Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences

Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examencommissie-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	
Name	Yaxuan Ge
Student number	5570573

Studio		
Name / Theme	Design of the Urban Fabric	
Main mentor	Marco Lub	Urban Design
Second mentor	Stefan van der Spek	Urban Design
Argumentation of choice of the studio	As mentioned in the introduction presentation 'we need a new spatial contract' while facing the challenges of space, we are also supported by technology thanks to the development of the Internet. 'Trends in technology and future studies as a base for design perspectives', using this idea as my starting point gave me a direction and many ideas. While the Internet has influenced the way people live, it has also influenced the spatial form of future cities. By enhancing the interweaving of virtual and real spaces in urban design, it may be possible to create a more flexible, diverse and richly layered public space. For example, the introduction of new media such as devices that can be experienced, engaged and interacted with to influence people's behaviour may stimulate more diverse social activities. Perhaps I could also venture an imagination that, inspired by the urban theory of the plug-in city, nodal public spaces could also become movable modules in the city, that decentralised design thinking could contribute to social equity and sustainability. This kind of new urban form could inspire me to rethink more about the form and function of future urban space. In addition, the studio-related components of intensives and workshops are very appealing to me, as spatial analysis, spatial narrative, pattern language, VR technology and so on will be of great help in expanding my design thinking and improving my design skills. VR is a new technology that is gradually being integrated into people's lives, and I would like to keep the possibility of using this technology to assist me in my design process. Based on the above my initial thoughts on the content of my graduation project, I think this studio is perfect for the topic I wish to explore and research in my final project. And I am also confident that my relevant experience and skills could help me to adapt to these intensive programs.	

Graduation project	
Title of the graduation project	Augmented Reality Revolution
Goal	
Location:	Rotterdam Blaak
The posed problem,	Firstly, with the advent of the internet era, the digital transition of society has led to a greater reliance on devices, weakening physical interaction and reducing the need for physical space. It has led to an increasing decline in the original episodic activity and mediating function of public spaces. However, the AR game Pokémon Go has succeeded, almost overnight, in enticing people into the streets of cities around the world, which make many previously underutilized public spaces suddenly become hot spots. Many studies have shown that virtual spaces are becoming increasingly functional and gradually replacing some physical spaces. However, virtual worlds cannot replace people's senses and experiences, such as restaurants and other experiential services. Traditional businesses that rely solely on physical spaces will face a transformation. Therefore, physical space, as a place to accommodate activities, needs to work in synergy with virtual space to achieve some balance, and AR technology can integrate virtual information into the physical world, acting as an information supplement and a catalyst for vitality. Secondly, accelerated urbanization and intensification have led to a high concentration of resources in the physical world. It has made both public resources and public space exclusive, which will increase social segregation as well as conflict. Despite this, the housing shortage is still in urgent requirement of a solution. High-density or multifunctional spaces might be the solution, but at the same time, the spatial justice of the city needs to be considered. Virtual spaces brought about by AR are adaptable and not limited by physical space, freeing up part of the urban function and providing more available space. Considering the problems and opportunities that digital transition and urbanization bring, designing more inclusive and accessible urban patterns and spatial forms for the future by adapting to people's future lifestyles and aiding physical spaces is the final goal. AR and its virtual content can help solve many urban issues as an additional layer of urban information.
research questions and	Main question: To solve urban issues with AR technology, how can we design virtual and physical spaces for collaborative working while ensuring that urban spaces are accessible and inclusive? Sub questions: 1 What are the urban problems that AR technology FEATURES can help solve? 2 Why can virtual spaces enhance physical spaces? 3 What kinds of physical spaces can be aided/changed by AR? 4 How can accessible and inclusive cities be defined/assessed?

design assignment in which these result.	Conceptual design (new urban system with AR involved) Physical environment about complex mass and public space with virtual layer A future AR-based 'pattern language'

Process

Method description

Research by design approach.

Research

- Theoretical framework: literature, desk research and interviews

The relationship between urban development and technology is researched to help formulate hypotheses for future city models basing on AR revolution.

