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	Samuel Slezak
Student number	5398495

Studio		
Name / Theme	Explore Lab	
Main mentor	Georg Vrachliotis	Architecture, design
Second mentor	Georgios Karvelas	Building Technology
Third mentor	Victor Muñoz Sanz	Research
Argumentation of choice of the studio	The Explore Lab is a graduation studio that allows me to delve deeper into a topic I have been passionate about since I began studying for my master's in architecture, which is technology in architecture and how it impacts buildings' design, realisation and use. Moreover, the Explore Lab allowed me to work with tutors that would typically not meet in other studios and create a topic that does not match any of the offered graduation tracks. The expertise of the tutors I am collaborating with on this project enabled me to study my selected topic more from the standpoint of theory and philosophy rather than just from the technical perspective.	

Graduation project	
Title of the graduation project	Responsive architecture: The home to come
Goal	
Location:	The campus of the Technical University of Delft, The Netherlands
The posed problem,	Machine intelligence in architecture evolved from an obscure topic of discussion in the 1970s and 80s to a topic of primary interest in contemporary architectural discourse centred on data and its application in design. The deep learning revolution has hastened the adoption of smart technology in the domestic environment, owing to the involvement of companies like Apple, Amazon,

	Google, and others. However, architects' interest in designing and developing these technologies as part of their designs is limited to a handful of architectural professionals with a primary focus on art, digital manufacturing and creators of urban platforms. These architects are continuing the legacy of architects' participation in the design of technology that reaches beyond the contemporary idea of a smart device. AI-based technologies create an opportunity for architects to bridge the physical and digital order and facilitate interactions between people and even machines. Furthermore, these technologies open up a new perspective on machines' role in domestic life beyond serving and maintaining the home.
research questions and	Smartphones have significantly changed human culture and communication, leading to a dramatic change in social interaction. The consequences of this have had an impact on daily interaction in the physical world, altering nearly every aspect of life, including the domestic environment. The computer, including the smartphone, has replaced many activities previously considered part of the domestic environment. They range from cooking, socialising, entertaining and, to some extent, reproducing, leading to a large part of human social interaction becoming digital instead of physical. This results in increased separation, loss of community and loneliness among many people. (Han, Non-Things Upheaval in the Lifeworld.) The possible solutions to these problems are to change the domestic environment and the approach to technologies and how we approach them in the physical world. These changes can be done through design, leading to a question: What new spatial implication of the home can arise from the integration of artificially intelligent technologies, and what role can AI technologies play in reinforcing social interaction among humans and between humans and machines?
design assignment in which these result.	The project focuses on designing a communal student home meant for the students of the TU Delft, right on the grounds of the campus. The main focus of the design is to facilitate a sense of belonging through constant interaction with the people, technology and the building they occupy. The project seeks to design an environment that allows the students to stay in touch with their place of origin - through the digital realm while balancing their integration and creating a sense of belonging through interaction with other students,

	people or machines in the communal spaces of the building/s. The design will address the human-to-human and human-to-machine interaction. Moreover, it will also challenge the question of privacy and data in a back-and-forth information exchange between the students — building — University.

Process

Method description

The approach used in the research borrows from Carlo Ratti's and Matthew Claudel's Futurecraft process used in their book 'the City of Tomorrow'. Futurecraft employs design as a medium for systematically exploring and germinating possible futures. The future scenarios are usually presented as 'what if?' questions. The aim is not to portray what will come but to imagine a scenario and reflect on its consequences and exigencies. The scenario is then presented and discussed publicly to encourage conservation and debate. The authors explain it as follows:
"(W)e propose to extrapolate from the present condition and to place ourselves, as designers, in a fictive but possible future context with the intent of realising or precluding that future through public discourse." (C. Ratti & M. Claudel)

This research recreates Ratti's and Claudel's approach to future crafting. The process studies the evolution of technologies over time and concentrates on how they permeate spheres of life, focusing primarily on the domestic sphere. It then looks at some of the trends these technologies introduce into society and architecture and creates a design based on this prompt. An example of this could be the following prompt: What if smart devices from our homes become the home itself, dropping the structure? Such prompt reflects on the essay 'A Home is not a House' by Reynar Banham and the trends that point to increasing home automation. Another example can be: What if the smartphone becomes our primary form of communication? This prompt is a reaction to the critical voices aimed at the striped mode of communication presented by texting, and it also touches on the 1908 short story Machine Stops by E.M. Foster.

