# CONFERENCE PROCEEDINGS

Proceedings of the

# Critical Technologies: Urban Tech for Social Impact

## How can technology and planning create more equitable cities?

**June 9, 2021**

A collaborative symposium of the Jacobs Institute at Cornell Tech, The College of Architecture, Art and Planning at Cornell University and the Technion's Faculty of Architecture and Town Planning

Editors
Sharon Yavo Ayalon
Wendy Ju
Meirav Aharon Gutman
Jennifer Minner

JACOBS INSTITUTE
AT CORNELL TECH

URBAN TECH HUB


**Organizing Committee:**

Sharon Yavo-Ayalon
Postdoctoral Associate, The Urban Tech Hub, Jacobs Technion-Cornell Institute at Cornell Tech

Wendy Ju
Associate Professor, Information Science, Jacobs Technion-Cornell Institute at Cornell Tech

Meirav Aharon-Gutman
Associate Professor, Faculty of Architecture and Town Planning, Technion

Jennifer Minner
Associate Professor, City and Regional Planning, College of Architecture, Art, & Planning, Cornell University

Jagan Narayanan Subramanian
Urban Tech Master Student, The Urban Tech Hub, Jacobs Technion-Cornell Institute at Cornell Tech

**For more information**
**https://www.urbantech4socialimpact.org/**

Sponsored by The Ezrieli Foundation, Israel

Cornell AAP Architecture Art Planning | The Department of Science & Technology Studies | TECHNION – ISRAEL INSTITUTE OF TECHNOLOGY FACULTY OF ARCHITECTURE AND TOWN PLANNING

# Contents

12:00 pm
## SESSION 3: HOW? Data, and Visualization

21

**Moderator: Wendy Ju**
the Jacobs Technion-Cornell Institute at Cornell Tech

**Anthony M. Townsend**
The Urban Tech Hub, the Jacobs Technion-Cornell Institute at Cornell Tech
NYCBusWatcher: Tools for Longitudinal Tracking, Visualization, Analysis and Predictive Modeling of New York City's Bus Network

**Karel Martens**
The Faculty of Architecture and Town Planning, Technion
COVID-19 and the Duties in Transport

**Nicholas Klein**
Architecture, Art, and Planning Cornell University
Car Donation Programs Affect Travel, Income, and Healthcare Access Among Poor Families.

**Ryan Thomas**
Architecture, Art, and Planning Cornell University
Climate Risk Mapping in Contexts of Informality

2:00pm
## SESSION4: HOW? Mixed Reality, Simulations, Computer Vision

26

**Moderator: Anthony M. Townsend**
The Urban Tech Hub, the Jacobs Technion-Cornell Institute at Cornell Tech

**Harald Haraldsson**
Director, XR Collaboratory, Cornell Tech
XR Interaction Design and Urban Tech

**Wendy Ju**
Jacobs Technion-Cornell Institute,
Where Did This Car Learn to Drive?

**Daphna Levine**
Architecture and Town Planning, Technion
A New Perspective on Gentrification and Displacement: Bat Yam Case-study

**Sharon Yavo-Ayalon**
The Urban Tech Hub, the Jacobs Technion-Cornell Institute at Cornell Tech
Towards an Urban Displacement Simulator

4:00 pm
## SESSION 5: WHO AND WHERE? Decision-making process and decision-making environments

31

**Moderator: Sharon Yavo-Ayalon**
The Urban Tech Hub

**Neema Kudva**
Architecture, Art, and Planning Cornell University

**Hagit Naali-Joseph and Shalhevet Visner**
Strategic Planning Department, Tel Aviv

**Christine Leuenberger**
Department of Science and Technology Studies,
Beyond Walled Spaces

**Batel Yossef**
Architecture and Town Planning, Technion
Urban Digital Twin Technology Generates a New Setup for Decision Making Environments.

# Executive summary

## Critical Technologies: Urban Tech for Social Impact

### How can technology help create more equitable cities?

**A collaborative symposium of the Jacobs Institute at Cornell Tech, The College of Architecture, Art and Planning at Cornell University and the Technion's Faculty of Architecture and Town Planning**

Cornell Tech's Urban Tech Hub hosted a first conference on the critical use of technology to better plan and design cities on Wednesday, June 9, 2021. The conference was held as a virtual event via Zoom Webinar. It was held in a compressed version to incubate ideas and format for a larger event to take place in the future. The lectures and following Q&A sessions can be found in this link.

The conference turned a spotlight on long-standing inequalities apparent during the global pandemic. These inequities have manifested themselves in various ways and along multiple fracture lines (e.g. race and ethnicity, class, and disability) leading to limiting access to opportunity and public space in cities. Despite mounting inequality – and although theory, social research, and policy indicate the need for more equitable urban environments – social issues that lack spatial definitions remain hard to incorporate into the planning processes. There is a growing need for effective, technology-based, spatial tools to understand the mechanisms that create and distribute disparities through the city.

This conference focused on the spatial dimensions of inequality in cities and explored ways for technology to promote more equitable cities. It brought together academic researchers from Cornell University, Cornell Tech, and the Technion, with practitioners from both NYC and Tel Aviv Planning Departments. The conference mapped existing methodologies and planning tools regarding urban challenges based on state-of-the-art research in the field.

The conference followed five main questions in five panels: **Why, What, How, Who**, and **Where. Why** is it important to harness technology to create more equitable cities; **What** can technology contribute to cities? **How** can current technologies contribute to societal challenges? This was exemplified through research projects from the three academic departments, ranging from data-driven urban research to, mixed reality, visualization, simulations to art. The closing session will cover the **Who** and **Where?** through a panel of decision-makers and examples of decision environments.

# Introduction

Almost two years ago, in a pre-pandemic world, we envisioned creating this platform for researchers from Cornell University, Cornell Tech, and the Technion to think together about social issues in smart cities. It has been postponed several times, and after a long and challenging journey, it took shape as a virtual event on June 9, 2021.

