# SITE, OBJECT, TECHNIQUE

Fall 2020, MSCD Pre-Thesis II (48716) Final Review

Through readings, discussions, written assignments, and oral presentations the MSCD Pre-thesis II seminar cultivates the skills to identify a thesis research question, situate it within a wider scholarly conversation, state its relevance to the field, and clearly formulate its methods and key proposition. We will consider different approaches to method and end with a thesis proposal and presentation open to all CD faculty and students, as well as to students' advisory committees and guest critics. In the Fall of 2020 we will emphasize two themes: a) Reflexive practices of academic inclusion —e.g. politics of citations in regards to intellectual-racial-gender-socioeconomic issues; and b) The discursive and political dimensions of technological systems.

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**Advisors**
Daragh Byrne; Grisha Coleman; Golan Levin; Jim McCann; Eddy Man Kim; Lawrence Shea; Kyuha Shim; Kiryiaki Goti; Red Wittaker; Molly Wright Steenson; Lining Yao.

**Invited Critics**
Dina El-Zanfaly, School of Design, CMU; Kyriaki Goti, School of Architecture, CMU

# SCHEDULE

| Opening | | 9:00 AM | 9:10 AM | |
|---------|---|---------|---------|---|
| **Morning** | Maria Vlachostergiou | 9:10 AM | 9:25 AM | Mermaid Effect: A New Approach Towards Assistive Technology Design |
| | Lydia Schweitzer | 9:45 AM | 10:00 AM | Visualizing Mission Initiative for Rover Space Exploration |
| | Katherine Giesa | 10:20 AM | 10:35 AM | Cyberurbanism and Symphonic Cartographies |
| | Qiqin Le | 10:55 AM | 11:10 AM | Dynamic Sketch: Coupling Digital Sculpture with Physical Simulation to Enhance the Tangibility of CAD Modeling |
| | Policarpo DelCanto Baquera | 11:30 AM | 11:45 AM | It's All Over the Space |
| | | *11:45 AM* | *12:30 PM* | *Break* |
| **Afternoon** | Shuyi Shao | 12:30 PM | 12:45 PM | Interactive and Immersive Modeling: Exploring Extensibility of Rhinoceros API for Architectural Modeling In Virtual Reality |
| | Michael Stesney | 1:05 PM | 1:20 PM | Rematerializing Graphs |
| | Kristen Lu | 1:40 PM | 1:55 PM | Exploring the Design Space of Programmable Hygroscopic Actuator for Kinetic Architecture Façade |
| | Ariadne Bai | 2:15 PM | 2:30 PM | TBD |
| | Qiao Zhang | 2:50 PM | 3:05 PM | Github With Shape: An Online Collaboration Platform to Implement Version Control to Assist in Collaborative Design |
| **Closing & Discussion** | | 3:05 PM | 3:30 PM | |

