Urban Tech Hub

Annual Report 2024

Leveraging the power of technology to make cities stronger, fairer, and more resilient.

JACOBS INSTITUTE
AT
CORNELL TECH

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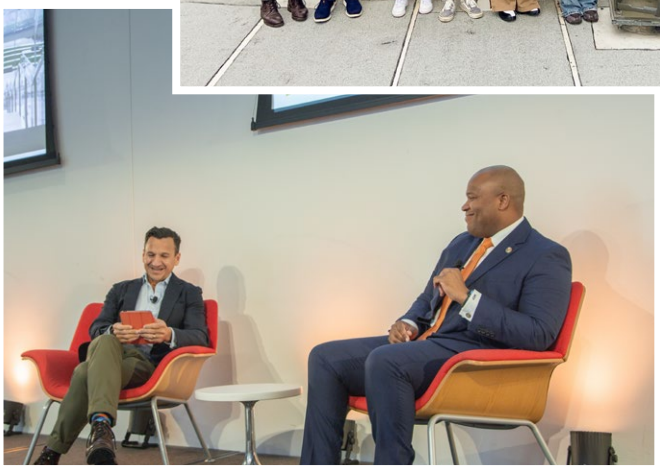

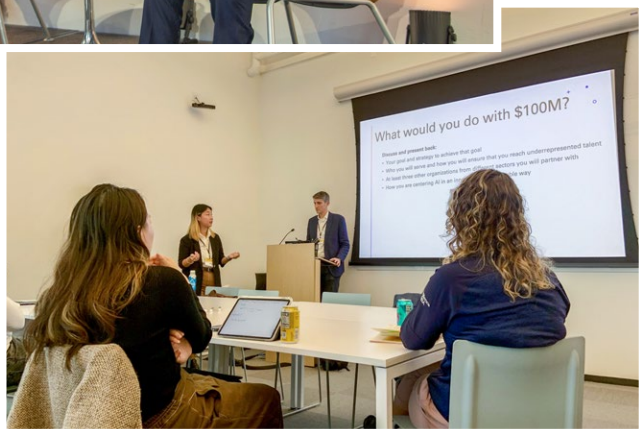

"The Urban Tech Hub transformed my approach from architecting spaces to data driven urban solutions. It embodies Cornell Tech's mission, bridging our classroom theories on urban data, privacy, and smart systems with real-world innovations. Through research and startup projects, the Hub connected Urban Tech students with industry pioneers, inspiring entrepreneurial journeys in this cross-disciplinary field. Here, we turn cutting-edge tech knowledge into immediate impact for smarter, more responsive cities!"

— Linjing (Mary) Rao, *UT '24*

Dear Friends of the Urban Tech Hub,

As cities and technology continue to converge, the Urban Tech Hub is leading the way to help make New York the global center of urban innovation.

As we enter our 4th year here at the Urban Tech Hub of the Jacobs Technion-Cornell Institute, we are reflecting on the dramatic changes that have occurred since we launched in 2020. There was so much uncertainty around the future of cities and an accelerated reliance on technology to help us manage our lives through the pandemic. Today we see a reversal whereby cities and urban environments are bouncing back strongly and now there is an increased skepticism – and in some cases a fear – of new technologies like AI.

At the Hub, we take a long view towards the role of technology in cities, and deeply believe in the power of technology to help optimize our aging urban systems, bring more social equity to cities and make urban environments more resilient to climate change.

This fall, we are delighted to welcome our new cohort of 22 urban tech students to campus! This year's cohort comes from legendary New York City universities, leading schools across the country and some of the top school's around the world. They add to our growing roster of pioneering urban tech graduates who are now working as analysts in government, data scientists in big tech companies and entrepreneurs in ambitious urban tech start ups.

Our research is increasingly focused on two profound changes in technology and cities, the future of urban AI and how cities must adapt to a changing climate. Led by our Senior Research Associate Anthony Townsend, our research ranges from a new Atlas of Urban Tech with case studies from around the world to new partnerships interrogating the public health impacts of climate change on aging populations in cities.

Adding to the breadth of our research, last year we welcomed our largest cohort of Urban Tech Fellows who took on challenges ranging from affordable housing and supercharging tech adoption in local government to the impacts of the *Metaverse* on cities and the role of digital technology to better understand how city streets operate. This year, we welcome two new fellows, Vianney Brandicourt and Tara Pham who are respectively investigating the impacts of Local Law 97 on building owners and how to value curb space in New York City.

We continue to bring New York City's ecosystem together in our Urban Tech Summit. Last year's sold out event was an inspiration to the hundreds of attendees from industry, government and academia who came together to delve into the role of technology in efforts to decarbonize urban systems. This year's Summit will conclude our recent three year focus on climate technologies with a look to the future of cities in the context of a changing climate.

Here's to another successful year of bringing together dedicated researchers, entrepreneurs, government officials and industry leaders to work together to make cities stronger, fairer and more resilient.

Warm Regards,

Michael Samuelian
Founding Director,
Urban Tech Hub

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Dear Friends and Colleagues,

In my first year at Jacobs, I am proud to share the significant milestones and accomplishments that continue to shape our community's impact on technology, innovation, and education. This past year we reached an extraordinary milestone: more than 100 start up ventures have launched, collectively valued at $660 million, with the Jacobs Institute playing a crucial role in powering much of this success.

Additionally, we welcomed our largest Runway cohort to date, with 9 new postdocs, and inaugurated our first cohort of New Venture (corporate) Fellows. The master's program also saw impressive growth, increasing by 14% and reaching a record-high enrollment of Jacobs students on campus.

We hosted prominent academic and tech leaders from across the globe. Last fall, we welcomed 40 Leadership in Academia university officials in collaboration with the Edmond de Rothschild Foundation and the Israeli Council for Higher Education. In April, we hosted the ATS (American Technion Society) Rothman Fellows, a distinguished group of elite lay and tech leaders from across the United States.

This past year we also expanded our Health Tech Hub when we appointed Dr. Chethan Sarabu from Stanford Medicine, as the new Director of Clinical Innovation for the Hub. Dr. Sarabu will be instrumental in expanding our partnerships with healthcare leaders across the city and state, driving the growth of our Health Tech master's program, and advancing impactful research and entrepreneurship at Cornell Tech.

Our faculty continue to garner prestigious accolades, further solidifying our role as a global leader in innovation. Professors Volodymyr Kuleshov and Emma Pierson received National Science Foundation Early Career Development Awards, while Professor Pierson was also honored with a Schmidt AI2050 Early Career Fellowship.

These achievements, along with our ongoing work to foster innovation and entrepreneurship through events, collaborations, and new initiatives, reflect the Jacobs Institute's unwavering commitment to advancing technology, entrepreneurship, and academia. We look forward to continuing this exciting journey, driven by the passion and creativity that define our community.

Warm regards,

Israel Cidon

Israel Cidon
Director, Jacobs Technion-Cornell Institute

CORNELL TECH

Dear Friends and Partners,

This past year has marked a profound transformation in the public's relationship with technology, particularly in the domains of artificial intelligence (AI), machine learning (ML), and data science. AI is set to revolutionize our society and cities in unprecedented ways, and Cornell Tech is leading the charge in this revolution towards lasting economic and social prosperity, both for New York City and the world. Through applied research, postgraduate education, and innovative startups, we are dedicated to developing the leaders and technologies that will define the AI era.

This year, we welcomed our largest class to campus with 529 master's students and 139 Ph.D.'s currently studying with us. We also launched several new programs to further expand our mission and deepen our contributions to the tech ecosystem. These include **Design Tech, and Data Science**, along with a new **Security, Trust, and Safety** initiative, all of which reflect our ongoing commitment to staying at the forefront of technological innovation.

Cornell Tech's educational and entrepreneurial programs are a driving force for the city's economy. In 2023 alone, we generated 2,300 jobs and $768 million in economic output. Our students, faculty, startups and alumni are essential contributors to New York's tech scene. The reach of our alumni continues to expand, with a majority staying in New York City after graduation to work in high-paying industries. Today, more than 1,000 Cornell Tech alumni are working in the city. Our commitment to fostering innovation extends to our startup programs, which have created an additional 525 jobs in New York City.

Our impact is built on a foundation of interdisciplinary collaboration, bringing together experts in engineering, computer science, health, design, business, and law. Our partnerships with leaders across the private and public sectors allow us to advance practical technology solutions that address real-world challenges. This commitment to innovation, combined with our mission to build strong connections between academia and industry, has established us as a cornerstone of New York City's vibrant tech ecosystem.

Cornell Tech's future is bright, and we are excited to continue growing our programs, partnerships, and campus to drive innovation and economic growth for New York City and beyond.

Warm regards,

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

Research

NYC Transportation Data Connect Symposium at the Microsoft Garage in New York City

The first pillar of the Urban Tech Hub's mission is to expand knowledge and share new insights through applied research.

Our research seeks to identify opportunities for optimizing urban systems, improve public service delivery with advanced information technologies, and anticipate the impacts of new technologies in cities. As new combinations of human and machine intelligence transform how cities are understood, managed and experienced, we are a leader in demonstrating how data-driven decisions can improve urban life.

