Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences

Graduation Plan: All tracks

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

Personal information	
Name	**Lena Balakina**
Student number	4592980

Studio		
Name / Theme	Building Technology	
Main mentor	Serdar Asut	Professor at the Faculty of Architecture and the Built Environment. Expertise in collaborative robots in architecture, inventive making, computational design, digital craft, human-computer interaction, robotic fabrication, and collaborative robots.
Second mentor	Seyran Khademi	Assistant professor at the Architecture and the Built Environment faculty, interdisciplinary researcher between computer vision lab and architecture department. Has knowledge of Artificial Intelligence.
Argumentation of choice of the studio	Interest in computational design, artificial intelligence, robotics, and smart houses.	

Graduation project		
Title of the graduation project	Transforming an existing house into a smart house to provide for the well-being of its residents.	
Goal		
Location:		The Netherlands
The posed problem,		Due to high housing demand, shortage in healthcare, the aging population, and the inability of older people to take care

	of themselves, this research aims to find a solution to these problems in the built environment field.
research questions and	Main research question: "How can a house be transformed into a smart house in order to improve the well-being of its resident using smart devices and the help of artificial intelligence?"
design assignment in which these results.	Transforming an existing house into a smart house to provide for the well-being of its resident.

Sub-questions:
- What is the state of the art regarding smart house devices and artificial intelligence used in the built environment?
- How can a smart house change the spatial relationship and function in a house?
- How can these smart and intelligent devices be implemented in the transformation of a smart house, and how will the architectural qualities of the house change?
- What are the steps to take in order to transform our current houses into smart houses?

Background questions:
- What are the differences between smart devices and intelligent devices and what are the expectations for the future?
- How does the surroundings of a house have an influence on transforming the house into a smart house?
- How does safety play a role in a smart house system?
- What are the options for the use of artificial intelligence regarding a smart house for the well-being of a resident?
- What are the benefits that a smart house system provides for the well-being of its residents?
- How can a grasshopper simulation help with the testing process in scenarios that are not possible to test in real life?

Process

Method description

Literature study: looking at the history of smart house systems, future possibilities.

Market study: what is already on the market, what does the market need, what are people developing for the future, interviewing companies to have a better understanding of the market and their needs, what is the difference between smart and intelligent devices.

Case study: A 60-year-old hypothetical citizen living in the Netherlands in the suburbs of Hoogeveen lives in a semidetached house with a history of health issues. This house will be transformed into a smart house. The resident has had some health problems in the past and is too young for elder care but needs a companion/someone/something that will take care of them and help with their needs in and around the house. This resident has inadequate nutrition, lacks physical activity, and feels lonely. A smart house with artificial intelligence applied to its devices can get to know the residents and help in and around the house to promote a better lifestyle. For the testing process, a simulation will be done with Grasshopper. The design of the transformation will eventually lead to a prototype.

Literature and general practical preference

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Reflection

1. The relation between the MSc Building Technology and this graduation topic is that a building technologist provides technical building design services; in this case, an existing house will be transformed into a futuristic house: a smart house.
2. Population aging and solutions are needed for the well-being of the elderly. These solutions can be developed in every field, including architecture and building technology.