# It's all over the space: Distributing screenless interactions in the 'multiplexer' space
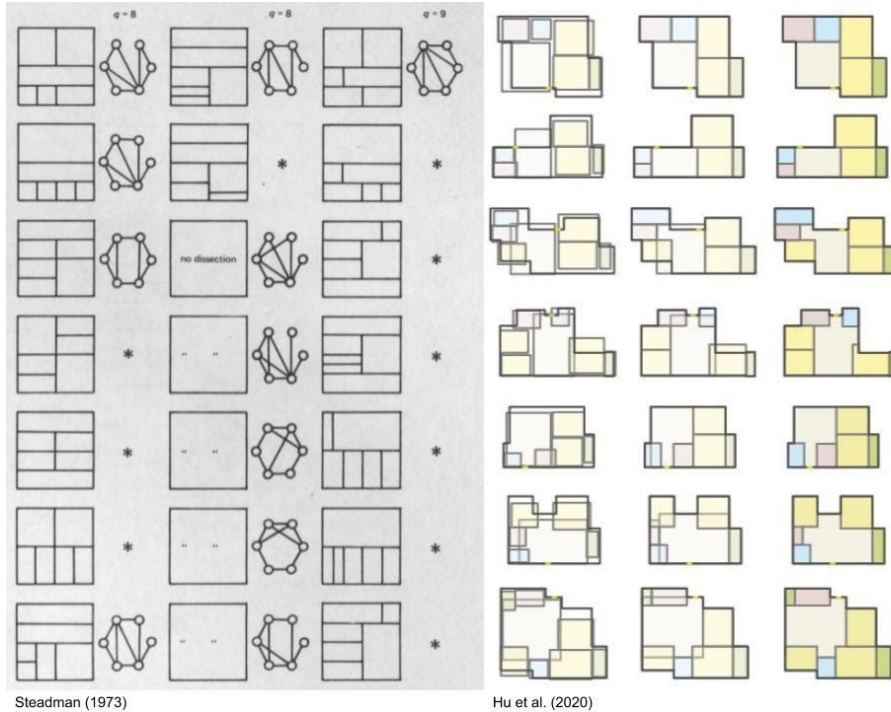
**AUTHOR**

Policarpo Del Canto Baquera

**COMMITTEE MEMBER**

Daragh Byrne, Lawrence Shea, Golan Levin

**ABSTRACT**

For almost half of the year, our homes have turned into an ultra-connected production and consumption space. Commuting is now occupied by a computational-mediated routine of screen-based interactions that claim to be seamlessly integrated with our environment; in reality, these have transformed the way we experience time and space with others and ourselves. This thesis proposes a framework to reclaim the domestic 'multiplexer' space through analog and digital found assemblages, to distribute our cognition of the virtual on the physical space, and to relearn the art of lingering in the anxious journey of the self fading amidst a pandemic.

Steadman (1973)　　　　　Hu et al. (2020)