Since the Urban Tech Hub's founding in 2020 our research has advanced the public's understanding in each of these priority areas. As we enter our fifth year, **our focus is increasingly defined by the two forces shaping the future of cities** – the growing impacts of climate change and the need for adaptation solutions, and the stunning new capabilities for sensing, sensemaking, and control delivered by new forms of AI. Through applied research partnerships with a growing array of research centers within Cornell University's network and beyond, we are creating our capacity to respond to this once-in-a-generation challenge and call to action.

Complementing our self-generated research, the Urban Tech Fellows program is a significant platform for inviting outside voices to campus. Inspired by the landmark *Rebooting NYC* report by our inaugural 2021 senior urban tech fellow Rohit (Rit) Aggarwala, we significantly expanded the program last year to include five fellows. This cohort broadened our research and took on such tricky issues as the design of online intake portals for public benefits and how to expand the deployment of urban technology pilots in New York City. This year we were joined by two extraordinary leaders in urban technology who are delving into the role that technology can play in reducing building's carbon emissions and developing a better understanding of how to value one of the most contested spaces in the city – the simple street curb.

Research Approach

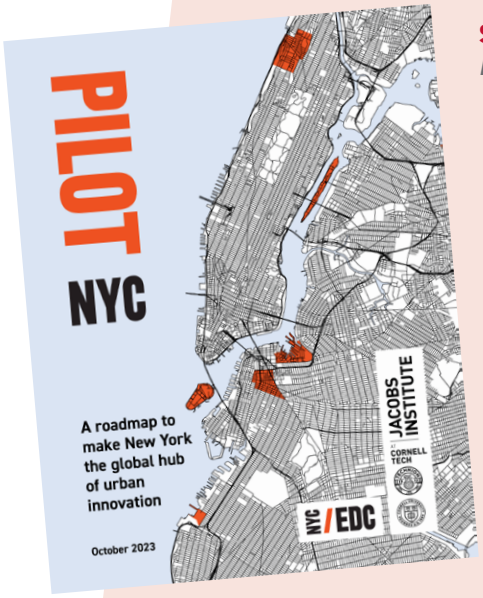
Our approach to expand the understanding of the complex issues at the intersection of cities and technologies has focused on three principal formats – surveys, optimizations, and explorations.

Surveys document best practices and trends in urban innovation, quantify the urban tech sector and its economic impact, and propose policies to guide the design and rollout of solutions in the public interest. Our efforts have highlighted ways in which university-based research can fill knowledge gaps that prevent city leaders from acting decisively and with confidence to kickstart, deliver, and manage urban tech innovations.

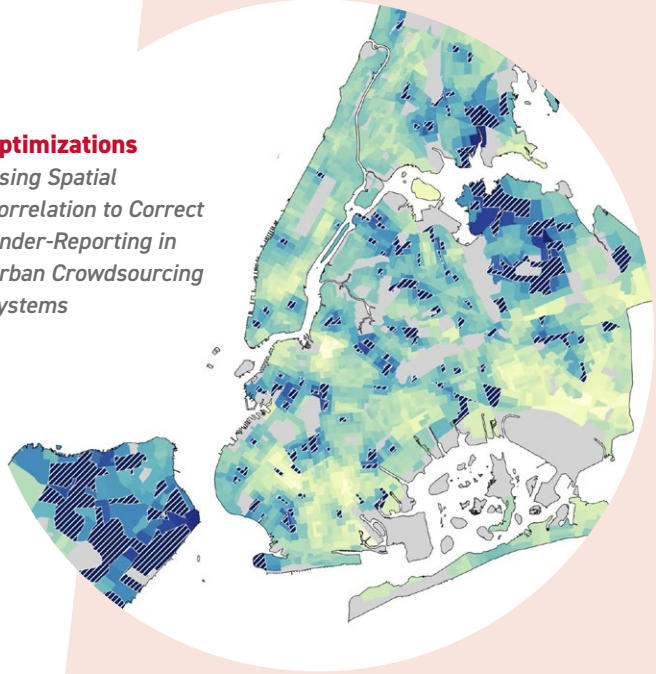
Optimizations develop instruments and analytical methods to improve the efficiency and equity of services provided by essential urban systems for buildings, transportation, energy, and health. The need for optimization approaches is growing and the work is becoming more complex. That's because tackling strategic challenges like decarbonization, environmental justice, and climate resilience means urban systems are more connected than ever.

Explorations investigate emerging needs, technologies, and long-range consequences of urban and technological change. Part of this work involves charting anticipated developments across the many sectors that shape the city – transportation, building systems, and energy distribution. But it also requires developing methods and knowledge for mapping more remote, but game-changing breakthroughs such as an artificial general intelligence, so we can anticipate and manage risks.

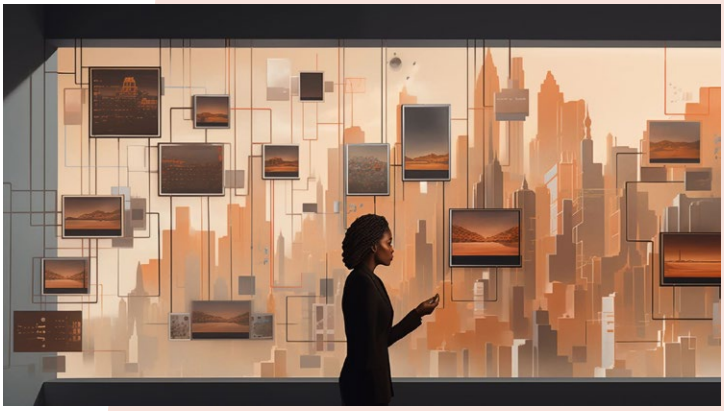
These complementary efforts draw on the contributions of Urban Tech Hub staff, fellows; faculty from Cornell Tech, Weill-Cornell Medicine, the Ithaca campus, and the Technion; students from the urban tech Master's program; and a growing network of partners in industry, government, and the nonprofit sector. This way of working – grounded in data, focused on practical application, and future-focused – allows us the freedom to think big but with the discipline to be relevant.



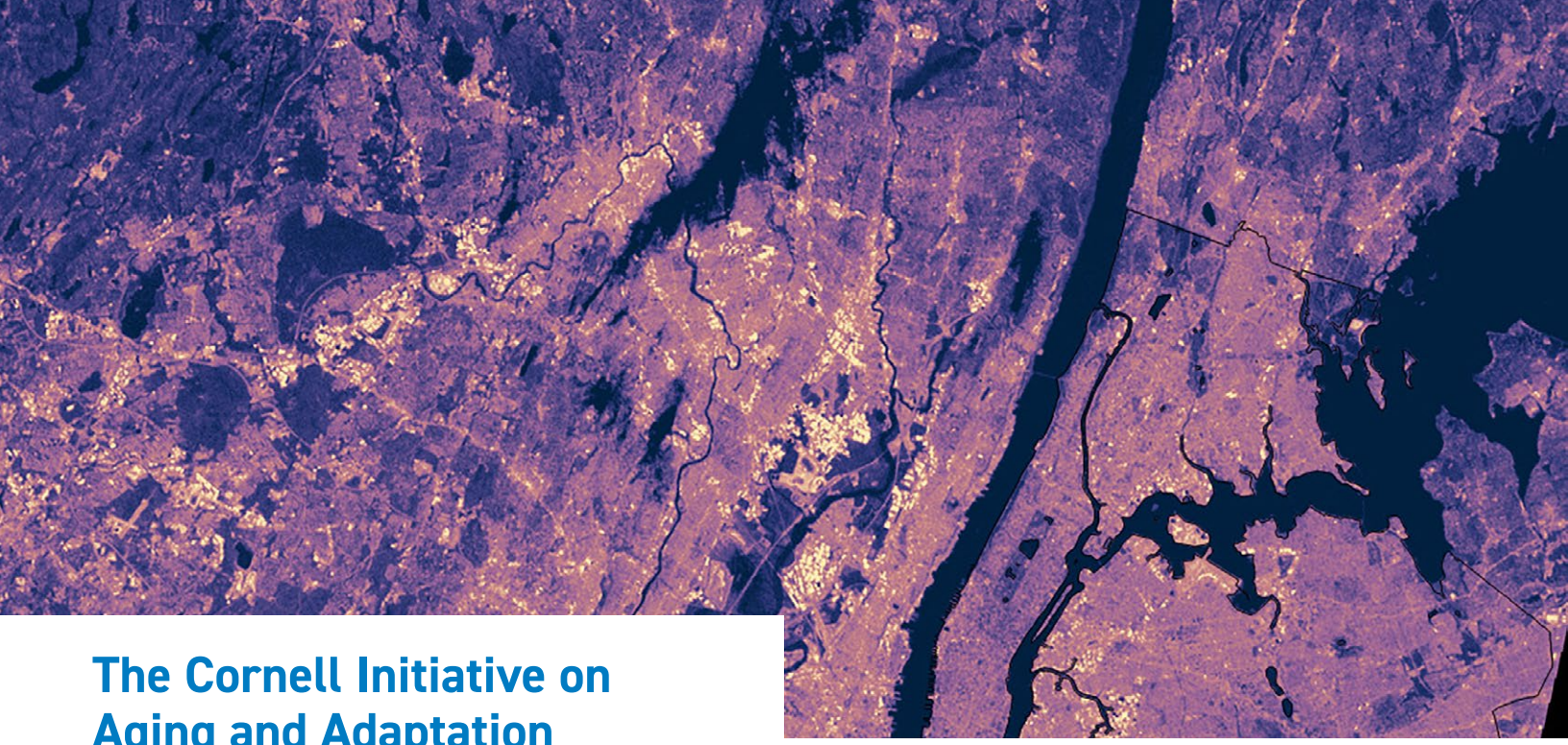
Surveys
Pilot NYC



Optimizations
Using Spatial Correlation to Correct Under-Reporting in Urban Crowdsourcing Systems



Explorations
The Future of Generative AI in Architecture, Design and Engineering



Credit: NASA Earth Observatory

The Cornell Initiative on Aging and Adaptation to Extreme Heat

In partnership with Cornell Tech's Health Tech Hub, Weill Cornell Medicine, and Cornell Public Health, the Urban Tech Hub launched the new Cornell Initiative on Aging and Adaptation to Extreme Heat. Using urban tech and digital tools as levers, this multi-disciplinary effort pursues integrative research across clinical medicine, public health and the built environment. In 2024, the Initiative launched three applied research projects to fill in important knowledge gaps and create cross-sectoral infrastructure for applied research collaborations among diverse stakeholders.

