

Invitation to the PhD defense of the dissertation:

Robust and Multi-Modal Analysis of Traffic and People

By: *Chris Holmberg Bahnsen*

The defense will take place on May 28th 2019 at 13:00.

Venue: Rendsburggade 14, room: 3.329, 9000 Aalborg.

The dissertation is a result of a PhD study at the Department of Architecture, Design and Media Technology, Aalborg University, Denmark.

Assessment Committee:

Associate Professor Lazaros Nalpantidis

Department of Materials and Production
Aalborg University, Denmark

Professor Michael Felsberg

Department of Electrical Engineering
Linköping University, Sweden

Docent Henrik Karstoft

Department of Engineering – Signal Processing
Aarhus University, Denmark

PhD Supervisor:

Professor Thomas B. Moeslund

Aalborg University, Department of Architecture, Design and Media Technology

After the defense, the Department of Architecture, Design and Media Technology will host a reception in room 5.355 (lunch area, level 3).

Questions can be directed to Senior Secretary Malene Friis (+4599407176 / mafr@create.aau.dk).

Summary of the PhD research:

This PhD covers work conducted from 2013 to 2018 within two overall themes: multi-modal analysis and robust traffic analysis

Within multi-modal analysis, we investigated how to obtain synchronized and registered imagery from visual, depth, and thermal sensors. We used our tri-modal acquisition and registration platform to conduct research within people re-identification and people segmentation. As part of this work, we released a publicly available tri-modal dataset for people segmentation. We developed and extended an annotation toolbox that has subsequently been used for many other research projects in our laboratory.

In traffic surveillance, we have investigated how to combine information from visual and thermal cameras using the related contextual information.

In the work within robust traffic analysis, we have studied the influence of rainfall and snowfall on visual traffic surveillance.

We surveyed the field of rain removal algorithms and selected six algorithms to investigate if the removal of rain from traffic surveillance video would increase the performance of subsequent background subtraction, instance segmentation, and feature tracking algorithms. We collected and annotated a new publicly available dataset consisting of visual-thermal traffic surveillance video.

Furthermore, we have investigated the use of fully synthetic sequences from a virtual world where rain is rendered in the entirety of the scene. On the basis hereof, we trained a rain removal algorithm.

Traffic researchers are analyzing the behavior of road users in order to understand the causation of accidents and improve road safety. To reduce the amount of video for manual inspection by the traffic researchers, we have developed the RUBA software tool.

We have tested RUBA for detection and counting of turning road user movements at urban intersections and compared it against a more advanced, feature-based tracker.

In extension of our work within traffic surveillance, we investigated several options for establishing a portable video acquisition platform, which led to the construction of a new portable pole.

As part of the dissemination activities, we have authored an article on deep learning for the Danish magazine on popular science, *Aktuel Naturvidenskab*.