# Rematerializing Graphs

**AUTHOR**

Michael Stesney

**COMMITTEE**

Daniel Cardoso Llach, Daragh Byrne, Molly Wright Steenson

**ABSTRACT**

Machine learning and artificial intelligence affect every aspect of modern society and culture. This technology has brought many conveniences to our lives and helped find solutions to many large scale problems. Although often presented as objective and bias-free, recent research has raised many concerns about its true impact. A critical reflection is warranted. In the architectural design domain, machine learning is beginning to gain interest from researchers and practitioners. One area of focus is the use of machine learning to analyze and even generate spatial organizations. To date there has been little research published about the capabilities, limitations and potential downsides to these methods. Using the history of our most common abstraction of spatial organization, the graph, as a framework, I propose a critical survey of the current cutting edge applications of computational tools that analyze and generate spatial organization.
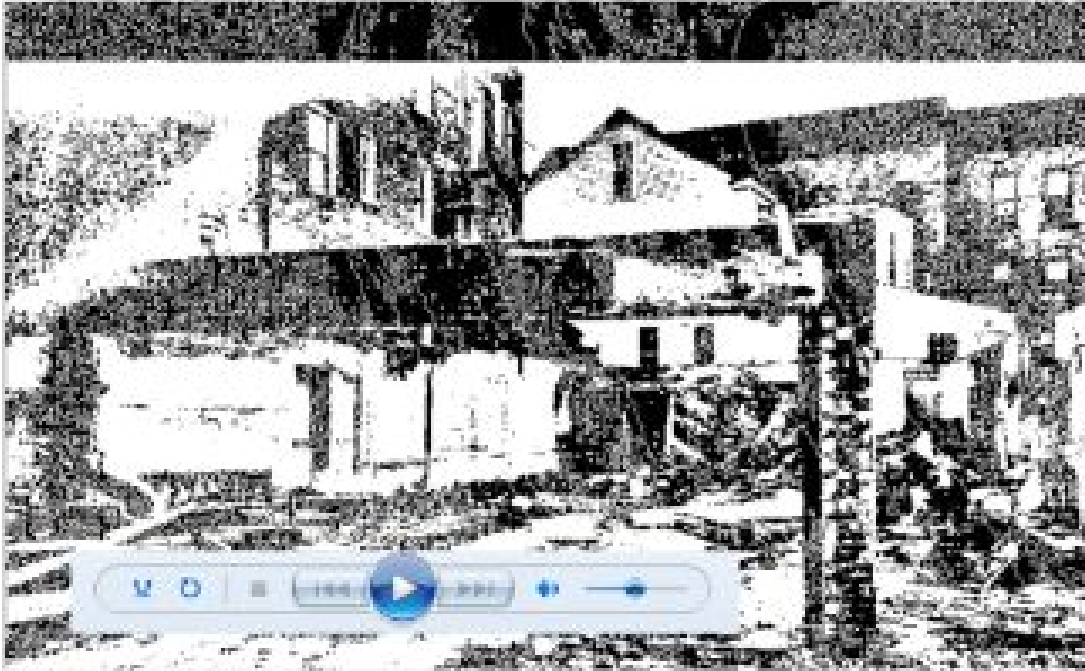
# CyberUrbanism and Symphonic Cartographies
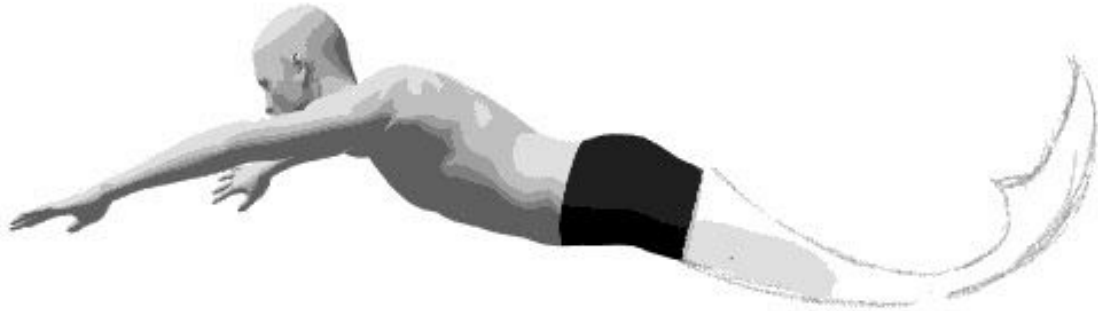
**AUTHOR**

Katherine Giesa

**COMMITTEE**

Daragh Byrne, Daniel Cardoso Llach

**ABSTRACT**

Digital mappings allow a user to traverse the globe from their table. While magnificent in their reach, the experience of digital travel tends to occlude the emotional effect of geographies. Virtual and augmented realities may offer greater immersion; still, soundscapes and sonic mappings offer rich potential to bridge aural and visual spatial imaginaries.

Highly influenced by psychogeographic tradition, this work aims to take the city as an instrument, emphasizing both its productive and evocative capacities. By generating sound maps from visual recordings of physical space, the thesis moves away from ocularcentric thinking about perception and current digital sound mapping practices (high fidelity recordings, tied directly to precise geographic coordinates) towards playful digital-spatial engagements.