Extreme Heat and Medical Needs Among Older Adults

Prof. Arnab Ghosh, MD, Medicine, Weill Cornell Medicine
Prof. Deborah Estrin, Ph.D., CS, Cornell Tech

This project seeks to improve understanding of the medical needs of older adults in the context of extreme heat, identify the greatest at risk, and evaluate how emerging digital health tools can be used to adapt to these needs. The research team is analyzing health care claims data to understand differentiated healthcare demand among older adults during heat waves. These findings will frame an evaluation of how emerging digital health tools can be leveraged to reduce risk, harms, and cost for vulnerable patients during extreme heat exposure.

Informing Public Health Response to Extreme Heat Events via Granular Urban Data

Prof. Nikhil Garg, Ph.D., ORIE, Cornell Tech
Prof. Gen Meredith, DrPH, OTR, Public Health

This project couples individual and community level data sources and modeling with a web-based tool to stress test heat action plans (HAPs) and prototype a decision support tool for public health officials. This prototype will demonstrate how near-real-time data and short-range forecasting models can leverage multiple data sources to provide new and actionable insights during heat waves.

Extreme Heat and Aging Exchange

Dr. Anthony Townsend, Pd.D., Urban Tech Hub, Cornell Tech

Three big systems are responsible for the health and well-being of older adults in cities: healthcare, public health, and the built environment. All are responding to growing risks of extreme heat for this highly-vulnerable group. But these responses are not well-integrated. Problems of information availability, access, and integration are widespread. The Extreme Heat and Aging Exchange facilitates integrated research and action across these silos. The Exchange provides a neutral space where industry, government, and academics can come together to share data, models, code, studies, and other resources that help us all think and work more strategically.

Visit **extremeheat.us »**

Developing a Digital Twin for Climate Adaptation in New York City

In March 2024, the Urban Tech Hub welcomed more than 65 participants to Cornell Tech's campus for a day-long planning workshop on the potential of emerging digital technologies to support more effective and equitable climate-adaptation planning. This workshop was hosted by the Cornell Mui Ho Center for Cities and the Urban Tech Hub as part of the NSF-funded Center for Urban Climate Adaptation Solutions grant (2334311). The convening was funded by a grant from the National Science Foundation's CRISES program, which supports interdisciplinary research to create evidence-based solutions that strengthen human resilience, security and quality of life by addressing seemingly intractable challenges that confront society.

Bringing together experts from industry, government, academia, and civil society, this workshop examined the potential uses of a digital twin of New York City – a virtual representation of the city informed by live data streams from multiple sources – to support climate change adaptation. The aim of this effort is to create an open computational platform for decision-makers in the public and private sectors, researchers, civil society, and the general public to better understand climate-related issues and evaluate potential responses.

Civic-Led Urban Adaptation Research Center (in collaboration with Victoria Beard + Mui Ho Center for Cities

> "It's a matter of redesigning workflows to coordinate human and machine work in complementary ways."

The Future of Generative AI in Architecture, Design and Engineering

Greg Lindsay and Anthony Townsend

The advent of OpenAI's ChatGPT in November 2022 heralded the arrival of "generative AI" (GAI) and subsequently sent shock waves through industry after industry. One field grappling with the potential of GAI to alternately augment or replace human labor and creativity is architecture, engineering and construction (AEC). Curious about its capabilities and eager to collectively assess and mitigate its risks, several dozen AEC firms comprising the Innovation Design Consortium (IDC) approached the Urban Tech Hub in August 2023 to draft usage guidelines for its members and scan the horizon out to 2030 for potential threats and opportunities for the AEC industry.

Led by 2022-2023 Urban Tech Fellow Greg Lindsay and senior research associate Anthony Townsend, the Hub conducted interviews with experts and leading practitioners in an effort to understand how GAI might evolve as both a technology and industry generally, and disrupt AEC specifically. Their report, published in January 2024, was supplemented with an "AI Service Assessment" comparing more than a dozen popular tools using dozens of criteria ranging from black box versus open source to the provenance of both inputs and outputs.

They were assisted in this by urban tech Master's student Ryan Hardesty Lewis, who developed the novel technique of asking GPT-4 (in concert with Microsoft Bing) to search-and-score each tool using publicly-available information on their Websites and in user forums, with appropriate citations. The results have since been promulgated to 40 AEC firms ranging in size from 150 to 2,000 employees. Lindsay was invited to present the report in May 2024 to the Canadian Large Firm Roundtable, which is comprised of the CEOs of the two dozen largest AEC firms operating in Canada.

Tree Folio

Tree Folio is one of the longest-running research projects that the Urban Tech Hub has supported since its founding four years ago. Tree Folio is a suite of tools to better understand and quantify the local impact of urban trees. The tools extract 3d models of every tree in NYC from publicly available, high-resolution LiDAR scans, simulates their local shading environments, and quantifies the amount and quality of shade they provide.

The success and impact of this project has demonstrated the potential of citywide LiDAR surveys and the research has filled critical knowledge gaps essential for maintaining and expanding urban tree canopies. The influence of the project is significant, and will help support strategies to improve tree health and growth, enhance the impact of new plantings, and align canopy expansion with public priorities and environmental justice goals. The tools developed to date have the potential to transform urban forestry in smaller cities and towns, which often lack the resources for comprehensive canopy management.

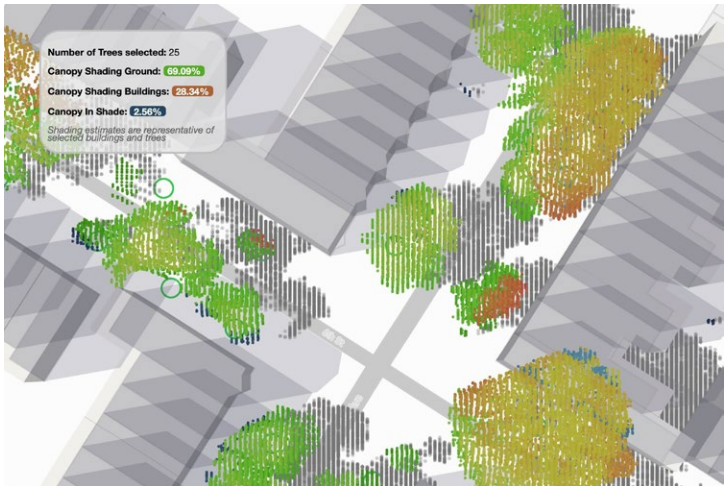
Cities largely rely on costly, infrequent data sources methods for measuring their urban canopies. As a result, the data to inform canopy management and improvement is often of low quality, low resolution, and out of date, harming a cities abilities to respond to the varied and current needs of their communities. Maximizing the impact of trees and leveraging new data sources is critical to understand and solve for the variable vulnerabilities of cities due to climate change.

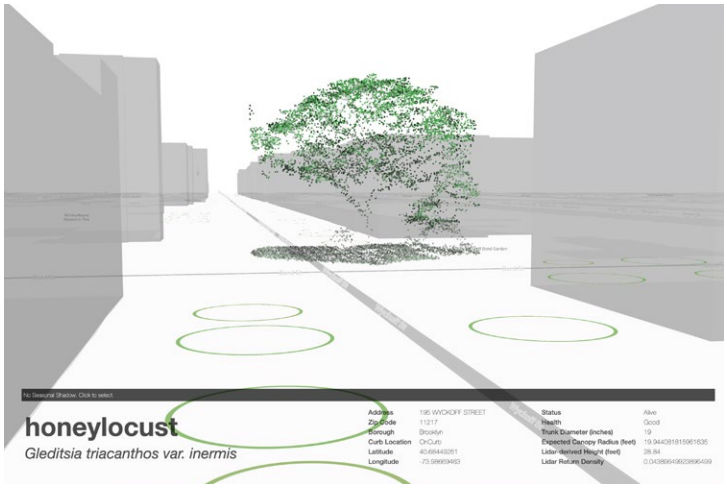
These efforts revolutionized urban forestry by addressing key gaps in data and modeling. The team combined expertise from spatial design perspectives, computer vision, cloud computing, urban design, and urban data analysis to create a multidisciplinary solution. By integrating these perspectives with public data, the project can ultimately provide cities of all sizes with tools to develop more effective and equitable urban canopies.