The technologies that this paper highlights are robotics, smart homes, and smartphones, and their evolution, focusing on the most recent couple of decades. These three technologies are selected as ones that are already relevant or are becoming increasingly relevant to the home context. Moreover, these technologies are then analysed with respect to the context of a home. The analysis is done through the study of academic literature, both non-fiction and fiction books, essays, and movies. The result of the investigation is the prompt, which offers a starting point for the design. The resulting scenarios are then discussed publicly within the university of TU Delft and with non-specialist people outside the academic

environment. The results of these discussions are then considered as the starting point for a further design that considers the technologies mentioned earlier.

Literature and general practical preference

2001: A Space Odyssey. Sci-Fi, 1968.

Andrés, Jaque. "IKEA Disobedients." Andrés Jaque / Office for Political Innovation. Accessed November 5, 2022. https://officeforpoliticalinnovation.com/work/ikea-disobedients/.

Antoine Picon, "Digital Culture in Architecture: Evolution or Revolution." Lecture, 2021. https://www.youtube.com/watch?v=VeJe9Ju9XmU.

Banham, Reyner. "A HOME IS NOT A HOUSE." In *Art in America*, Vol. 2, 1965.

———. *The Architecture of the Well-Tempered Environment*. 2nd ed. Chicago: University of Chicago Press, 1984.

Bava, Alessandro. "Computational Tendencies." e-flux, January 2020. https://www.e-flux.com/architecture/intelligence/310405/computational-tendencies/.

Carpo, Mario. "The Alternative Science of Computation." Accessed November 7, 2022. https://www.e-flux.com/architecture/artificial-labor/142274/the-alternative-science-of-computation/.

———. *The Second Digital Turn: Design beyond Intelligence*. Writing Architecture. Cambridge, Massachusetts: The MIT Press, 2017.

Certain Measures. "HOME IS WHERE THE DROIDS ARE — Certain Measures," 2019. https://certainmeasures.com/CLOUDFILL.

Darby, Sarah J. "Smart Technology in the Home: Time for More Clarity." *Building Research & Information* 46, no. 1 (2018): 140–47. https://doi.org/10.1080/09613218.2017.1301707.

Easterling, Keller. "An Internet of Things - Journal #31 January 2012 - e-Flux." Accessed January 9, 2023. https://www.e-flux.com/journal/31/68189/an-internet-of-things/.

Engelhart, Katie. "What Robots Can—and Can't—Do for the Old and Lonely." *The New Yorker*, May 24, 2021. https://www.newyorker.com/magazine/2021/05/31/what-robots-can-and-cant-do-for-the-old-and-lonely.

Forster, E. M., Julieta Aranda, Fia Backström, R. Lyon, and Ed Atkins. *The Machine Stops: 1909*. Edited by Erik Wysocan. New York: Halmos, 2015.

Georgiev, Aleksandar, and Stephan Schlögl. "Smart Home Technology: An Exploration of End User Perceptions," 2018.

Goodhouse, Andrew, and Canadian Centre for Architecture, eds. *When Is the Digital in Architecture?* Berlin: Sternberg Press, 2017.

Han, Byung-Chul. *Non-Things Upheaval in the Lifeworld*. Translated by Daniel Steuer. Cambridge: Polity Press, 2022.