The idea behind the conference was to think about the connections between INEQUALITY, TECHNOLOGY, and CITIES. These connections define our time. For example, my son is fascinated with luxury cars; Ferrari, Lamborghini, MacLarens. You name it; he knows the exact model and price. The other day, I was walking with him in Times Square, a post-pandemic Times Square which is gradually starting to feel like it was before, and he noticed a Ferrari, screaming out loud, “Ferrari.” Then a Tesla, and another one. On the other side of the street, he saw a homeless person and another one. Then in the spur of the moment, he suggested: let’s count them - “you’ll count the homeless and I’ll count the cars.” And we did. He counted 33 luxury cars, and I’ve lost count at 20 homeless people. So we have these two ends of the socioeconomic scale: 33 Ferraris, 20-something homeless people, and Times Square. with its countless screens. A glorious manifestation of technology in urban space.

CITIES. INEQUALITY and TECHNOLOGY, all condensed into 15 minutes of walking in the city with my son. Condensed spaces, intensity, density, and diversity are what make cities so unique. However, in this example, the city, the INEQUALITY, and TECHNOLOGY do not contribute to one another. They merely exist side by side. The contrasts and lack of connection are so obvious even a child can see them clearly.

This gathering aimed to link those issues together. Times Square is filled with technology. Much of it is designed to keep the homeless under control, but could it help them instead? Can the screens in Times Square help a homeless person find a ride home with one of the Ferraris?
With careful curation of speakers, the conference lectures gathered in these proceedings shared their critical thinking about how we can harness technology to better our cities.
In this one-day gathering, researchers and practitioners alike brainstormed to develop better examples. Because although the data has been telling us for years about the spatial dimensions of inequality, we still lack technology-based, spatial tools to understand the mechanisms that create and spread disparities throughout the city.

This first joint conference and the texts in these proceedings reflect our efforts to contribute to this mission to suggest how technology can help improve the quality of life and well-being in our cities.

I thank the Azrieli Foundation for supporting this conference and all the people who helped to make this happen: **Michael Samuelian**, the founding director of the Urban Tech Hub, and **Ron Brachman**, the director of Jacobs institute who gave me the opportunity to develop and produce this event. I also want to thank the academic committee: **Meirav Aharon Gutman, Jeniffer Minner, and Wendy Ju,** who have contributed their time and knowledge to forge this collaboration and develop the content. In addition, many thanks to **Jagan Subramanian and Vasilis Drimalitis,** who helped behind the scenes, and to **Anthony Townsend** for moral support and cultural translation.

I want to thank all the speakers who participated in the conference, with talks that shed new and exciting light on ways in which technology can be harnessed as a force for positive change for our cities. Finally, I want to thank all the attendees, who unfortunately could not be seen due to the Webinar format. However, their presence, challenging questions, and discussions were crucial in making the conference come to life.

Sharon Yavo Ayalon
Postdoctoral Associate
Jacobs Institute Urban Tech Hub at Cornell Tech

# Program

## 9-10, June 2021

The ongoing pandemic has highlighted long-standing social inequalities. These inequities have manifested themselves in various ways and along multiple fracture lines (e.g. race and ethnicity, class, and disability). Despite mounting inequality, and a growing body of evidence of its negative consequences, big barriers remain to understanding how these complex social issues and planning processes connect. There is a growing need for effective, technology-based, spatial tools to understand the mechanisms that create and distribute disparities through the city.

This conference focused on the spatial dimensions of inequality in cities and explored ways for technology to promote more equitable cities. It brought together academic researchers from Cornell University, Cornell Tech, and the Technion, with practitioners from both NYC and Tel Aviv Planning Departments.

Conference website

Links to the session's recordings:

Opening Session

Session 1: Why?

Session 2: What?

Session 3: How?

Session 4: How?

Session 5: Who And Where?

0

## 8:30 am

# OPENING SESSION

## Welcome, Introductions and Greetings

**Moderators: Sharon Yavo Ayalon and Michael Samuelian** Jacobs Institute Urban Tech Hub at Cornell Tech

**Greg Morrisett**
Jack and Rilla Neafsey Dean and Vice Provost, Cornell Tech

**Ron Brachman**
Director of the Jacobs Technion-Cornell Institute, Professor, Computer Science

**Meejin Yoon**
Gale and Ira Drukier Dean of the College of Architecture, Art, and Planning, Cornell University

**Yasha Grobman**
Dean of the Faculty of Architecture & Town Planning Technion

1

9:00 am

## SESSION 1: WHY?

### framing the current societal challenges

**Moderator:** Meirav Aharon Gutman
The Faculty of Architecture and Town Planning, Technion

**Howard Slatkin**
Deputy Executive Director for Strategic Planning at NYC DCP

**Erez Ben Eliezer**
Israel Planning Administration

**Rohit Aggarwala**
The Urban Tech Hub, the Jacobs Technion-Cornell Institute at Cornell Tec

Meirav Aharon-Gutman is an Urban Sociologist, a faculty member at the department of Architecture and Town Planning at the Technion and the PI of the Smart Social Strategy Lab. Dr Aharon-Gutman is an Acting member of the National Council for Planning and Building and the Academic head of the Technion's Social Hub. She received her Bachelor's degree (1998), her Master's degree (2001), and her Ph.D. (2007) from Tel Aviv University's Department of Sociology and Anthropology and completed postdoctoral fellowships at the Hebrew University (2007) and Columbia University (2008). Aharon Gutman is a Fulbright (twice) and Marie Curie Award scholar



# Meirav Aharon-Gutman

Assistant Professor
Faculty of Architecture and Town Planning, Technion

## Tech for Change: the social turn in the realm of urban technologies

Technology has always been the weapon of the powerful, and in the 21st century technology and capitalism go hand in hand. Within this reality, dual markets are created: banks, finance companies and corporations possess advanced technologies, whilst the public sector: municipalities and governments - are far behind. "Smart cities," both as a paradigm and as a product are particularly concerned with the built environment, and not enough with the social environment. The global response to the corona pandemic has highlighted a simple fact: In times of crisis, social issues are the ones that tip the scales: Do people listen to instructions? Do people help each other? Are they visiting their elderly neighbors? Are people prepared to get vaccinated? These "soft" issues are at the center of the event. The authorities responsible for managing the event do not have suitable tools to do so, and in Israel it was the army that set up command and control rooms together with the municipalities and shared its technological platforms for the benefit of the public. The management of the pandemic stressed the need to develop technology based, data driven tools that will create resilient cities. This conference brings together the Cornel Ithaca - the urban-tech program at Cornell Tech and the Smart Social Strategy laboratory, from the Technion to lead the social change in the technological-urban arena. The opening session will discuss and present the challenges and opportunities that arise from utilising technologies in the urban sphere.

