Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences
# Personal Information

<table>
<thead>
<tr>
<th>Name</th>
<th>Bhavana Vaddadi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Number</td>
<td>4513762</td>
</tr>
<tr>
<td>Telephone Number</td>
<td>+31 682317773</td>
</tr>
<tr>
<td>E-mail Address</td>
<td><a href="mailto:bhavna.1993@gmail.com">bhavna.1993@gmail.com</a></td>
</tr>
</tbody>
</table>

## Graduation Studio

<table>
<thead>
<tr>
<th>Name/ Theme</th>
<th>Complex Cities</th>
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<tr>
<td>Teachers</td>
<td>Dominic Stead, Steffen Nijhuis</td>
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**Argumentation of choice of the studio**

The Complex Cities research group states: "(...) how planning and design resolves territorial conflicts and how urbanism addresses poverty, extreme environmental threats, weak governance or urban emergencies in neighbourhoods, cities and regions around the world" which nearly sums my intention of working with a process and it's impacts on the cities of tomorrow. Through this research group I can gain a thorough understanding of the planning process that could be involved in such projects.

## Graduation Project

<table>
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<tr>
<th>Title of the Graduation Project</th>
<th>Autonomous Shared Mobility &amp; the Cities of Tomorrow: Impact of shared self-driving vehicles on the urban form of the city of Amsterdam</th>
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**Goal:** The goal is, through scenario based studies, explore the impact Autonomous Shared vehicles will have on different parts with different characteristics of Amsterdam.

### Location

**Amsterdam**

### Posed Problem

Autonomous and shared mobility is the most talked about topic in the world of transport today. The upgrade from the current mobility systems might add another level of safety, efficiency and sustainability. But, implementing this kind of system might lead to changes in the road patterns, parking facilities, and the urban form of a city overall, thus affecting the end user. Hence, there is a need for Transport Planners and Urban Designers to investigate the possible impacts of Autonomous mobility on the city and the space it offers to reap maximum benefits in future. How can scenarios be used as a tool to formulate a strategy to transform the urban form of the city in the age of developing technology of Autonomous Shared vehicles?

### Research Questions

1. Why is there a need to explore Shared Autonomous Mobility in growing cities today?
2. What role could the Autonomous Shared vehicles play in changing the trends of Mobility in the city of Amsterdam?
3. What are the possible impacts of Shared Autonomous vehicles on the urban form of Amsterdam?

### Design Outcome

The design outcomes of this project would be considered as recommendations by the author to understand the potentials the freed-up spaces will offer the city due to the onset of Autonomous technologies in the long term. They consist of illustrations, maps and schemes of a selected future, representing the impact of Autonomous shared vehicles in different locations in Amsterdam. The purpose of the illustrations of the future is not just to provide visualization but an understanding of the opportunities and challenges the technology will offer to the city.

### Process

**Method Description**

The goal of the project is to understand the consequences of the changes in mobility systems that might take place in the near future. Hence, it aims to cover three important sectors of Urbanism i.e. Research, Planning and Design as it begins with a strong understanding of the technology and
exploring existing research for the technology as well as its supporting systems to derive a base for the study to hold on to.

Adding to this stage is the analysis of the city of Amsterdam in order to understand the opportunities it has to offer to adapt to the technology. At this point it is also of utmost necessity to understand the approach that has to be taken for this project to unfold.

Hence, scenarios have been constructed to speculate how the future would look like. For the planning stage of the project, the combination of the opportunities and the city analysis would help in formulating a strategy or the target year of 2040 which will help in deciding ideal scenario/scenarios in which the city will mostly likely develop in future.

In order to achieve this scenario, an approach guide is suggested which deals with various concepts and tools that could be used. The design stage aims mostly at the spatial translation of these tools at a smaller scale for different urban forms and understanding their impact on a larger scale which would in turn reflect the strategy that the city developed to tackle the onset of Autonomous Mobility.