Hughes, Francesca. "Search - e-Flux." Accessed January 22, 2023. https://www.e-flux.com/architecture/superhumanity/68648/facilities-for-correction/.

Introducing Amazon Astro – Household Robot for Home Monitoring, with Alexa, 2021. https://www.youtube.com/watch?v=sj1t3msy8dc.

Kilian, Axel. "Autonomous Architectural Robots - Architecture - e-Flux." Accessed November 15, 2022. https://www.e-flux.com/architecture/artificial-labor/140671/autonomous-architectural-robots/.

Lepore, Jill. "The History of Loneliness." *The New Yorker*, March 30, 2020. https://www.newyorker.com/magazine/2020/04/06/the-history-of-loneliness.

MAIO. "The Diffuse House - Architecture - e-Flux." Accessed January 5, 2023. https://www.e-flux.com/architecture/confinement/373338/the-diffuse-house/.

Meagher, Mark. "Designing for Change: The Poetic Potential of Responsive Architecture." *Frontiers of Architectural Research* 4, no. 2 (2015): 159–65. https://doi.org/10.1016/j.foar.2015.03.002.

Negroponte, Nicholas. "Terms and Conditions - Architecture - e-Flux." Accessed January 19, 2023. https://www.e-flux.com/architecture/digital-x/260419/terms-and-conditions/.

OMA. "Venice Biennale 2014: Fundamentals." OMA. Accessed October 31, 2022. https://www.oma.com/projects/venice-biennale-2014-fundamentals.

Pasquinelli, Matteo, and Vladan Joler. "The Nooscope Manifested: AI as Instrument of Knowledge Extractivism." *AI & Society*, 2020, 1–18.

Pendergrast, Kelly. "Performing Automation - Architecture - e-Flux." Accessed January 5, 2023. https://www.e-flux.com/architecture/workplace/430311/performing-automation/.

Potochnik, Angela, and Audrey Yap. "Revisiting Galison's 'Aufbau/Bauhaus' in Light of Neurath's Philosophical Projects." *Studies in History and Philosophy of Science Part A* 37, no. 3 (September 2006): 469–88. https://doi.org/10.1016/j.shpsa.2005.11.001.

Ratti, Carlo, and Matthew Claudel. *The City of Tomorrow: Sensors, Networks, Hackers, and the Future of Urban Life*. New Haven ; London: Yale University Press, 2016.

Santiago, Denisse Vega de. "The Circus of Essential Work - Architecture - e-Flux." Accessed January 5, 2023. https://www.e-flux.com/architecture/workplace/430309/the-circus-of-essential-work/.

Sparrow, Robert. "The March of the Robot Dogs." *Ethics and Information Technology* 4, no. 4 (2002): 305.

Tariq, Bassam. "Video: Turking for a Living." *The New Yorker*, March 20, 2015. https://www.newyorker.com/culture/culture-desk/video-turking-for-respect.

Tolentino, Jia. "What It Takes to Put Your Phone Away." *The New Yorker*, April 22, 2019. https://www.newyorker.com/magazine/2019/04/29/what-it-takes-to-put-your-phone-away.

Turner, Ash. "How Many People Have Smartphones Worldwide (Jan 2023)," July 10, 2018. https://www.bankmycell.com/blog/how-many-phones-are-in-the-world.

Williams, Sarah. *Data Action: Using Data for Public Good*. Cambridge, Massachusetts: The MIT Press, 2020.

Witt, Andrew. "Feral Autonomies." e-flux, August 2020. https://www.e-flux.com/architecture/software/341087/feral-autonomies/.

zazenergy. "Hacking Your IRobot." Instructables. Accessed January 16, 2023. https://www.instructables.com/Hacking-Your-iRobot/.