**SESSION 1: WHY?** framing
the societal challenges

**SESSION 1: WHY?** framing the societal challenges

# Howard Slatkin

Deputy Executive Director for Strategic Planning at NYC DCP

Howard Slatkin is the Deputy Executive Director for Strategic Planning at New York City Department of City Planning. Specialties: Land use, zoning, affordable housing, inclusionary zoning, housing policy, sustainability planning, transit-oriented development, smart growth, waterfront planning and development, economic development, community planning, strategic planning, transportation planning, climate resilience, climate adaptation

Erez Ben Eliezer is the Advisor to Head of Israel Planning Administration regarding issues concerning the interface between urban planning, data and technology


# Erez Ben Eliezer

Israel Planning Administration


## Towards Smarter Decision Making

Information about our cities is collected by various methods and tools by private and public authorities but this information is not adequately accessible to planners and decision-makers 'ongoing" throughout the planning process and the project lifecycle. Collecting data effectively will produce different simulations regarding density, energy use, media Social etc. to assist the national, district, and municipal level better decision making. Israel Planning Administration is conducting public research regarding the digital transformation from "excel sheets and GIS stand-alone maps" of data towards a "Digital twin" vision using various tools and processes in order to improve the process and quality of urban planning.


Co-Authors

Arch Amos Dar, ad@adma-arch.com. Advisor to Israel Planning Administration


**SESSION 1: WHY?** framing the societal challenges

Rohit T. "Rit" Aggarwala is an executive-in-residence at Closed Loop Partners, an investment firm focused on the circular economy, and a Senior Fellow at the Urban Tech Hub at the Jacobs Cornell-Technion Institute at Cornell Tech. He also teaches urban policy at Columbia University, and recently chaired the Regional Plan Association's Fourth Regional Plan for the New York metropolitan area.

Until 2020, Rit was a member of the founding team at Sidewalk Labs, where he was Head of Urban Systems and led its mobility and sustainability work. Prior to that, Rit spent five years at Bloomberg Philanthropies, where started the foundation's environmental grantmaking program, served as President of the Board of the C40 Cities Climate Leadership Group, and led the sustainability practice at Bloomberg Associates.

Rit holds a BA, MBA, and PhD from Columbia University, and an MA from Queen's University in Ontario. He serves on the boards of the Regional Plan Association, the Urban Green Council, and the Design Trust for Public Space. He was born in New York City, where he now lives.

# Rohit Aggarwala

Senior Urban Tech Fellow
Jacobs Institute Urban Tech Hub at Cornell Tech

## Rebooting NYC: An Urban Tech Agenda for the Next Administration

New York City's elections in November 2021 will usher in a huge change in the personnel of the city's government, as the mayor, the comptroller, nearly 80% of the City Council, and 4 of 5 borough presidents will leave office at the end of this year. Rebooting NYC is an effort to offer a practical set of wide-ranging recommendations for how the new administration can harness technology. It includes recommendations on privacy, organization, broadband access, expanding public engagement through technology, delivering services, and enforcement. Released as a draft for discussion, the team will be taking feedback and engaging with New Yorkers in order to produce a final report later this year.

Co-Authors:
Michael E. Bloomberg
Victoria M. Woo
Rebecca Lassman
Adrian Silver
Phillip D. Ellison
Matt Stempeck
Michael M. Samuelian

2

## 10:00 am
## SESSION 2: WHAT?
### Harnessing technology to develop more equitable cities

**Moderator:** Jennifer Minner
Architecture, Art, and Planning Cornell University, NYC

**Michael Samuelian**
The Urban Tech Hub, the Jacobs Technion-Cornell Institute at Cornell Tech
Defending Density

**Dafna Fisher-Gewirtzman**
The Faculty of Architecture and Town Planning, Technion
Urban Wellbeing, as Influenced by Densification Rates and Building Typologies

**Robert W. Balder**
Architecture, Art, and Planning Cornell University, NYC

**Aaron Sprecher**
The Faculty of Architecture and Town Planning, Technion
Senses, Sensors, Sentiment – Few Notes on the Post-Pandemic Landscape of Architecture

Jennifer Minner is an Associate Professor in the Department of City and Regional Planning at Cornell University. She directs the Just Places Lab, a platform for multi-disciplinary research and creative action centered on igniting community imagination around 'just places' and the built environment.

**SESSION 2: WHAT?**
Harnessing technology to develop more equitable cities

# Jennifer Minner

Associate Professor
Architecture, Art, and Planning Cornell University, NYC

## Visualizing just places: the critical role of mapping technologies

Geospatial and scenario planning tools, as well as other map-based visual media, play important roles in understanding the past, analyzing existing conditions, and exploring urban futures. Map-based tools are fundamental to planning scholarship and practice; they are used to explore, analyze, delineate, and regulate cities and regions. As visual media, maps have the capacity to draw together communities, shape public attention, and exercise power. This talk outlines the critical role of maps in revealing urban inequities and in finding collective ways of addressing them. Observations are derived from joint faculty-student research over the course of several years of teaching Cornell technology seminars, land use planning and preservation courses, and directing research efforts in the Just Places Lab. Central takeaways are about what is needed to create and employ analytical mapping tools and visual media to ignite public imagination around collective work toward building equitable cities.

