Volvo Group is one of the world’s leading manufacturers of trucks, buses, construction equipment and marine and industrial engines under the leading brands Volvo, Renault Trucks, Mack, UD Trucks, Eicher, SDLG, Terex Trucks, Prevost, Nova Bus, UD Bus, Sunwin Bus and Volvo Penta.

Volvo Group Trucks Operations encompasses the production of state-of-the-art products for the truck brands of the Volvo Group, as well as Volvo Group engines and transmissions, through an international world class industrial environment.

With Volvo Group Trucks Operations you will be part of a global and diverse team of highly skilled professionals working with energy, passion and respect for the individual to become the world leader in sustainable transport solutions.

Background of thesis project
To be prepared for a future where significantly increased flexibility is needed when it comes to e.g. number of produced product variants, Volvo Group are, together with some university partners, (e.g. Chalmers) developing a Generic Photogrammetry based Sensor System, GPSS. A camera-based sensor system with several cameras mounted in the factory ceiling. Applying artificial intelligence when interpreting the video stream the results can be used for e.g. controlling robots, tracking people and in general finding objects preventing the robot movements.

The master thesis
This work is a continuation of a previous successful master thesis that trained a semantic segmentation network for finding the free floor space. This was used for defining areas on the shop floor where Autonomous Transport Robots (ATR) could act and maneuver without the need of expensive on-board sensors.

![Figure 1. Results from the semantic segmentation using one camera.](image)

This thesis is about using the fact that there are more than one camera covering the same floor space for calculate the floor coverage of objects (i.e. as ground truth rather than the object’s pixels in the image). We believe it is likely that a multi-view setup would outperform a single camera for this task. Therefore, we should investigate if it is possible to predict a single floor coverage mask when using images from several cameras as input.
This document describes a Master Thesis to be performed at Group Trucks Operations, GTO, Göteborg, during 2022.

Suitable background
Master program in Systems, control and mechatronics or courses in Computer vision and deep machine learning.

Methodology
- Literature study
- Understanding the GPSS environment at the Volvo pilot plant in Gothenburg
- Develop and test algorithms
- Make a system implementation
- Run demonstration to validate the result

Thesis Level
Master

Language
Thesis is to be written in English.

Starting date
January 2022

Number of students
Two (2) or 2+2

How to apply
Send an email to Per-Lage Götvall, Sr. Research Engineer, Volvo GTO, R&TD, per-lage.gotvall@volvo.com