# Mermaid effect: A new approach toward Assistive Technology design

**AUTHOR**

Maria Vlachostergiou

**COMMITTEE**

Daniel Cardoso Llach, Lining Yao, Daragh Byrne, Grisha Coleman

**ABSTRACT**

What if prosthetics could achieve more than just reproducing missing limbs? What if they invited users and designers to work together in order to reimagine what a body could be and do?  The Mermaid effect is an inclusive, collaborative design practise that calls together designers and people experiencing motor challenges,  to oppose purely medical perspectives on the disabled experience. While the latter ones aim at restoring according to the standards of fully enabled bodies, mermaid effect practitioners highlight the importance of creating technologies that go beyond engineering practicalities. Mermaid effect includes the healing of the emotion and social life of the user as well. Let's be in this together to interweave 'exploring' with 'solving', 'form' with 'function', 'embodiment' with 'computation, 'identity' with 'ability'." Let's reconstruct the narrative about what today is perceived as able, disabled, even normal.
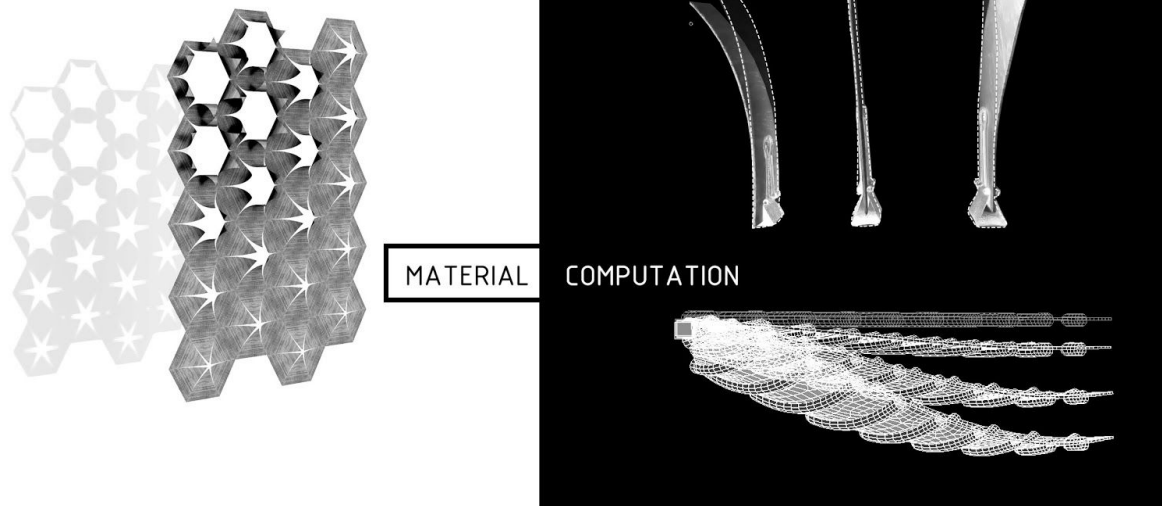
# Exploring the Design Space of Programmable Hygroscopic Actuator for Kinetic Architecture Façade
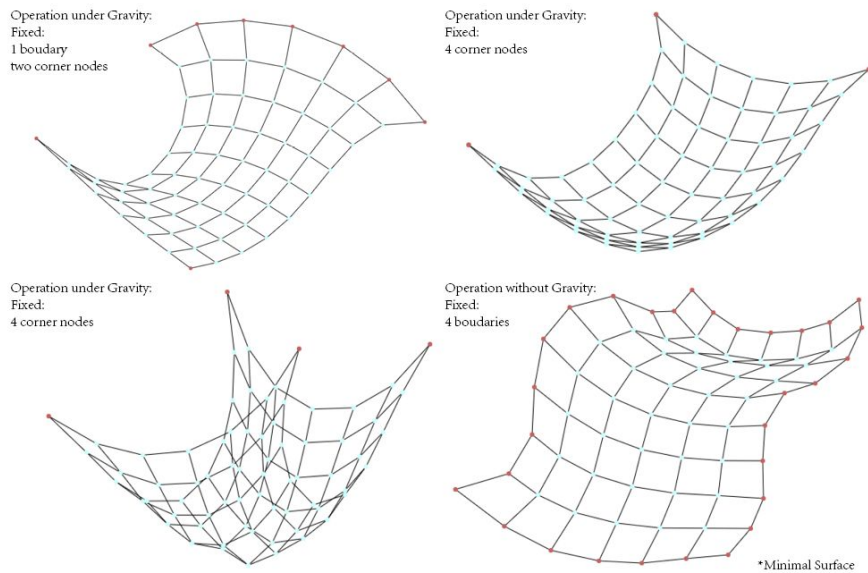
**AUTHOR**