Michael Samuelian the Founding Director of the Urban Tech Hub at Cornell Tech, a venture that bridges tech industries and academic research to address pressing urban challenges and public needs. He is an urban planner, real estate developer, professor and most recently the President and CEO of the Trust for Governors Island. From the revitalization Lower Manhattan after 9/11 to the creation of a new neighborhood in Hudson Yards and the activation of Governors Island he's helped plan, design and develop some of the most transformative projects in New York City. Michael is an Assistant Professor at Cooper Union.
Prior to his appointment as President of the Trust, Michael was a Vice President with Related Companies, where he was responsible for the planning and design of Hudson Yards. After 9/11, Michael was the Director of Lower Manhattan Special Projects at the New York City Department of City Planning, helping the city's efforts to redevelop downtown.

**SESSION 2: WHAT?**
Harnessing technology to develop more equitable cities

# Michael Samuelian

Founding Director
The Urban Tech Hub, the Jacobs Technion-Cornell Institute at Cornell Tech

## Defending Density

There is an aversion to density in America, density is a continual trope in the country, blamed for all of the ills of urban life, from crime and racial unrest in the middle of the 20th century to public health concerns today. In the early stages of the COVID pandemic density was the culprit, even though we've subsequently seen outbreaks in rural areas and sprawling cities across the United States. This paper will look into the root of America's problems with density, its relationship with technology and argue that density is not the problem but the solution to the challenges of todays and to-morrow's cities. As we deplete the resources of the planet, density is our most direct pathway to recover some balance with nature. And with the accelerated adoption of new digital technologies due to the COVID pandemic, geospatial differentiations will continue to matter less and less in cities. As geography declines in importance in tomorrow's cities, the density of people and their social networks will fuel innova-tion. Finally, density is our best hope to create more equitable, diverse and sustainable urban environments to mitigate the existential challenges of a warming planet.

Dafna is the Head of the Architecture program at the Faculty of Architecture and Town Planning at the Technion-Israel Institute of Technology. Previous vice dean for students. Academic Director of the VisLab, (virtual reality laboratory) and head of the Architecture Visual Perception Lab. Previously a visiting Professor at CUSP-NYU.
Her research focus is on the field of visual analysis and simulation and development of novel, automated architecture design tools based on potential residents' visual perception of space, directed toward the development of sustainable built environments. In addition, she leads research in the area of Environments for the Aging Brain.
Her research is financially supported by the Israel Science Foundation and Joy Ventures. She is a UNESCO fellowship recipient, a laureate of the prestigious Yanai Prize for Excellence in Academic Education and the Henri Gutwirth Fund for the Promotion of Research. Her work has been published in leading professional journals and presented in numerous international conferences and universities around the world such as ETH, FCL-NUS, CASA-UCL and CUSP-NYU.

**SESSION 2: WHAT?**
Harnessing technology to develop more equitable cities

# Dafna Fisher-Gewirtzman

Associate Professor, Head of the Architecture Program,
The Faculty of Architecture and Town Planning, Technion

## Analytical Tools for Predicting Urban Well-Being

It is expected that in two decades, more than 70% of the total population of the planet will be city dwellers. Urban morphology significantly impacts resident's and pedestrian wellbeing. Pedestrian movement is considered as one of the important characteristics of a sustainable urban environment.
In our lab, we develop analytical models and tools for simulating and predicting visual perception of potential uses aiming at urban well-being. We assess the models with controlled experiments in VR and explore the relations of patterns of visibility quantification, and perceived values in various urban typologies. Each experiment focused on specific characteristics and components of the urban environment (urban, building and façade morphology, geometry, proportions, greenery, sky view, transparency/opacity of facades, functions etc.). The presentation will give an overview of the current stage of our work. We will present and demonstrate the DVA (3D Dynamic Visibility Analysis model) and the DESSA (Dynamic Enclosure Street Section Analysis) as analysis and predictive tools for potential rates of well-being in changing variant hypothetical urban conditions such as urban environments going through densification processes, suggesting tailor routes to a specific user profile, purpose of travel and state of mind. The research is demonstrated on Tel-Aviv and Manhattan case studies.

**Co-Authors:**
Roei Yosifof & Yaala Trosman-Heifler
Roei Yosifof ryosifof@gmail.com
yaalat@campus.technion.ac.il

**SESSION 2: WHAT?**
Harnessing technology to
develop more equitable cities

# Robert W. Balder

Director
Architecture, Art, and Planning Cornell
University, NYC

Robert (Bob) Balder (B.S. URS '89) has held several important positions in New York City, including director of the Mayor's Office of Lower Manhattan Development, and executive vice president of the New York City Economic Development Corporation. Most recently, he was director of planning and urban design at Gensler, New York. As the executive director of AAP NYC, Balder's charge is to help advance and coordinate AAP NYC's programs, and to ensure that the AAP presence in New York City is optimized for all AAP students, faculty, and alumni.

Aaron Sprecher is Associate Professor and Chair of the Landscape Architecture Department at the Technion Faculty of Architecture and Town Planning. He directs the Material Topology Research Laboratory at the Faculty of Architecture. In parallel, he is co-founder and partner of the award-winning practice Open Source Architecture. This collaborative research group brings together international researchers in design, architecture, engineering, and media research. His research and design work focuses on the synergy between information technologies, computational languages, and digital fabrication systems, examining the way in which technology informs and generates innovative approaches to design processes. Besides his publications and exhibitions, he has lectured at many institutions, including the Massachusetts Institute of Technology (MIT), Harvard University, Rhode Island School of Design (RISD), and Rice University. Aaron Sprecher is co-editor of "Architecture in Formation—On the Nature of Information in Digital Architecture" (2013, London: Routledge/Taylor and Francis) and "Instabilities and Potentialities" (2019, London: Routledge/Taylor and Francis).