Tree Folio NYC is a research project by the Design Across Scales Lab at Cornell AAP, funded and developed in collaboration with the Urban Tech Hub

Alexander Kobald (Cornell AAP), Joe Ferdinando (Cornell CS/AAP), Sarang Pramode (UT '23), Jiahao Dong (UT '23), Guangwei Jiang (UT ' 24) Anthony Townsend, Meejin Yoon (Cornell AAP).

> "It's not only fun to zoom around the city, seeing every tree and building, and the shade they cast, from every angle, it's also a useful tool for scientists and city planners as global warming intensifies."
>
> **— Ruben Bolling**, *boingboing.net*





Visit **treefolio.org »**

Open Zoning

Decoding Zoning – Zoning complexity is a barrier to more "Missing Middle" housing

To take on the crucial challenge of decoding zoning, the Urban Tech Hub and Harvard's Graduate School of Design – Laboratory for Values in the Built Environment joined forces to develop "Open Zoning" – a pioneering initiative designed to redefine how we access and comprehend local zoning policies.

The growing housing shortage in the United States underscores an urgent need for new mechanisms to increase the nation's housing supply. At the heart of this crisis lies a puzzle: zoning.

Zoning codes are critical infrastructure shaping our cities; however, their intricate legal language is challenging for small-scale builders and housing advocates to decipher where and what they can build in their community. Fortunately, a growing number of cities, like Minneapolis, are pioneering efforts to write new policies that nurture more equitable housing development, especially focused on closing the "missing middle" housing gap. However, these revised policies, although well-intentioned, remain a persistent puzzle for non- experts to solve.

> Open Zoning unlocks the power of zoning data, enabling users to visually analyze what is possible to build at the parcel and neighborhood level."

Demo Website: **openzoning.ai »**

Despite great strides in zoning reform, the key challenge is decoding zoning – translating zoning policies into formats accessible to small- scale builders and housing advocates, sparking bottom-up action to combat our national housing shortage.

Open Zoning democratizes zoning codes, transforming them into legible, actionable data to spark a bottom-up response to the housing crisis.

The research team developed a tool that translates zoning codes into an open-source, machine-readable data standard, the first of its kind. This novel system known as our "Feed Specification", employs algorithms to instantly decode the zoning puzzle, equipping small-scale builders – instrumental in closing the missing middle housing gap – with actionable zoning data.

Open zoning is a joint initiative of Cornell Tech and the Harvard Graduate School of Design (GSD), it was developed as a partnership between Cornell's Tech's Urban Tech Hub (Michael Samuelian, Nneka Sobers, Paul Salama, Linjing (Mary) Rao, Vikranth Kanumuru) and the GSD's Laboratory for Values in the Built Environment. (Elizabeth Christoforetti, Carol Voulgaris, Luke Reeve, Ana Lucia Merla).

OPEN ZONING

Open Zoning unlocks the power of zoning data, enabling users to visually analyze what is possible to build at the parcel and neighborhood level. Open Zoning is powered by a robust system of technologies that source, translate, analyze, and visualizes zoning data.

Data Source → Data Translation → Data Analysis → Data Visualization

Open Zoning aggregates zoning data from city codes, the National Zoning Atlas, and open-source public contributions

- Municipal Zoning Codes
- National Standardized Zoning Data
- Open-Source Public Contributions

Through the Open Zoning Feed Specification, we convert disparate data sets into a novel schema format

Open Zoning Feed Specification

The Open Zoning Engine employs geo-decision making, converting data into JSON files stored in the Open Zoning Database

Open Zoning Engine

Open Zoning Database

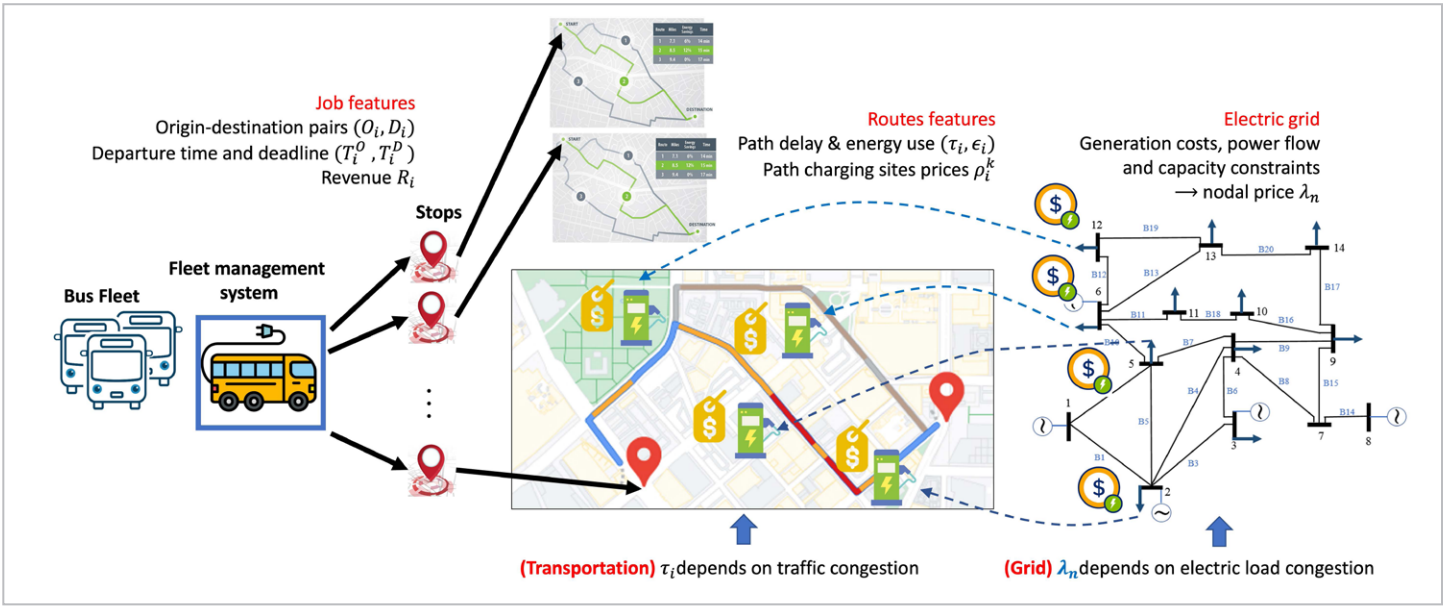
The Open Zoning Platform brings our data to life, offering users a dynamic space to visualize and retrieve zoning data

Open Zoning Platform

Faculty Research Projects

The Hub works closely with Cornell Tech faculty engaged in cutting edge research in the fields of optimization, computer vision and human computer interaction (HCI). These projects complement our overall Hub research by giving us opportunities to delve deeper into technologies that can change how cities and urban systems are managed,optimized and improved.

The electric bus vehicle scheduling problem (EVSP)



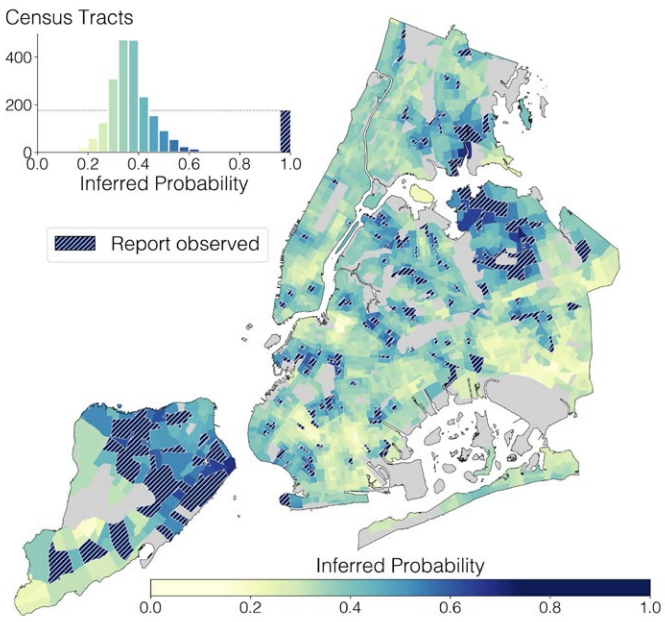
Sustainable Urban Electrified Transportation Service Networks: Cooperative Logistics and Charging

The coupling between the scheduling of electrified fleets of buses, their charging and grid pricing.

The scheduling of service routes for fleets of buses is a classical example of a complex integer programming problem, for which effective approximate solutions have been developed. The recent and continuing electrification of these fleets introduces a new dimension to their scheduling, involving decisions on when and where to charge the buses. An increasingly electrified bus fleet will contribute significant demand to the electric grid distribution system, bus charging schedules can impact local congestion and influence the locational marginal price of electricity. This creates a feedback loop between wholesale market operators and transportation operator decisions if scheduling responds to these prices.

This research project examines approaches to address this coupling, aiming to effectively capture the price-sensitive nature of bus travel and charging scheduling. Simultaneously, we seek computationally efficient methods to obtain solutions for the bus schedule and the correct price of electricity facing this enhanced complexity.