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 topic of this thesis is exceptionally relevant for both my master's track, which is architecture and my MSc AUBS program. Throughout my MSc, I focused my interest on digital fabrication and computational design in architecture. I have had a chance to spend an exchange semester abroad at ETH Zurich, where I pursued research in digital fabrication and computational design, as well as design studio under Professor Tom Emerson, combining computational architecture research and theory research. Both computational architecture and theory are very close interests of mine. They need to be developed alongside each other because communication between them is often lacklustre in some parts of academia.
The topic of this thesis manages to connect these two realms in a single project quite well. The resulting design can therefore serve as a valuable narrative of the importance of computational technology as a part of the theory and vice versa.

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

The narratives of the 'digital' have been the topic of discussion in academia since the late 1960s. The Architecture Machine Group was established in 1968 by Nicolas Negroponte. Later the group transformed into the Media Lab, which is still running today.1(Norman n.d.) Later in the 1970s and 1980', with the debut of AI, Cedric Price developed a number of projects that focused on developing artificially intelligent architecture. Unfortunately, most of these projects never materialised and only rarely utilized true AI. (Chaillou). Nowadays, there is no question that academia successfully managed to adapt and react to the digital turn. However, the work of academia still stays primarily outside of the realm of reality. (Rodrigues Silva Dória et al. 2021). The academia has been relatively crafty in making and implementing its technology; however, the practice primarily relies on commercial software.

The gradual onset of parametricism in architecture practice allowed designers to achieve a more optimised building form that resulted in higher building efficiency. However, these tools cannot yet encompass the social, political, and contextual aspects of buildings, which are the essence of the profession. (Bava 2020). However, more recently, there has been a move to

computational tools outside of optimisation and simulation. These are no longer just tools for making but rather tools for thinking. (Mario Carpo). However, it is important not to see these technologies as ‘magical’ machines. It is necessary to understand them deeply to remain critical of them.

It is important to note that architects are already calling for more controlled and educated use of AI. Academic and designer Sarah Williams highlight that it is essential that data is used for good. (Williams, 2020) The adoption of AI relies on access to data, so it is detrimental that the right policies and (moral) standards are set on the ownership and sourcing of this data. Most importantly, Pasquinelli and Joler call for a critical stance on AI. They argue that we refrain from embracing AI as a standalone entity capable of operating autonomously, as a form of mathematical absolute. It is necessary to consider AI as a human-made artefact that can be utilised for varied outcomes. (Pasquinelli and Joler 2020)

Data is essential in building smart homes and smart cities. This data originates from every aspect of life; therefore, the trend impacts the whole of society. The living environment is increasingly becoming one of sensing and scanning, it is perpetually collecting data, and this trend is bound to continue growing. Architecture is shifting to a narrative where data is a design driver meant to increase the users' comfort and well-being, benefiting the user. However, this raises the question of whether we should be using data only for the benefit of certain groups or, rather, everyone, including nature and the planet. Therefore, proposing an urgency is even greater than just social.

Humans have always been wary of technical progress. The Machine Stops, a 1909 book, depicts the tale of a machine taking over all the challenges and difficulties of human life and leaving hardly anything within human control. The story resonates, even after 110 years, because it portrays a reality similar to contemporary human existence, especially during the Covid-19 pandemic. Narratives about technology are a vital part of the critical discourse that is an inseparable part of its development. It is clear that works such as The Machine Stops by E. M. Forster or S. Kubrick Spacey 2001: A Space Odyssey remain relevant even after nearly 120 and 50 years, respectively. (A space odyssey). These stories illustrate the negative and positive aspects, often serving as an inspiration for a discussion and design.

Adopting any new technology needs to be accompanied by discourse. AI's rise has tremendous implications for both the environment and society. Therefore, it is essential to question continuously; whether we can assume these tools to be autonomous. How can we use and benefit from automation without it resulting in a dystopian future? These tools are built on our data, so how can we approach data privacy and ownership in our personal and public lives? Can these tools be relayed with an understanding of the historical, social, and political context? Architects must address similar issues if they are to take on the role of technology designers.