# Aaron Sprecher

Associate Professor, Head of the
Landscape Architecture Track
The Faculty of Architecture and Town
Planning, Technion

## Senses, Sensors, Sentiment – Few Notes on the Post-Pandemic Landscape of Architecture

Landscape architecture expresses the unstable and dynamic conditions inherent to our environment. The perception of the environment as an ensemble of natural and artificial forces stems from the impact of information technologies that now penetrate the depth of all matters constituting our reality. With the global pandemic, this intensity of data screening and streaming has been coupled to a technological extensity that has blurred even more the limits between living and inert organisms, local and territorial regions, individual and societal desires. Along these two notions of technological intensity and extensity, we will consider the idea of potentiality as a design strategy for reconsidering the relation between our human communities and our global ecologies, being natural, artificial, or virtual. Three unique sensible technologies developed at our laboratory MTRL in the past year will provide the critical foundations for redefining this perception of the environment: senses, sensors, and sentiment for a post-pandemic era.

3

12:00 pm

## SESSION 3: HOW?

Data, and Visualization

**Moderator: Wendy Ju**
Cornell Tech

**Anthony M. Townsend**
The Urban Tech Hub, the Jacobs Technion-Cornell Institute at Cornell Tech
NYCBusWatcher: Tools for Longitudinal Tracking, Visualization, Analysis and Predictive Modeling of New York City's Bus Network

**Karel Martens**
The Faculty of Architecture and Town Planning, Technion
COVID-19 and the Duties in Transport

**Nicholas Klein**
Architecture, Art, and Planning Cornell University
Car Donation Programs Affect Travel, Income, and Healthcare Access Among Poor Families.

**Ryan Thomas**
Architecture, Art, and Planning Cornell University
Climate Risk Mapping in Contexts of Informality

Dr. Anthony Townsend works at the intersection of urbanization and digital technology. He is Urbanist in Residence at Cornell Tech's Jacobs Institute, where his research focuses on scenarios and ethical frameworks for urban tech innovation. Anthony is the author of two books, Ghost Road: Beyond the Driverless Car (2020) and Smart Cities: Big Data, Civic Hackers and the Quest for A New Utopia (2013), both published by W.W. Norton & Co. His consultancy, Star City Group, works around the world with industry, government and philanthropy on urban tech foresight, policy, and planning studies.

**SESSION 3: HOW?**
Data, and Visualization

# Anthony M. Townsend

Urbanist in Residence
The Urban Tech Hub, the Jacobs Technion-Cornell Institute at Cornell Tech

## NYCBusWatcher: Tools for Longitudinal Tracking, Visualization, Analysis and Predictive Modeling of New York City's Bus Network

This presentation will provide an overview of ongoing work coordinated by the Jacobs Institute's Urban Tech Hub to preserve a record of New York City's bus system performance during the pandemic and recovery, and develop new metrics, visualizations, and predictive models of bus service. We will describe the Urban Tech Hub's work to develop a platform for retrieving bus position and passenger count data from the MTA BusTime API, archival and programmatic access through our own API, and provide front-end web-based tools for data exploration. Additionally, we will share work-in-progress from two Cornell Tech master's Specialization Project (INFO7900) teams using this data to: evaluate the impact of bus rapid transit (BRT) improvements in 2020 along the East 149th Street corridor in the Bronx; and, to model the impact of subway disruptions on crowding and travel speed on nearby bus services. We will also discuss proposed work in which we hope to explore the potential for this data to reveal the impacts of climate change and severe weather on bus system performance, and the role of infrastructure improvements like bus lanes and shelters in enhancing the resilience of bus services to such shocks.

**Co-Authors:**
Lars Kouwenhoven, Cornell Tech
Jeremy Shaffer, Cornell Tech
Jamie Geng, Cornell Tech

Prof. Karel Martens is Chair of the Graduate Program in Urban and Regional Planning at the Faculty of Architecture and Town Planning, Technion - Israel Institute of Technology (Haifa, Israel), where he also heads the Fair Transport Lab. His research interests include the nexus between transport and justice, transport and land use interaction, and parking dynamics and policies. His book Transport Justice: Designing Fair Transportation Systems has been described by colleagues as "ground-breaking", a "landmark" and "a revolution".

# Karel Martens

Associate Professor, Head of the Urban and Regional Planning Track
The Faculty of Architecture and Town Planning, Technion

## COVID-19 and the Duties in Transport

The COVID-19 crisis has drastically changed people's travel behavior. Public transport ridership is down, in part because of a general decrease in trip-making and in part because of concerns over health-related safety while riding public transport. In addition, alternatives have become (temporarily) more attractive. Drops in trip-making have made car use faster and more convenient, due to a reduction in congestion and increased availability of parking spaces. In some cities, tactical interventions have made walking and cycling (much more) attractive. In many countries this reduction in ridership has led to the well-known Pavlov response of (planned) reductions service levels, through the cancellation of lines, limitations on operating hours, and cutting of frequencies. In this presentation, I will explore the underlying reasons for this approach, discuss potential implications and present an alternative that can enhance equity in the domain of transport.

SESSION 3: HOW?
Data, and Visualization

Nicholas J. Klein's research contributes to two central areas of transportation planning: understanding the factors that influence how people travel on a daily basis and how these changes play out over the course of their lives. His work focuses on marginalized populations and neighborhoods that use transit, walk, and bike at high rates. By studying factors that influence how people in these communities travel on a daily basis and how their travel evolves over many years, his work offers new perspectives for planners, policymakers, and researchers on issues of equity and sustainability in transportation. He received his Ph.D. from the Edward J. Bloustein School of Planning and Public Policy at Rutgers University, a master's degree in urban spatial analytics from the University of Pennsylvania, and a bachelor's degree in operations research and industrial engineering from Cornell University. Klein previously taught at Columbia University, Temple University, and Pratt Institute.