Collaborators: Nathan Cho, Prof. Andrea Lodi, Prof. Anna Scaglione and Tong Wu



Using Spatial Correlation to Correct Under-Reporting in Urban Crowdsourcing Systems

Improving Flood Prediction and Government Response through Spatial Correlation and Demographic Analysis.

City governments often become aware of urban incidents through a self-reporting process. New York City's 311 system is the channel through which residents voice their complaints about fallen trees, flooded basements, noisy neighbors, and more. But some problems that occur are never reported and problems that truly did not occur cannot be distinguished without additional assumptions. In this work, researchers looked at disentangling the phenomenon of under-reporting – i.e. the lack of use of 311 systems – from street flooding occurrences in New York City with Bayesian methods.

In this research, the team leverages and validates two principles: spatial correlation, as flooding often occurs in neighboring areas, and heterogeneous reporting, as reporting rates and 311 usage are correlated with neighborhood demographic factors. Accounting for such principles improves both the prediction of future flooding reports and the allocation of post-flood inspections. Our work lays the groundwork for more equitable proactive government services, even in light of disparate reporting behavior. This work appeared in the 2024 AAAI Conference on Artificial Intelligence (AAAI'24).

Collaborators: Gabriel Agostini (PhD student), Prof. Emma Pierson, Prof. Nikhil Garg

Inferring Fine-Grained Migration Flows in the United States from Noisy Data

Harmonizing Consumer and Census Data to Produce Fine-Grained Migration Flow Estimates Across the U.S.

The average American person moves more than 10 times during their lifetime. Migration can be motivated by personal relationships, the pursuit of education, or other opportunities such as a new job. However, it can also result from climate change, surging rent prices due to gentrification, or even political turmoil in one's hometown. Studying migration for the entire United States population becomes complicated, as different socioeconomic and demographic groups migrate following trends that may disagree with the whole.

However, current datasets on migration are not fine-grained enough to facilitate demographic assessment. The American Community Survey (ACS), for example, only releases estimates at the very heterogeneous county-level. And, although there exist fine-grained and even individual-level migration datasets, those are often produced by companies and introduce bias, noise, and privacy concerns. In this work, researchers develop a method to harmonize noisy, biased migration data from consumer data records with publicly available Census data to obtain fine-grained migration flow estimates for the entire United States.

Collaborators: Gabriel Agostini (PhD student), Prof. Emma Pierson, Prof. Nikhil Garg, Prof. Maria Fitzpatrick

A Letter from Tel Aviv...

Urban Tech Postdoc

I am writing this letter to summarize the journey I had as an urban tech postdoc at Cornell Tech in 2023. Being a postdoc at Cornell Tech over the past year has been an exhilarating and intellectually stimulating experience. The vibrant academic community, cutting-edge research projects, and collaborative spirit have made every day a new adventure. Engaging with fellow researchers, brilliant minds, and state-of-the-art facilities has not only enriched my understanding but also fostered a sense of camaraderie that made the journey immensely enjoyable. Additionally, being an Urban Tech Postdoc added another layer of excitement to my academic journey. The program's emphasis on innovative solutions for urban challenges provided a real-world context for my research. The joy of contributing to understanding the security and privacy risks in the intersection of technology and urban development has made this year an unforgettable and joy-filled chapter in my academic career.

Collaborating with esteemed Tom Ristenpart and Vitaly Shmatikov has been an extraordinary experience that has significantly enriched my research capabilities in topics I have not pursued before including end-to-end encryption for messaging applications and GenAI security. Their expertise, guidance, and commitment to pushing the boundaries of knowledge have elevated the quality of our research. Moreover, the opportunity to guide Peter Hsieh, an Urban Tech masters student, in joint research has been a truly enriching experience that led us to shed light on the security and privacy risks associated with GenAI models and demonstrate how such models can be abused using seemingly innocent inputs such as images and audio samples.

This year has been marked by significant accomplishments in my academic journey, highlighted by the publication of three impactful papers in top-tier security conferences (one paper at CCS'23, two papers at SP'24). Additionally, receiving the prestigious Pwnie Award for the best cryptographic attack of 23 is an immense honor that underscores the real-world impact of the work I did during the postdoc. These achievements collectively highlight a year of excellence and commitment to advancing the forefront of security research. They are the result of the productive ecosystem that Cornell Tech and the Urban Tech Hub provide to postdocs.

In addition, living in New York City was a significant experience, offering a dynamic and vibrant urban lifestyle like no other. The city's energy, diversity, and cultural richness create an ever-evolving backdrop for daily life. From the iconic skyline and bustling streets to the world-class dining, arts, and entertainment, every facet of Manhattan contributes to an immersive and unforgettable experience. NYC and Cornell Tech allow postdocs to combine the experience of being part of conducting innovative research in an excellent university while living in the best city in the world.

Finally, I would like to thank Michael Samuelian, the director of the Urban Tech Hub for allowing me to be part of this ecosystem. His generosity, understanding, and leadership provided me with the infrastructure and silence I needed to focus on pursuing high-quality research that led me to the great accomplishments I made.

Thank you, Michael.
I will never forget the opportunity you gave me!

Ben Nassi, PhD

> "Tech is a means to an end and not the end. And therein lies the real power of AI and tech within the urban space."
>
> — **Mariela Alfonzo**, *CEO, State of Place*

Future of Urban AI

Global Dialogues on the Future of Urban Artificial Intelligence

Cities are evolving at an unprecedented pace, driven by rapid technological advancements. The need for a deeper understanding of how Artificial Intelligence can shape urban life has never been more critical. Recognizing this imperative, in fall 2022, Paris-based think tank Urban AI and the Urban Tech Hub partnered on an exploration of trends, applications, and anxieties around how AI is being used to manage, plan, and govern cities around the world.

Continuing this successful collaboration, the partnership delivered a second annual series of 8 webinars on *The Future of Urban AI* in fall 2023. These global dialogues explored AI-related trends featured in the Hub's 2021 Horizon Scan on the future of urban tech, as well as emerging areas of innovation, including: the use of generative AI in participatory urban design and cartography; machine learning and computer vision approaches to predictive maintenance for building facades and water systems; agent-based models for modeling pedestrians and building occupants; programmable urban sensor networks; and, developments in AI use in Latin American cities

In the second season of *The Future of Urban AI*, which delved even deeper into the realms of urban Artificial Intelligence. Beginning with an exploration of how generative AI is being harnessed for participatory planning with Damiano Cerrone of Helsinki-based UrbanistAI, eight webinars continued our exploration of how AI is shaping the future of urban tech, drawing on Cornell Tech's Future of Urban Tech Horizon Scan as our roadmap. Additional conversations brought together a diverse panel of pioneering international experts in urban robotics, urban sensing, digital twins, and the geopolitics of urban AI.

Future of Urban AI
Season 2 Conversations

Watch the recordings and read the summary report at urbanai.fr/events/the-future-of-urban-ai

9. October 4, Towards Participatory Planning
Damiano Cerrone, UrbanistAI

10. October 11, Trustworthy Cartography
Alexander Kamenev, aino.world

11. October 18, Self-Repairing Cities
Taras Wankewycz, H3 Dynamics

12. October 25, Software-defined Sensing
Charlie Catlett, Argonne National Laboratory

13. October 31, Anticipatory Government
Naysan Saran, CANN Forecast

14. November 8, Reimagining Offices
Davide Schaumann, Technion

15. November 15, Decolonizing Smart Cities
Soledad Guilera, School of Government, Universidad Torcuato Di Tella

16. November 22, Choreographed Streets
Mariela Alfonso, State of Place

URBAN AI

Produced and developed in partnership with Urban AI (urbanai.fr)

Urban Tech Fellows

Building on the success of our inaugural Senior Urban Tech Fellow, Rit Aggarwala, in 2021, the Hub significantly expanded our fellows program this past year. The program's goal is to bring external voices to campus, broadening the scope and impact of the Urban Tech Hub and Cornell Tech beyond our campus. This initiative reflects the Hub's commitment to public engagement as a collaborative effort that is both educational and inclusive of diverse perspectives.

Our fellows are invited to spend a year on campus, where they explore how technology can address pressing urban challenges. They also have the opportunity to collaborate with students, faculty, and researchers, bringing new perspectives to campus and enhancing our internal engagement. Many fellows have also worked directly with New York City government, building new connections between the Hub, public agencies, and community advocates.

We were thrilled with the range of topics explored, from the tactical challenge of integrating technology into existing public intake systems for affordable housing to the future role of cities in the Metaverse. Our fellows hosted events, published op-eds, and contributed to advancing technology's role in improving city management and promoting equity.

> "The Urban Tech Fellows programs is one of our most powerful platforms that brings outside voices to campus to take on some of the trickiest challenges the city faces."

2023 Urban Tech Fellows

Cara Eckholm

Supercharging urban innovation in New York City government through advancing technology Pilots and research partnerships.