Kexin Lu

**COMMITTEE**

Daniel Cardoso Llach,  Kyriaki Goti, Lining Yao

**ABSTRACT**

Inspired by the anisotropic shape changing behavior of wood sheet under humidity changes, the method of multi-layer 3D printing a laminated structure with materials of different stiffness as an actuator has shown priority over other mechanisms. However, further application on the scale of architectural façade components is hindered by the unclear connection between the design of 3D printing path and the shape changing behavior at the discussed scale. The proposed research aims to fill-in this gap by understanding and interpreting the behavior model into a design tool that eases the design workflow. Impact of several significant factors of the system will be examined and documented through both physical experiments and digital simulations. Specifically, a computational design tool allowing customized user input geometry with pattern output for additive manufacturing would be proposed. Finally, an application of the proposed tool will be presented to verify the feasibility of the suggested methodology.

Operation under Gravity:
Fixed:
1 boundary
two corner nodes

Operation under Gravity:
Fixed:
4 corner nodes

Operation under Gravity:
Fixed:
4 corner nodes

Operation without Gravity:
Fixed:
4 boudaries

*Minimal Surface

# Dynamic Sketch: An Exploration of Coupling Digital Sculpture with Physical Simulation to Enhance the Tangibility of CAD Modeling Systems
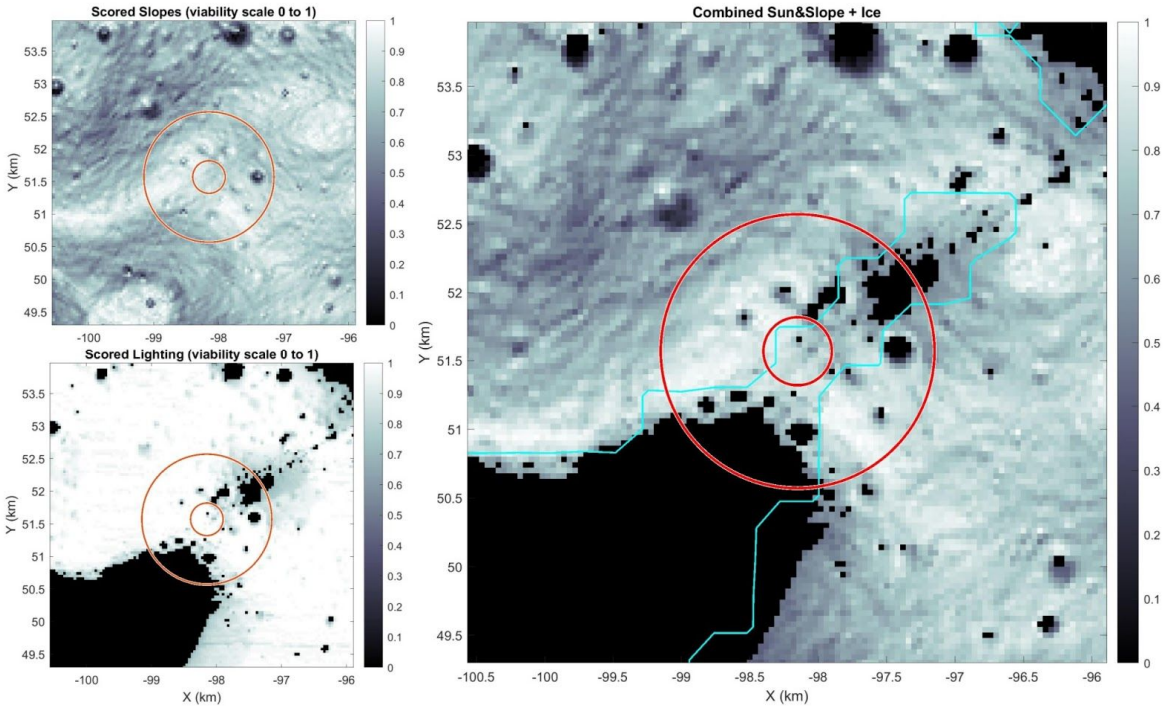
**AUTHOR**