# Nicholas Klein

Assistant Professor,
Architecture, Art, and Planning Cornell University

## Car Donation Programs Affect Travel, Income, and Healthcare Access Among Poor Families.

This research examines precarious car ownership among low-income households. Previous research has painted a partial picture of these transitions which have a large effect on households' wellbeing. We know that low-income households' grasp on car ownership is tenuous. These households experience more transitions into and out of car ownership compared with more affluent households. We also know that having or gaining a car is associated with upward economic and social mobility. Yet, we know little about how low-income households acquire cars or the consequences for these households when they lose or give up a car. This research examines these two aspects of car ownership transitions.

Ryan Thomas is a PhD candidate in City and Regional Planning at Cornell's Ithaca campus. His research examines the methods of producing metrics for policy and planning decisions, with a focus on spatial planning metrics in contexts of informality. His dissertation examines the political economy of climate change knowledge production in Dar es Salaam by exploring how NGOs, communities, the state, and international agencies to produce climate risk maps. Previously, Ryan worked on program evaluations for USAID, and contributed to a global index of urban environmental justice.

# Ryan Thomas

Ph.D. Candidate
Architecture, Art, and Planning Cornell University

## Climate Risk Mapping in Contexts of Informality

Climate risk is spatialized within geographic information systems as the intersection of two layers—assets and hazard occurrence. In cities dominated by informal settlements, like Dar es Salaam, Tanzania, municipal data bases often lack the information needed for computer flood risk models, such as the location of assets (e.g., schools, hospitals, roads) and hazard occurrence (flood plains). To begin addressing the lack of information, In Dar es Salaam, the World Bank employed a process called community mapping that relies on public engagement and mobile apps to rapidly collect data. These efforts are also supported by crowdsourcing infrastructure of OpenStreetMap and have led to the use of new tags and types of data being added to the platform. The social processes of data collection, along with the computer software they rely on, shape what risks are considered, and in turn, urban planning and policy making priorities focused on risk mitigation. This presentation reviews the emergence of the “community risk mapping” method as a method for spatializing flood risk and identifies the social and technological limitations of representing informal settlements on climate risk maps. I argue that flexible data standards offer both challenges and opportunities for just climate adaptation.

.

4

## 2:00pm
## **SESSION 4: HOW**?
## Mixed Reality, Simulations, Computer Vision

**Moderator: Anthony M. Townsend**
The Urban Tech Hub, the Jacobs Technion-Cornell Institute at Cornell Tech

**Harald Haraldsson**
Director, XR Collaboratory, Cornell Tech
XR Interaction Design and Urban Tech

**Wendy Ju**
Jacobs Technion-Cornell Institute,
Where Did This Car Learn to Drive?

**Daphna Levine**
The Faculty of Architecture and Town Planning, Technion
A New Perspective on Gentrification and Displacement: Bat Yam Case-study

**Sharon Yavo-Ayalon**
The Urban Tech Hub, the Jacobs Technion-Cornell Institute at Cornell Tech
Towards an Urban Displacement Simulator

**SESSION 4: HOW?**
Mixed Reality, Simulations, Computer Vision

Harald Haraldsson is the Director of the XR Collaboratory, and lecturer on augmented and virtual reality at Cornell Tech. At the XR Collaboratory, Harald works with Cornell faculty, researchers, and students from a variety of disciplines on XR-related projects. Harald holds a master's degree in computer engineering from Tokyo Institute of Technology.

# Harald Haraldsson

Director, XR Collaboratory, Cornell Tech

## XR Interaction Design and Urban Tech

The impact of virtual reality (VR) and augmented reality (AR) - often combined under the term XR - on our daily lives is widely expected to increase in the near future. In this talk I will discuss the role of XR in the field of urban tech, and some of the technical and interaction design challenges involved. This talk will also present the design of a syllabus for urban tech students wishing to integrate XR into their practice.

Wendy Ju is an Associate Professor at the Jacobs Technion-Cornell Institute at Cornell Tech and in the Information Science field at Cornell University. She is also on the faculty at Technion – Israel Institute of Technology. Her research explores how people will interact with future automated systems, such as cars, robots and cities.

**SESSION 4: HOW?**
Mixed Reality, Simulations, Computer Vision

# Wendy Ju

Associate Professor
Information Science, Jacobs Technion-Cornell Institute at Cornell Tech
Jacobs Technion-Cornell Institute,

## Where Did This Car Learn to Drive?

Drivers communicate and negotiate with other drivers, pedestrians and road users implicitly and explicitly through the movement of their cars, as well as through honking, verbal communication, body language and gaze. It is widely recognized that these interaction patterns vary culturally; the advent of autonomy will necessitate a more explicit understanding of the complex manner in which drivers interact. Mismatches in perception, understanding and action between road users can easily cause accidents. We are exploring how drivers implicitly communicate and coordinate with others on the road, and to assess how these driving interactions differ across cultures.

We have developed a multi-person virtual-reality driving simulator to study how drivers interact.

By staging situations that demand negotiation, such as ambiguous four-way stops, we can capture how participants communicate with other drivers or pedestrians to coordinate joint action, implicitly through the movements of their virtual car or bodily movement, or explicitly through verbal or gestural exchange. By comparing how people from different cultures coordinate in comparable situations, we can better understand cultural differences in driving interaction.

**Co-Authors:**
David Goedicke, Cornell Tech, Carmel Zolkov, Israel Institute of Technology, Natalie Friedman, Cornell Tech
Avi Parush, Israel Institute of Technology

SESSION 4: HOW?
Mixed Reality, Simulations, Computer Vision

# Daphna Levine

Ph.D. Candidate, The Faculty of Architecture and Town Planning, Technion

## A New Perspective on Gentrification and Displacement: Bat Yam Case-study

The urban research community tends to view gentrification-based displacement as the primary social impact of urban regeneration. This study reopens the discussion by asking whether urban regeneration does indeed work to the detriment of local homeowners, or whether it expands their opportunities for social mobility. By employing a micro-simulation model based on data pertaining to the households and the existing and planned apartments in the city, the study finds first that while low-income residents can be expected to be displaced, most of the middle-income homeowners will survive the process and benefit from a new apartment. Second, according to the simulation, only households from the top two deciles will be able to purchase or rent an apartment in the new projects as new residents. The lecture highlights the impact on the middle deciles and the way in which the split between homeowners and others is reflected in the process of urban regeneration.