- Exploration of technical development of AR

The features of AR are studied to redefine 'public space', suggest approaches in which AR might help to improve the inclusiveness and accessibility of public space

- Spatial analysis
- Programmatic analysis

Understanding the physical space and looking for opportunities.

Design

- Conceptual design
- Spatial design for Blaak location (Binnenrotteplein), combining physical and digital models

Using Rotterdam Blaak as a pilot to test whether and how could AR solve the urban issues and benefit the urban environment.

Evaluation

Evaluation criteria are set with reference to urban research, digital models of the pilot designs are used to evaluate the results.

Conclusion

- Patterns (spatial prototype) based on physical and digital environments

Research and design are carried out simultaneously and iterative way.

Literature and general practical preference

[1] Ruth Potts, Lachlan Yee. (2019) Pokémon Go-ing or staying: exploring the effect of age and gender on augmented reality game player experiences in public spaces. Journal of Urban Design 24:6, pages 878-895.

[2] Liao, T., & Humphreys, L. (2015). Layer-ed places: Using mobile augmented reality to tactically reengage, reproduce, and reappropriate public space. New Media & Society, 17(9), 1418–1435.

[3] Cahill, N.B., Damiani, J. (2022). Augmented Reality Interventions in Shared Space: Subversion and Social Impact. In: Geroimenko, V. (eds) Augmented Reality Art. Springer Series on Cultural Computing. Springer, Cham. https://doi.org/10.1007/978-3-030-96863-2_11

[4]Miller MR, Jun H, Herrera F, Yu Villa J,Welch G, Bailenson JN (2019) Social interaction inaugmented reality. PLoS ONE 14(5): e0216290.

[5]Kaley Overstreet. "Designing Physical Spaces to Support a Virtual World" 08 Feb 2022. ArchDaily. Accessed 25 Oct 2022.

[6]Barry, A., G. Thomas, P. Debenham, and J. Trout. 2012. “Augmented Reality in a Public Space: The Natural History Museum, London.” Computer 45 (7, July): 42–47. doi:10.1109/MC.2012.106.

Reflection

1. What is the relation between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS)?

The AR revolution results in a new urban pattern that adapt to future technology. It is studying the possibilities of different patterns caused by how people live, considering the trend in technology as a design base to explore future spatial studies.
As a new technology that could influence people’s lifestyles and the mobility of society, AR could change a lot to the urban environment. Many traditional physical spaces will be influenced when adding an extra digital layer to the city. It could lead to a digital transition of all urban systems.
The starting point of this project is to focus on urban issues like urban density, spatial justice, and future goals like sustainability. It is blending knowledge from design, from the physical and virtual perspective, technology and sociology. This project explores innovative ways to create more inclusive development. Moreover, the project involves different scales, from urban to architectural design. It is a proper approach to understanding the city.

2. What is the relevance of your graduation work in the larger social, professional and scientific framework.

Firstly, it provides a new perspective from the technology that how could AR involve and benefit the urban design process, especially focusing on solving urban issues like where to densify or how to design public space inclusively. It is showing the future possibilities of urban patterns and helping form a data-adapted urban system. People could find the space they need to use based on data flow, enabling more intensive urban spatial development, which can address the densification of the city and reserve more space for other functions.

Secondly, facing the digital transition of society, working with augmented reality could help us rethink the relationship between physical space and virtual space. The focus of urban design is usually on

physical space, the design of relay spatial forms that can accommodate both virtual and physical spaces need to meet the possibilities of multifunctional development and the different needs of people for public and private spaces. As a new technology, there is little existing research on the spatial impact of augmented reality on urban design, and the possibility of changing urban patterns and spatial forms is of interest to future urban research or urban design.

Thirdly, applying this technology to a less sexy task—seamlessly integrating data into everyday experiences—could provide much more concrete value to cities. This will show how people's lives will be changed and what will happen as a result of the interaction between people's behaviour and space. The designing part of the project will be an experiment to evaluate the results to determine if the implication of the task on the city is beneficial. And the whole process itself is also valuable to the future urban design and research.