Qiqin Le

**COMMITTEE**

Daniel Cardoso Llach, Kyuha Shim, Jim McCann

**ABSTRACT**

Since the invention of modern digital CAD systems, most creative works of designers and artists have shifted into digital form. The working space of design has been gradually converted into digital media. However, despite the numerical algorithms' (relative) correctness and the graphical interface's visualization, researchers have demonstrated its inefficiency in producing creativity. Nonetheless, some studies suggested the potential of CAD system in supporting ideation-oriented work, given its tangibility can be improved. The thesis proposes a new paradigm of building a CAD system based on the combination of digital sculpting and physical simulation – two standard techniques applied in the design industry but rarely combined – to improve the current CAD system's tangibility.

# Visualizing Mission Initiative for Rover Space Exploration

**AUTHOR**

Lydia Schweitzer

**COMMITTEE**

Daragh Byrne, William (Red) Whittaker, Molly Steenson

**ABSTRACT**

This research intends to explore visualization methods and creative approaches to mission development through the mission operations lens of MoonRanger, a lunar rover landing at the south pole of the moon in 2022. There are three key values at the core -- visual decision making, mission planning, and scientific initiative. Historically and in various capacities, the science and art communities have been considered independent of one another within the space-exploration community. This thesis intends to address and explore that relationship and expose opportunities for creative problem solving between these two disciplines in the process of designing operations for the MoonRanger rover.
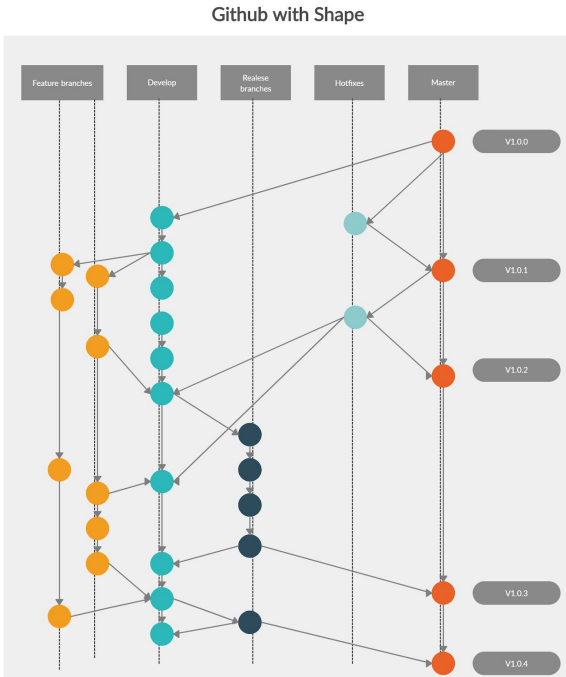
Github with Shape

# Github with shape: use an online collaboration platform to implement version control to assist students in collaborative design

**AUTHOR**

Qiao Zhang

**COMMITTEE MEMBER**

Eddy Man Kim, Daniel Cardoso Llach, Daragh Byrne

**ABSTRACT**

The pandemic has forced a major transition in education: from face-to-face to online education, which poses challenges for students in collaborative design. Currently, the process usually involves copying design files and continuing to make modifications, which lacks effective communication when collaborating asynchronously from different geographic locations and may lead to irreversible changes. This work is to envision a new collaborative design paradigm that adapts to the functions and limitations of digitalization, which will introduce the concept of version control and integrate collaborative design with Web 2.0. This work aims to use an online collaboration platform to implement version control and enable the students to track model changes, identify key decisions, and enhance the efficiency and experience of collaborative design. The research begins with an investigation of online collaborative design tools and practices, followed by the build of the online collaborative platform prototype and its evolution in design and feedback iterations.