Architect Daphna Levine is a PhD candidate in the Faculty of Architecture and Town Planning at the Technion – Israel Institute of Technology. Daphna is engaged in the search of routes to integrate social issues into urban planning, by creating models of concrete areas for representing abstract social phenomena. Specifically, her research examines urban redevelopment as an opportunity for social mobility of the lower-middle-class. By combining cutting-edge technology (e.g. Spatial Microsimulation) and qualitative research, Daphna strives to encode and assess the demographic dynamics and social impacts of urban redevelopment processes.

**Co-Authors:** Shai Sussman, Meirav Aharon Gutman
Faculty of Architecture and Town Planning, Technion - Israel Institute of Technology
Sharon Yavo Ayalon, The Jacobs Institute, Cornell Tech.

**SESSION 4: HOW?**
Mixed Reality, Simulations, Computer Vision


# Sharon Yavo-Ayalon

Postdoctoral Associate
The Urban Tech Hub, the Jacobs Technion-Cornell Institute at Cornell Tech


## Towards an Urban Displacement Simulator

### A Microsimulation for Predicting the Demographic Changes Caused by Privatization

Sharon Yavo-Ayalon is a Postdoctoral Associate at Cornell Tech, developing visualizations and simulations to achieve social impact in planning. Currently, she has been focusing on mapping NYC social distancing stories and the demographic changes resulting from privatization processes. Her Ph.D. explored the linkage between urbanism and art and the manner in which local identity, spatial (in)justice, and social (ex-in)clusion are forged or deconstructed by artistic activity in cities. This research was awarded the President of Israel's Grant for Scientific Excellence and Innovation. She received her Ph.D. from the faculty of Architecture and Town Planning at the Technion IIT, where she graduated summa cum laude BArch and MSc.


Within the discourse of displacement and gentrification, this lecture will turn the spotlight to the privatization of once publicly funded affordable housing. Based on the Roosevelt Island case study, we developed a microsimulation that follows the conversion from affordable to market-rate units and predicts the expected demographic changes each year between 1976-2070. By combining information from the American Community Survey, the island's masterplan, the privatization agreements, and interviews with residents, the simulation produces interactive graphs at three urban scales: the neighborhood, the project, and the individual building. We found that while the households of market-rate units are gradually becoming younger and more affluent, the households of affordable units are becoming older and more impoverished. That despite an individual agreement for each building, the demographic changes will be similar in all of them, and that, those changes will affect low-income buildings first. Moreover, upon expiration, 30% of the existing protected tenants will be over 65 and at risk of being displaced.



**Co-Authors:**
Daphna Levine, Shai Sussman, Meirav Aharon Gutman, The Faculty of Architecture and Town Planning, Technion, Israel

5

4:00 pm

## SESSION 5: WHO AND WHERE?

### Decision-making process and decision-making environments

**Moderator: Sharon Yavo-Ayalon**
The Urban Tech Hub, the Jacobs Technion-Cornell Institute at Cornell Tech

**Hagit Naali-Joseph and Shalhevet Visner**
Strategic Planning Department, Tel Aviv

**Neema Kudva**
Architecture, Art, and Planning Cornell University

**Christine Leuenberger**
Department of Science and Technology Studies, Cornell
Beyond Walled Spaces – Transforming Policies of Exclusion with Policies of Inclusion

**Batel Yossef**
The Faculty of Architecture and Town Planning, Technion
Urban Digital Twin Technology Generates a New Setup for Decision Making Environments

As the Director of the Strategic Planning Department, Hagit promotes social planning, emphasizing the need for accessible planning for all citizens, including vulnerable communities. Hagit focuses on urban renewal complexes and integrating and promoting planning in living, populated, and built textures. Hagit is an expert in spatial planning, public services, and social policy. In addition, she is proficient in housing policy, emphasizing social housing and solutions for a diverse population, including the Arab population in Israel. She also dealt with the development and preparation of programs for public areas and services, emphasizing quality aspects in program planning.

Shalhevet is an Urban Planner and Urban Designer with a background in architecture and design. Shalhevet has been working as an urban designer for the GLA (Greater London Authority), developing masterplans and key urban strategies for Opportunity Areas in London. As a fellow in the 2020 Local Pathways Fellowship, supported by the UN SDSN, Shalhevet has been promoting and developing practical solutions to integrate the sustainable development goals (SDGs) and particularly sustainable cities and communities. Shalhevet worked as an architectural assistant in London and Tel Aviv. She was responsible for the design, research, analysis, and visualization of different concepts.

**SESSION 5: WHO AND WHERE?**
Decision-making process and decision-making environments

# Hagit Naali-Joseph

Director of the strategic planning, Tel Aviv-Yafo Municipality.

# Shalhevet Visner

Senior Urban Planner at the Strategic Planning Department, Tel Aviv-Yafo Municiplaity

The COVID-19 pandemic has exacerbated long-standing inequalities in cities and countries across the world, leading decision makers to act quickly and respond in innovative ways to the crisis. Tel Aviv-Yafo and Israel have demonstrated how technology plays a key role in fighting and overcoming COVID-19, using existing digital platforms, improving them and developing new ones. DigiTel, for example, has been developed and used by the municipality to maintain continuous contact with local residents. During the pandemic, the platform has been adapted to update residents on government guidelines and provide information related to the rollout of vaccinations. To track the spread of coronavirus across the city, the city's Computer and IT department have developed a map-based Coronavirus dashboard, providing information on the number of elderly living in each district of the city.
The municipality also works on a regular basis with its vibrant startup community, supporting initiatives and projects that tackle inequalities of gender, race, religion and disability. Despite the terrible effects of COVID-19, the pandemic has prepared us to respond to global risks and threats. Technology enabled us to develop local and national strategies more quickly through collaboration and engagement with professionals and researchers from academia, private stakeholders including the tech industry, the public sector and most importantly, local residents.