### Literature and General Practise preference

- The Driverless City by Carlo Ratti and Matthew Claudel Project Syndicate, October 2016
- Full speed ahead: How the driverless car could transform cities | McKinsey & Company, August 2015
- Improving mobility and public space- Parking policy and car sharing in Amsterdam, Evelien van der Molen, City of Amsterdam
- Self-Driving Cars Will Improve Our Cities, If They Don't Ruin Them, August 2016
- The third transportation revolution, John Zimmer, December 2016
- Policy and society related implications of automated driving: a review of literature and directions for future research, Dimitris Milakis, Bart van Amerongen, Bert van Wee
- Autonomous Mobility-on-Demand Systems for Future Urban Mobility, Marco Pavone
- The Impact of Autonomous Vehicles on Cities, Stelios Rodoulis
- Autonomous Driving and Urban Land Use, Dirk Heinrichs , May 2016
- Autonomous Cars, Uber, and Future Urban Form GRIDS blog, July, 2016
- How will driverless cars affect our cities? Issi Romem, March 25,2013
- Impact of autonomous vehicles on urban mobility, Muhammad Aamat, December 2015
- MAKING BETTER PLACES: Autonomous vehicles and future opportunities WSP | Parsons Brinckerhoff in association with Farrells, April 2016
- Implications of Vehicle Automation for Planning, Sivaramakrishnan Srinivasan, Scott Smith and Dimitris Milakis, January 2016
- Planning for Cars That Drive Themselves: Metropolitan Planning Organizations, Regional Transportation Plans, and Autonomous Vehicles, Erick Guerra, 2015
- Autonomous Mobility on Demand in SimMobility: Case Study of the Central Business District in Singapore, Katarzyna Anna Marczuł, Harold Soh Soon Hong, Carlos Miguel Lima Azevedo, Muhammad Adnan, Scott Drew Pendleton, Emilio Frazzoli and Der Horng Lee
- Imagining the Driverless City, Patrick J. Kiger, October 2, 2015
- Research, Information and Statistics, Gemeente Amsterdam

### Reflection

This reflection aims to throw light upon the process and the outcomes of the project, its relevance to the graduation studio and the social relevance followed by exploring the challenges and weakness faced during the project. Autonomous Shared Mobility in today’s context is still at its technological development state and against the background of urban implications it is still an under examined field of research which proved to be quite a challenge for this project.
To predict the future development of cities hand in hand with the technology, this graduation project aims at dealing with a futuristic phenomenon with the help of scenarios. It intends to understand the possible impact of the technology on the urban form of the city.

To gain this understanding, the methodology of the project was designed to obtain a strong research and planning basis accompanied by design illustrations or spatial translations of the conclusion derived. In order to gain the knowledge of the impact of the technology on the urban form of the city, questions were raised on why is there a need for it and what really is the technology. The first couple of months of the project were spent solely in understanding and finding answers to these questions.

The second half of the project aimed at developing the different futures that could happen with the on set of these technologies and through them strategic goals and actions to reach a stage where recommendations and suggestions were given to understand the potentials space has to offer with the use of an approach guide. The graduation research group, Complex cities aims to understand how planning and design resolves territorial urbanism by addressing poverty, extreme environmental threats, weak governance, or urban emergencies in neighborhoods, cities and regions around the world.

Their mission focuses on interdisciplinary approach/integral thinking. Internationalization/Understanding differences: Institutional context/developing a critical perspective: Planning methods and tools/manage change and the Decision-making and participation process. For this project, it was of utmost necessity that an integral thinking approach and the concept of internationalization and understanding differences is considered and used at different stages thoroughly. Through this research group a thorough understanding of the planning process was gained for such projects. The technology of Autonomous mobility not only impacts the change in urban form, it will have a significant impact on the citizens as well. This new technology will provide easy and quick mobility for different types of citizens and will also permit living in remote areas. It will also play an important role in reducing the time spent looking for parking spaces in and around the city limits saving valuable time.