# Interactive and Immersive Modeling: Exploring extensibility of Rhinoceros API for Modification of Architectural Models in Virtual Reality to improve design iteration efficiency
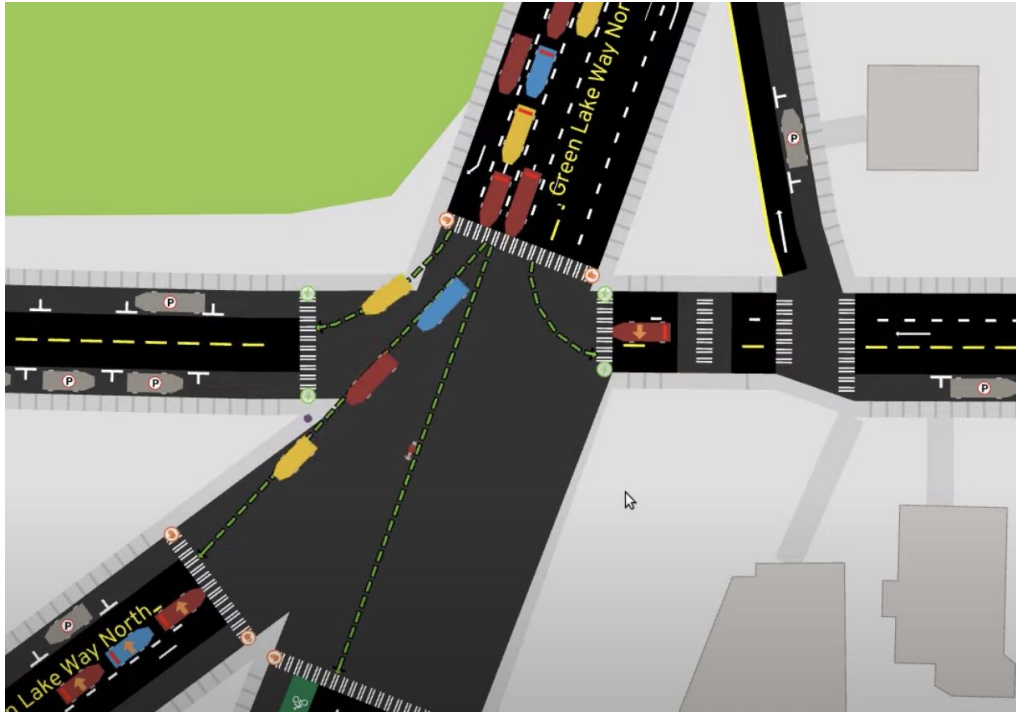
**AUTHOR**

Shuyi Shao

**COMMITTEE**

Daragh Byrne, Daniel Cardoso Llach

**ABSTRACT**

This thesis digs into the question of how to improve the design decision-making process through extensibility of Rhinoceros API for modification of architectural models in Virtual Reality.

# Interactive Mobility Prediction for Urban Transportation Space with Agent Based Simulation

**AUTHOR**

Ruoqi Bai

**COMMITTEE**

Daniel Cardoso Llach

**ABSTRACT**

With cities being rapidly changing complex systems, urban designers face special challenges in making spatial design decisions. Current workflows are mostly top-down processes with limited quantifiable performance evaluation. Targeting at the mobility feature and public transportation space of cities, this research examines limitations for current tools, studies the agent-based simulation method, with an aim of producing better predictions for the impacts of interventions on urban systems. Interactivity and usability of tooling is emphasized to enhance the participation of different stakeholders. A technical prototype will be done to demonstrate and evaluate the summarized principles, and trigger a conversation for making technical choices in tools development.