SESSION 5: WHO AND WHERE?
Decision-making process and decision-making environments

# Neema Kudva

Associate Professor
Architecture, Art, and Planning Cornell

Neema Kudva's research focuses on small cities and their regions, and on institutional structures for equitable planning and development. She has explored various aspects of these issues primarily in South Asia but also in the U.S., and across the world, with students. She is involved in pedagogical experiments around citizenship and sustainability planning and is faculty lead for the Nilgiris Field Learning Center, Kotagiri, a transdisciplinary engaged collaboration between Cornell and the Keystone Foundation, India.
At Cornell, Kudva is the associate dean of faculty; house professor and dean at Becker House, and co-chair of the AAP Council for Diversity & Inclusion. She serves as faculty affiliate of the South Asia Program, a fellow of the Atkinson Center for a Sustainable Future, and as a field member for public affairs, Asian studies, development sociology, and visual studies.
Kudva received her Dip.Arch. from the School of Architecture CEPT at Ahmedabad, India, in 1989; and her M.Arch./M.C.P. and Ph.D. from the University of California–Berkeley in 2001.

## Thinking Tech in, of, for planners and citymakers

I see planning as both capital-P Planning – the drive the and small-p planning, the everyday acts of maintenance and crossing that allows for our public selves to survive and even, thrive. As planners we work in both realms, sometimes simultaneously, but using different modalities of engagement with city dwellers, elected officials, businesses and more through
differing practices and rooting our decisions on different forms of data and knowledge. As planners we are also rooted in many different organizational forms and hierarchies – ranging from those who work more informally to help organize and learn in communities to many of us who work in formal governmental roles within city agencies, para-statal organizations and
design or real estate conglomerates. I am interested in how this diversity of organizational forms and institutional locations that planners occupy shapes decision-making. Related to it I ask: how do we think about technology based on our location? How do we absorb and imbibe it in decision-making processes? Whose voices and shapes do we build in and whose are left out? How we regulate its use and how
does it shape our actions even as we shape it to fit our needs?
I will frame these questions using the examples of work I have been immersed in during the pandemic and the BLM protests, and drawing on a broader literature that touches on organizational practices and the ways in which they shape larger social and political questions.

SESSION 5: WHO AND WHERE?
Decision-making process and decision-making environments

# Christine Leuenberger

Senior Lecturer
Department of Science and Technology Studies, Cornell

## Beyond Walled Spaces – Transforming Policies of Exclusion with Policies of Inclusion

Dr. Christine Leuenberger is Senior Lecturer in the Department of Science & Technology Studies at Cornell University and a Fulbright Specialist. She has published various edited volumes and books and her work has also appeared in various academic journals, edited volumes and popular news outlets. Her most recent co-authored book was published with Oxford University Press (2020) The Politics of Maps: Cartographic Constructions of Israel/Palestine. She was a Fulbright Scholar in Israel and the West Bank in 2008 and an American Association for the Advancement of Science (AAAS) Science & Technology Policy Fellow (STPF) at the U.S. Department of State and at the United States Agency for International Development in 2016-2017. She was the recipient of a National Science Foundation Scholar's award to investigate the history and sociology of mapping practices in Israel and the Palestinian Territories. She is currently conducting research on issues of migration and borders, and is engaged in peace and educational initiatives in the Middle East and Sub-Saharan Africa.

In 1989, the sentiment was that the fall of the Berlin Wall would spell an end to bordering, walls and fences in favor of mobility and open geographical spaces. Instead, however, we have observed a 'new area of walls', hard borders, checkpoints and physical and virtual frontiers, between and within national territories as well as within cities. Endemic within the "global cities" during and post the 1990s were socio-economic inequalities that went alongside the building of technologies of division that created ever more walled-off and 'secure' communities that guard against the unwanted 'other', establishing forms of 'spatial apartheid'. The Covid-19 pandemic reveals how socioeconomic and spatial segregation and inequalities are corrosive to social cohesion and democratic governance. It is therefore paramount that strategies of spatial segregation enforced through walls, fences and barriers are replaced by evidence-informed policies that tackle root causes of inequality in an attempt to establish cities based on spatial justice, mobility and the right to the city.

Batel Yossef Ravid is an experienced architect in participatory planning and design practices. She is currently a PhD candidate in the faculty of Architecture and Town Planning at the Technion and a Research and development Director of the Smart Social Strategy Lab. Batel Yossef Ravid's studies and practices explore the gap between local and professional knowledge in urban development and management. She received her Bachelor of Architecture (B. Arch) from Bezalel Academy of Arts and Design Jerusalem (2013) and Master of Research (MRes) from the Royal College of Art London (2018) and awarded with a "Clore Bezalel-RCA leadership" for an outstanding graduate student.

**SESSION 5: WHO AND WHERE?**
Decision-making process and decision-making environments


# Batel Yossef

Ph.D. Candidate
The Faculty of Architecture and Town Planning, Technion


## Urban Digital Twin Technology Generates a New Setup for Decision Making Environments

What does spatial inequality look like? Can it be measured? is it possible to navigate within it? '3S-Smart Social Strategy', a multidisciplinary research team from the Technion - Israel Institute of Technology, developed an innovative environment with both physical and digital elements which tackles these key questions. The digital environment is based on a Digital Twin platform which demonstrates real-word complexity via a 3D virtual model. The physical environment facilitates immersive interaction with the Digital Twin in order to enable Data Driven Decision making. Utilizing mixed methods of immersive and interactive technologies, the environment has become a space with unique visualization and representation. The innovative environment encourages inclusive dialogue between participants with different backgrounds and skills.

Our research project focuses on the neighborhood scale and we collect, analyze, and integrate comprehensive data from government institutions as well as local knowledge. We use collaboration and civic monitoring methods for creating a civic real time data system. The physical space is located in the middle of the neighborhood, enabling us a unique link between the real-world neighborhood and the virtual Digital Twin model. Our project demonstrates how advanced technologies empowers the local community and supports better decision making based on the integration of data.