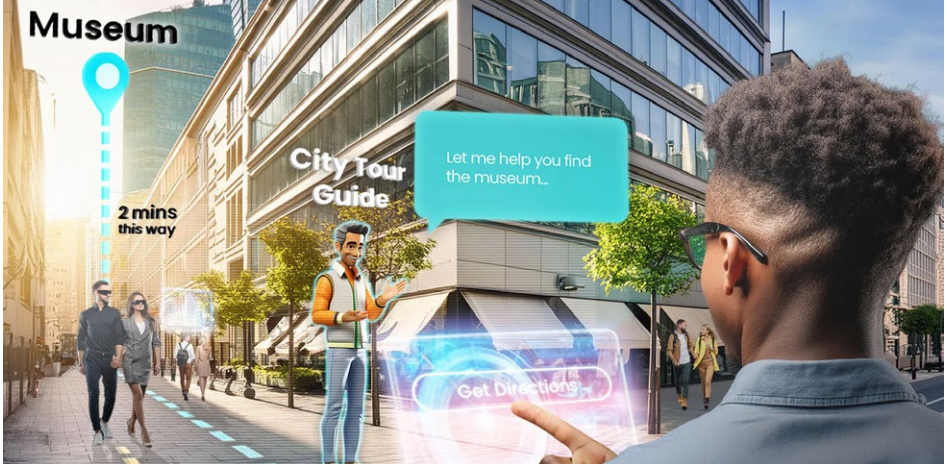
Cara proposed, scoped, and was the lead author of *Pilot: New York City*, a blueprint – co-authored with Daria Siegel at NYC EDC – to update how the city pilots, procures, and evolves policy to encourage the adoption of new technology. Cara's fellowship at Cornell Tech was extended through 2024 to see the *Pilot: New York City* plan through execution, supported by a generous grant from the Sloan Foundation.

The *Pilot: New York City* plan has already had a significant impact in changing government's relationship with technology.

- Passage of a reform to New York City's procurement code, allowing agencies to run "challenge-based" procurements to purchase new technology. In a "challenge-based" procurement, agencies identify the *problem* they are trying to solve, rather than the prescriptive *solution*, and vendors compete to address the identified problem statement. The City's first two official challenge-based procurements are anticipated to launch in Fall 2025, opening a new avenue for innovation in New York City government.
- The launch of the Pilot Policy Studio, a new program to help "match" City agencies with pertinent academics to provide technical diligence on pilot projects. At the Pilot Pitchfest in December 2024, over 50 projects were pitched, and two received funding through a competitive application process. Selected pilots were funded to be deployed in summer 2024 and include 1) using computer vision to automate bike lane inspection with the NYC Department of Transportation and NYU and 2) validating the impacts of leaf mulching on urban soil health between the New York City Housing Authority and Brooklyn College.
- The launch of the Urban Innovation Fellows program to place mid-career professionals directly into New York City's government agencies.

Since Pilot: New York City's publication, Cara has also engaged with over 40 other government agencies on implementing aspects of the plan. She looks forward to continuing her work in the government innovation space, in New York and beyond.

The Pilot Pitchfest in December 2024



Credit: Darabase

Greg Lindsay

Examining the urban implications of Augmented Reality using foresight methodology to identify both the opportunities and the risks to cities

Lindsay explored the concept of "artificially intelligent reality" (AIR), a term he coined to describe the integration of AI with augmented reality (AR). His report, The Augmented City, examined the urban-scale implications of AR and AIR technologies, such as Ran-Ban Meta Smart Glasses. Lindsay used foresight methodology to identify both the opportunities – like enhanced civic engagement – and the risks, including digital divides and corporate overreach. He emphasized the need for proactive urban governance to manage these emerging technologies for equitable outcomes.

Apple made a splash in February 2024 with the launch of the Apple Vision Pro – a $3,500 headset designed to replace desktop computers. But like a stone in the water, its sales quickly vanished without a trace. Meta's $500 Ray-Ban Smart Glasses have already proven to have more staying power, thanks to its onboard AI capable of seeing, listening, and answering wearers' questions.

Taking these abilities into account, Urban Tech Fellow Greg Lindsay has coined the acronym AIR, or "artificially intelligent reality," to describe this new direction for augmented reality (AR). AIR refers to both hardware devices such as Meta's Wayfarers or Snap Spectacles, and to AI agents given form and personalities in augmented reality.

"Taken together," Lindsay writes, "this twin definition of AIR – as AI augmenting the world and AR giving form to AI – points to a new trajectory for both technologies that is fundamentally urban."

His forthcoming report *The Augmented City* explores the implications of AR and AIR at urban scale. Together, they promise to transform how residents and visitors alike experience and interact with cities. As with previous technological disruptions such as ride-hailing apps, they also pose significant challenges to urban governance and equity.

Using a foresight methodology known as "threatcasting," Lindsay's report examines potential threats such as unchecked corporate expansion into public spaces, new vectors for crime and exploitation, and the exacerbation of digital divides. It also highlights opportunities for enhancing civic engagement, improving public services, and fostering community resilience.

The report emphasizes the need for cities to proactively shape these technologies rather than reacting to their consequences. It calls for new roles and departments within city governments to manage the digital public realm, and for increased collaboration between tech companies, community organizations, and public officials.

By anticipating both the promise and perils of augmented cities, *The Augmented City* offers a roadmap for civic leaders to harness the potential of AR and AIR while safeguarding public interests and ensuring equitable access to these transformative technologies.

Paul Salama

Streamlining New York City's transportation and development approval processes through innovative digital technologies

Salama led the project How NYC Moves: Tech-Accelerated Data Solutions for Transportation and Development Approvals in NYC. In collaboration with the Mayor's Office of Policy and Planning, Salama organized the NYC Transportation Data Connect Symposium in January 2024, which explored how technology could streamline NYC's transportation analysis. The symposium featured discussions on probe data, computer vision, and digital twins. The resulting report outlined key recommendations, including centralized data sources and cross-sector tech capacity, providing a roadmap for more efficient transportation processes in the city.

In response to the urgency of the current housing crisis and economic challenges, which demand decisive action, New York City initiated the "Get Stuff Built" report. As a follow-on activity, the Mayor's Office of Policy and Planning (MOPP) reached out to Cornell Tech to lead further investigation into the essential reform topic of accelerating the transportation analysis process. This project aimed to streamline New York City's transportation and development approval processes through innovative technologies. The initiative included organizing the 2-day NYC Transportation Data Connect Symposium and producing the report "How NYC Moves: Tech-Accelerated Data Solutions for Transportation and Development Approvals in NYC."

NYC Transportation Data Connect Symposium at the Microsoft Garage in New York City

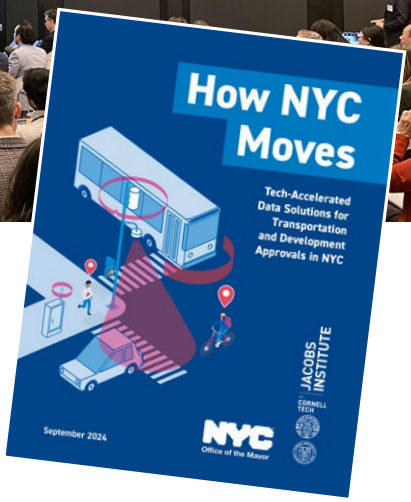
NYC Transportation Data Connect Symposium

The NYC Transportation Data Connect Symposium, was a collaborative effort organized by the MOPP and Urban Tech Fellow Paul Salama. The event brought together experts from government, transportation firms, tech companies, and academia at the Microsoft Garage in New York City. The symposium explored how technology could streamline transportation analysis and review processes in NYC. It featured presentations, discussions, and working group sessions focused on identifying challenges and proposing solutions to enhance transportation data collection and analysis.

Symposium Highlights:

Day 1: Industry leaders presented the latest advancements in transportation data technologies, including probe data, computer vision, and digital twins. Discussions highlighted the potential of these technologies to provide broader and more accurate data, accelerate data processing, streamline and automate processes, and improve predictive analytics.

Day 2: Participants engaged in working groups to address specific challenges identified on the first day. These groups developed preliminary solutions and validation methods, setting the stage for future implementation of tech-driven improvements in transportation analysis.



Report: "How NYC Moves"

The report "How NYC Moves" synthesized insights and findings from the symposium, delving into the details of the transportation analysis challenge. It provided a primer on relevant technologies and techniques and outlined the current bottlenecks in transportation analysis. The report culminated in five key recommendation areas to enhance efficiency through technology:

1. Produce Centralized Transportation Data Sources
2. Leverage Computer Vision on City Assets
3. Develop Software to Streamline Routine Agency Procedures
4. Review Latest Practices and Innovations for Opportunities to Improve Analysis Methods
5. Build Cross-Sectoral Technology Capacity

With support from the Urban Tech Hub and funding from Cornell Atkinson Center for Sustainability, the symposium and report collectively provided a roadmap for New York City to transform transportation analysis processes, reduce delays, and promote effective use of public resources.

Mirtha Santana

Revealing the roadblocks and challenges in NYC's affordable housing system, and developing technology-driven solutions and policy reforms

Mirtha Santana's study on New York City's affordable housing system revealed several key findings that highlight the challenges faced by both residents and property owners. One of the most prominent issues is the extended time it takes to lease affordable housing units compared to market-rate units, reflecting significant inefficiencies in the current process and leaving thousands of desperately needed units vacant. This prolonged leasing process puts additional strain on both tenants searching for housing and property owners trying to fill vacancies.