Additional benefit is the safety factor which also provides reason to research the benefits of this technology and regulate the way it develops to reap maximum benefits in future. A considerable time was spent in the initial stage of the project dealing with the concept of scenario building. There were three major challenges that were faced at this stage. One, for such a futuristic technology, the most suitable tool to speculate its consequences is to build the futures based on the certain factors, some constant and some varying. This proved to be quite difficult due to the involvement of various factors with the autonomous technology and narrowing them down to three core factors was a difficult decision to take as there were greater chances of important factors being left out. After many mentoring sessions, it was understood that due to the time constraints of the project, if the factors were not concise the conclusion to the project would not be reached. The second challenge was that faced at this stage was designing the futures which would be the best match for the city of Amsterdam.

On a personal note, the best part of working on this project with Amsterdam in mind was that, it offered a wide range of opportunities in terms of projects, strategies, and initiatives to integrate with the technology and the project strategy as well. These opportunities also played a great role in designing the futures. Research projects for the same from the Faculty of Civil Engineering and Geosciences and Ministry of Infrastructure and Environment proved to be the best inspiration at this stage.

The pitfall in the backcasting future designing process is that, the proactive approach of multi-modality and mobility on demand that are chosen to formulate the strategy is quite utopian. There are many disadvantages that come along with both these concepts. This project makes the choice of considering the advantages over the disadvantages that it can cause. One of the challenges was the acquisition of origin destination studies for the city of Amsterdam for better reasoning for the construction of scenarios. Due to the lack of this information, the scenarios lean more towards being qualitative than quantitative.

The next challenge lied in the spatial translation of the strategic vision i.e. to incorporate the actions of the vision on both large and small scale. According to the thought process, it was assumed that the spatial translation would be achieved through design which was an incorrect assumption. Coming from an urban planning background, the challenge also lies in understanding and translating the research and derived strategy into design. During the mentoring sessions, it became clearer that a step in between must be taken in order to achieve the design stage.

This intermediate stage is to formulate certain tools or an approach guide that will facilitate the actions to take place orderly. The weakness of the project here is that due to the way the methodology was developed, the approach guide initially consisted of both tools and heavy concepts that can be achieved through more tools in a generalized manner derived from the scenarios that were developed. To solve this flaw in the approach guide, the tools were categorized into four greater concepts.

During the designing process, it was realized that there are many other tools that could be used to develop the city and its urban form. Hence, the approach guide has been under constant upgradation ever since its conception. In the designing process, the weakness lies in the way it has been illustrated. Better quality of visual aids like real time picture renderings and collages could have been used extensively to convey their importance of the design to not only urbanists and planners but to multidisciplinary audience and citizens alike. This would also help in visualizing the strategy goal on a larger scale. As discussed above, the scenario designing process had a major weakness.

The scenarios chosen are expected to have quite a lot of disadvantages and their advantages could have been strongly proven through mathematical modelling to overcome the pitfalls and develop strong reasoning. Overall the project has many other facets that are yet to be researched and explored in detail to achieve better results and this is where the future scope of the project lies. With inspiring and educational mentoring sessions and a supportive city like Amsterdam for testing, the project aims to contribute in any way possible to the larger concept of Smart Mobility in the cities of tomorrow.
The project spanned over the period of 12 months and was carried out in the following five phases:

Stage 1- Research: This stage focussed on grasping the issue at hand and exploring the topic in detail to formulate research questions.

Stage 2- Processing: Having established the trending issue at hand, the processing stage involved a deeper understanding of the concepts tied to the topic and various approaches that could be taken to take the project forward. This phase simultaneously involved getting familiar with the site and its characteristics.

Stage 3- Concept Building: The concepts, analysis and conclusions from the previous stage form a foundation for building the concept of this project. The approach of backcasting scenarios was adapted to devise a strategy for mobility for the city and various tools and guidelines have been suggested to achieve this strategy.

Stage 4- Production: The production stage focused on creating illustrations and visuals for different parts of the city to visualize the implementation of the tools and guidelines that could highlight and explain the potentials the space has to offer as a consequence of this mobility trend. Stage 5- Presentation: The presentation stage was to work towards a display of findings and reflection of the project with final conclusions and understanding the future scope of the project.