Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences

Martijn L. Hollestelle (4015002)
Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examencommissie-\textsc{BK}@tudelft.nl), Mentors and Delegate of the Board of Examiners one week before P2 at the latest.

The graduation plan consists of at least the following data/segments:

## Personal information

<table>
<thead>
<tr>
<th>Name</th>
<th>Martijn Hollestelle</th>
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<tbody>
<tr>
<td>Student number</td>
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## Studio

<table>
<thead>
<tr>
<th>Name / Theme</th>
<th>Design of the urban fabric</th>
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<tbody>
<tr>
<td>Teachers / tutors</td>
<td>Dr. Egbert Stolk, Dr. Akkelies van Nes, Dr. Dimitris Milakis</td>
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<tr>
<td>Argumentation of choice of the studio</td>
<td>The research group takes a scientific and self-critical attitude towards design. Because of the multidisciplinary character, design will be just as much a component of the study as the model, and a dialogue will emerge between those two aspects of the thesis. I consider the self-conscious and critical role of the studio towards design essential for my research. I will approach the modal with a similar conscious attitude.</td>
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## Graduation project

<table>
<thead>
<tr>
<th>Title of the graduation project</th>
<th>Assessing the impacts of automated vehicles on urban form through an integrated agent-based modelling research-by-design approach</th>
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## Goal

<table>
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<tr>
<th>Location:</th>
<th>Utrecht region, the Netherlands</th>
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<tr>
<td>The posed problem,</td>
<td>Automated vehicles are propagated as a potential disruptive innovation. On the one hand it can lead to a more efficient transportation system and on the other hand it can influence spatial quality. Many research focusses on these problems, yet there is no substantiated image how vehicle automation will influence urban form in terms of density and diversity of functions.</td>
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<tr>
<td>research questions and</td>
<td>How can predictive quantitative model research contribute to the development of a spatial strategy for urban areas with automated vehicles, and what role can</td>
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urban design play to employ the potentials of automated vehicles to synchronise the balance between mobility and land-use?

The design assignment is to develop a modelling tool that supports to grasp the complexity of the urban system in order to conduct a spatial strategy for the uncertainty around the development of vehicle automation. The design assignment will be to illustrate this strategy through various urban scales from a general vision of the region to interventions on specific areas in the region.

**Process**

**Method description**

Cities are considered complex systems. In that light, the main methodology will comprise modelling as a tool to study the core dynamics that are initiated by the emergence of vehicle automation. This model will be an agent-based model.

Modelling is not only the usage of a simulation tool, it is also a process that promotes a scientific habit of mind, makes assumptions explicit and is a guided mean to data collection. Therefore, the geospatial and behavioural data will also provide for understanding of the case study area. However, since these data will be very metrics based, they will be critically assessed from an urban design perspective. This means comparing metrics to context.

Modelling is a powerful study tool, but also very labour and time intensive. Therefore, the design process that incorporates the model will be further more rather traditional in other aspects.

**Literature and general practical preference**

Literature can be distinguished in four categories:

1. Literature on design thinking, engineering thinking and science philosophy will help to provide for a basis of a self-conscious research process combining modelling with design thinking.
2. Literature on land-use transport interaction modelling. About how to model urban processes and how to formalise this in a computational model.
3. Literature on urban metrics. How does one express cities in metrics and what can one derive from those metrics?
4. Literature on automated vehicles in terms of effects and deployment.

**Reflection**
Relevance

Various researches state that very few research is conducted on the spatial impacts of automated vehicles (e.g. Milakis, van Arem, et al. (2015) or Fagnant and Kockelman (2015)). It is one of the aspects related to vehicle automation which is highly unsure. Yet, it is a significant issue to address in order to complete the picture on automated vehicle research. The urban context is of high influence of how technology can be implemented, and the urban context is also of high influence for the mobility demand. The spatial impact is in that sense a missing link in order to complete the picture how automated vehicles will change the transportation system and the built environment.

Automated vehicles are proclaimed to be disruptive, yet very beneficial to improve the life of people. This is by no means a thing that can be taken for granted. In terms of accessibility – which can be interpreted as opportunities – space and mobility are limited resources, yet of vital importance to everybody. This is one ethical consideration next to the popular examples of the trolley problem (e.g. Bonnefon, Shariff, and Rahwan (2016)) or the concerns related to employment and automation. In order to achieve an inclusive city, a reasonable level of access to opportunities should be considered to all.

Time planning
2017

September
- 31: thesis plan
- 8: model development

October
- 1: literature/scenario analysis
- 17: model results!

November
- 1: thesis plan
- 21: strategy development & design

December
- 1: finalising report
- 28: design interventions

January
- 2: model development

February
- 4: finalising

March
- 2: strategy development & design

April
- 2: finalising

May
- 31: finalising

June
- 30: finalising

July
- 31: T&P

August
- 1: Urbanism