Another critical finding was the need for technology-driven solutions to streamline the leasing and management of affordable units. Property owners expressed a strong desire to leverage technology to reduce inefficiencies and make the leasing process smoother. Current systems for managing affordable housing are outdated, making it difficult for owners to keep up with demand and ensuring that eligible tenants are placed in available units in a timely manner.

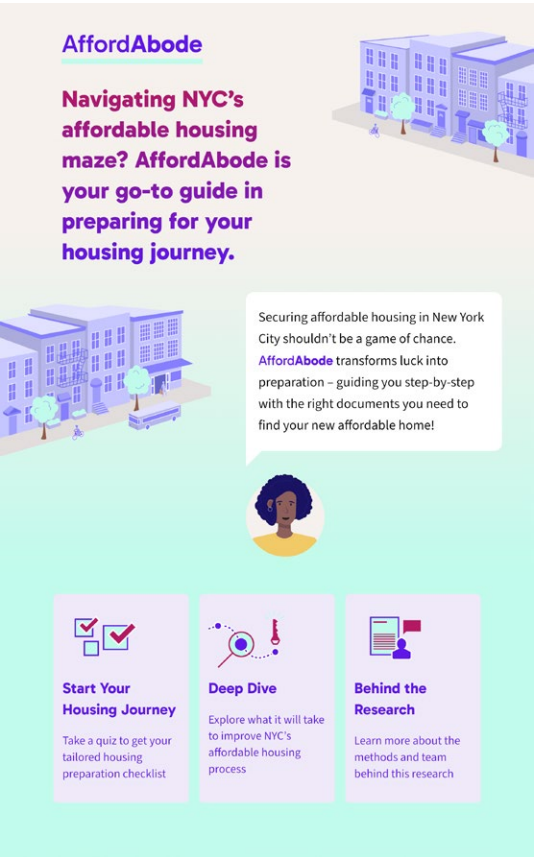
From the tenant perspective, Santana's research uncovered significant challenges in navigating the complex and often overwhelming affordable housing system. Many residents face limited availability of units, complex eligibility requirements, and stiff competition for the few homes that do meet their needs.

These barriers make it difficult for low- and moderate-income individuals and families to secure affordable housing, leaving many vulnerable to displacement or homelessness.

Additionally, the study examined the existing affordable housing programs offered by both government and nonprofit organizations. While these programs have had some successes, they also face significant limitations that contribute to the ongoing housing shortage. Inefficiencies in policy implementation and program management further complicate efforts to meet the demand for affordable housing.

Santana's research culminated in the development of Affordabode, an online portal that guides tenants through the leasing process. It is the hope that this is the first step towards improving the system to accelerate the leasing process and reduce the number of empty affordable units in New York City.

Visit **AffordAbode.org »**



2024 Urban Tech Fellow

Vianney Brandicourt

Key collaborator: Zhiyi Tang

Developing open-source resources to help building owners plan for Local Law 97, New York City's landmark building decarbonization law.

Environmental compliance laws for the built environment are coming into effect in over 30 cities and 4 states over the coming years. This shows a drastic shift in legislation to enforce emission reductions across the United States, going beyond the net offsetting of emissions. New York City is on the vanguard with its groundbreaking Local Law 97 (LL97), passed by the City Council in 2019 as part of the Mayor's New York City Green New Deal.

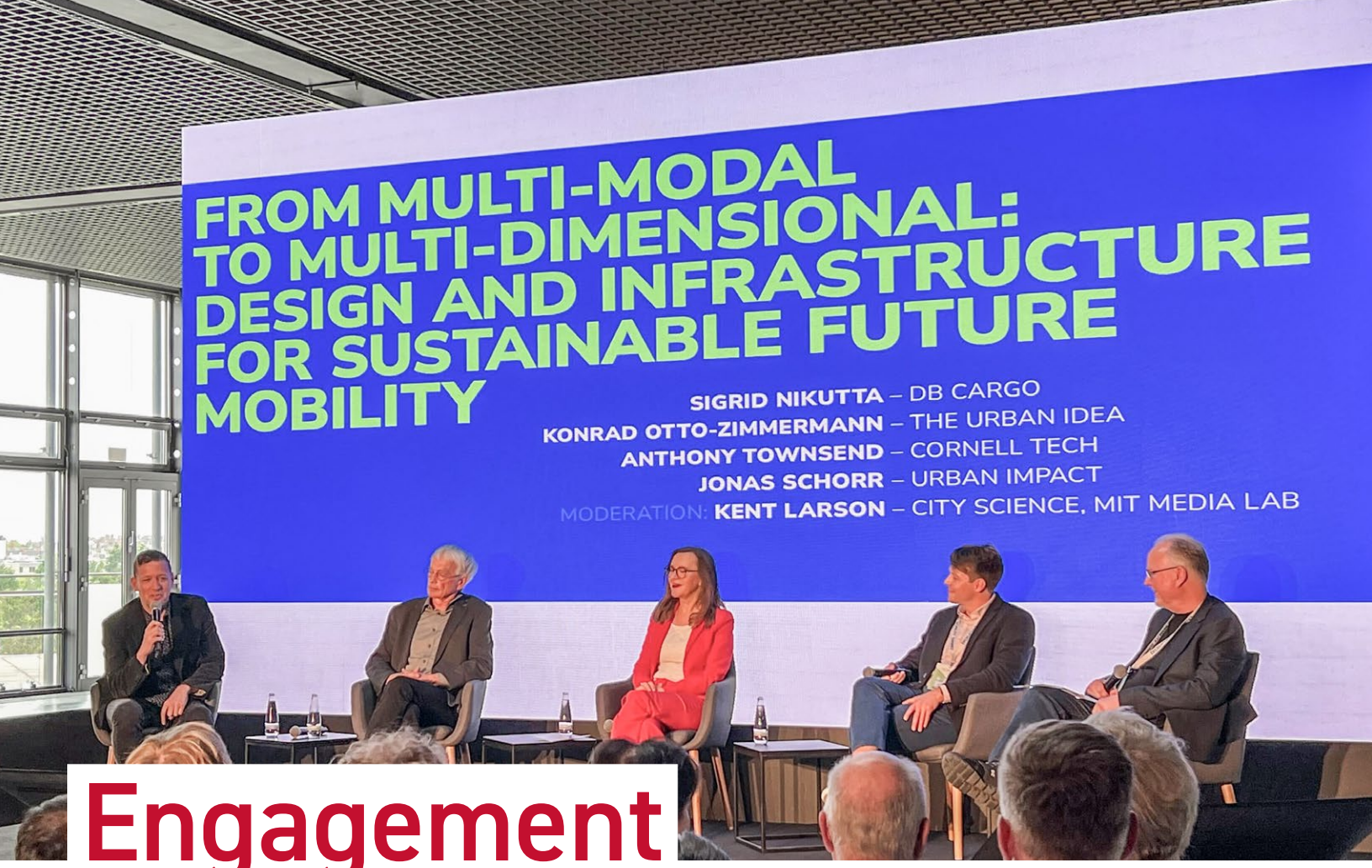
Buildings account for approximately two-thirds of greenhouse gas (GHG) emissions in New York City, and both Mayor Adams as well as prior mayors have pledged to address these emissions as part of their plans to make the city carbon neutral by 2050.

Under LL97 most buildings over 25,000 square feet will be required to meet new energy efficiency and GHG emissions limits by 2024, with stricter limits coming into effect in 2030. The goal is to reduce the emissions produced by the city's largest buildings 80 percent by 2050.

However, while the costs of LL97 non-compliance in the form of penalties are clearly outlined and well-understood, the retrofit costs of compliance in the form of infrastructural improvements and equipment upgrades remain largely opaque for NYC building owners.

"The lack of retrofit cost data for building owners presents an important gap in our understanding of how rapidly and extensively Local Law 97 is likely to be adopted" according to Brandicourt. "Will owners have a strong incentive to pay a known penalty versus investing in the largely indeterminate cost of retrofitting their buildings?" Gaining a deeper understanding of the relationship between cost uncertainty and LL97 compliance would have significant policy implications for NYC and other building decarbonization laws around the nation. He is currently drafting a report containing both qualitative and quantitative findings and recommendations for addressing the negative impact of retrofit cost uncertainty, with the aim of building a simple, intuitive, open-source calculator that helps owners acquire more detailed, accurate estimates of their retrofit costs.

In parallel, Brandicourt is working on adding data-driven clarity to the impact of new city legislation (proposed Intro 772) that would provide significant carve-outs for owners facing potential penalties under LL97. "The potential impact of Intro 772 has been reported in the media along highly anecdotal and political lines, with a noticeable lack of data," he says. "Providing policy makers and the public with clear counterfactuals should make for a more productive debate and catalyze climate action."



Engagement

Anthony Townsend speaking at the 2024 Disrupting Mobility Summit

A core pillar of the Urban Tech Hub's mission is engaging New York City's tech ecosystem by bringing together diverse voices to address the critical challenges cities face. Through strategic partnerships, thought-provoking events, and public forums, the Hub convenes leaders from government, academia, and industry to drive meaningful change.

Public engagement at the Urban Tech Hub is dedicated to being responsive to emerging issues and amplifying new and diverse perspectives. Our flagship event, the annual Urban Tech Summit, attracts hundreds of attendees to discuss the role of technology in addressing climate change. Beyond the Summit, the Hub's engagement extends to events hosted by our Urban Tech Fellows, such as the Pilot Pitchfest and the innovative Metaverse Threat-casting workshop.

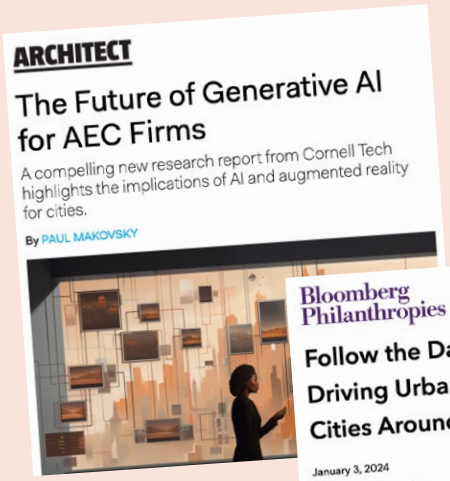
We also collaborate closely with government decision-makers, as demonstrated by hosting an Advanced Research Projects Agency – Infrastructure (ARPA-I) listening session and the NYC Transportation Data Connect Symposium, both of which highlight the intersection of policy, procurement and technology. Our Tech and Innovation Center Series facilitates a national dialogue on the role of technology in infrastructure procurement through monthly webinars that bring together government officials to explore technology's role in urban infrastructure planning.

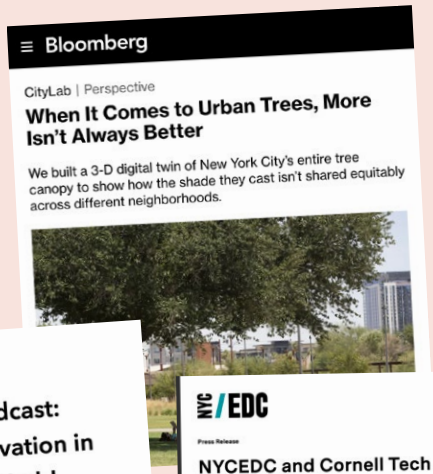
The Hub consistently engages a wide range of stakeholders across NYC's tech ecosystem, integrating applied research, advancing government innovation, and accelerating technology adoption. Through this inclusive and strategic approach, the Urban Tech Hub remains a leading force in shaping the future of urban technology and addressing the most pressing challenges facing cities today.

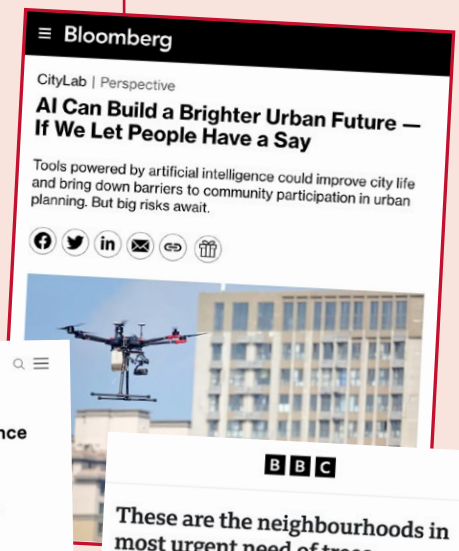
Impact – Urban Tech Hub in the News

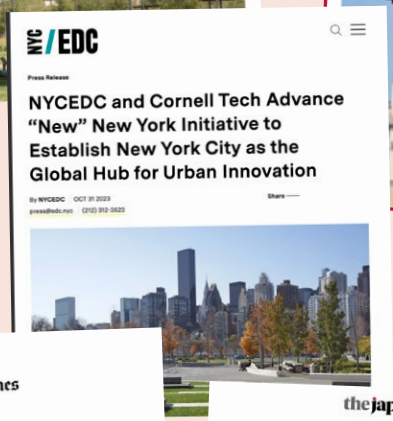
Our research and events reached thousands last year through articles, op-ed and podcasts, from the Japan Times and Bloomberg to the pages of the New York Times and the BBC. Our researchers and Fellows discussed how AI is reshaping urban environments, offering innovative tools to enhance city life and engage communities in the planning process.

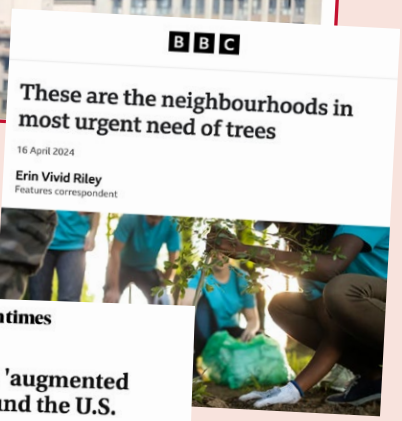
> "The choice for cities and their leaders isn't whether or not to embrace AI's potential. Rather, the choice is what values we impose on the makers of AI, and how we enforce them."

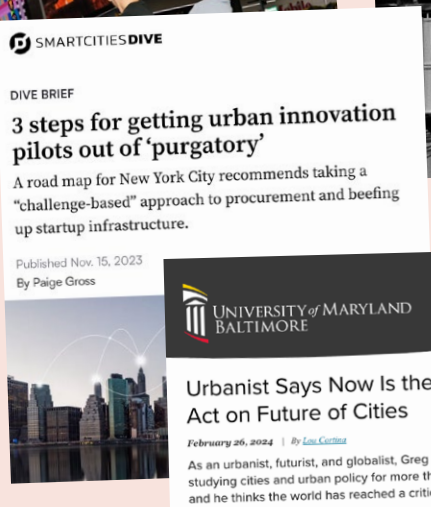


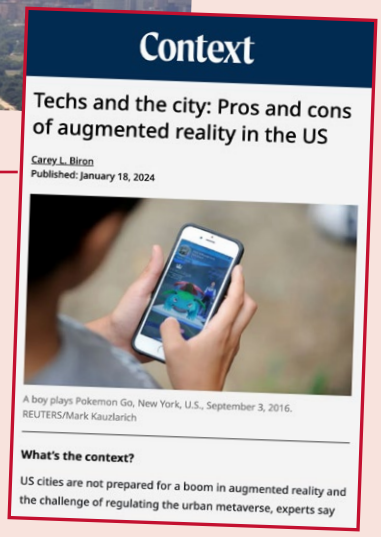












> "Can you put an AR advertisement across the street from a competitor? Will we see a land grab, with multiple overlapping, incompatible realities?"

Urban Tech Summit 2023

Cities: Driving Decarbonization Technology

In a world grappling with increasing carbon emissions and the grim realities of climate change, the 2023 Urban Tech Summit served as a powerful testament to the potential of decarbonization technology in New York City to reshape the future. Last year's Summit, "Cities: Driving Decarbonization Technology," was a dynamic sold-out event, where experts, academics, industry leaders and government officials discussed New York City's cutting-edge climate mitigation projects.

350+ Attendees

52 Speakers

8 Workshops

6 Panels

5 Fireside Chats

3 Keynotes

12 Climate Innovator Showcases

Day One of the Summit explored strategies for creating practical climate solutions in New York City. The Summit commenced with an opening Keynote by President & CEO of New York State Energy Research and Development Authority (NYSERDA) **Doreen Harris**. "As a general matter, there can be no better time for an energy agency to be focusing on the topic of innovation," Harris said, emphasizing the important role of innovative energy projects in creating climate solutions.

During the Summit, attendees participated in Climate Innovation Workshops including the "Act Now: Future Scenarios and the Case for Equitable Climate Action" led by Strategy Senior Manager at Monitor Institute by Deloitte **Jennifer Holk** and Climate Fund Program Manager at CIV:LAB **Vijayta Rao Narang**. This workshop delved into climate injustice – envisioning a future where everyone is impacted by climate change.

Other discussions revolved around strategies for achieving the ambitious goals outlined in New York City's Local Law 97. Topics included the development of new materials like calcium and magnesium to reduce carbon emissions in construction, workforce training for new decarbonization technologies, and discussions on AI and the privacy risks associated with data sharing.

Climate Innovator Showcases featured insights from climate and urban solution pioneers, including **MIMiC Systems, Brooklyn SolarWorks, Impulse Labs, Circuit Transit**, and Cornell Tech's own **Trash Bots**.

Day Two of the Urban Tech Summit explored the critical intersection of government, climate action, and technology. The morning's fireside chat with Head of Government Innovation Programs at Bloomberg Philanthropies **James Anderson** set the tone for the day, emphasizing the need to prioritize public practice and problem-solving.

Throughout the rest of the day, attendees engaged in programming that provided actionable insights into accelerating climate tech in the City. The Climate Innovation Workshop "Accelerating Hardware Climate Tech in New York City," for example, led by Senior Vice President of Green Economy at NYCEDC **Nse Esema**, Manager of Innovation at NYSERDA **Richard Bourgeois**, and Economic Development Project Manager of Offshore Wind at NYCEDC **Gabe Lefferts**, covered the potential of hardware climate tech in shaping the future of NYC across energy, buildings, and transportation, and demonstrated practical solutions to overcome existing obstacles. Lara Skinner, Executive Director of Climate Jobs Institute at Cornell University highlighted the importance of addressing climate injustice in implementing climate solutions.

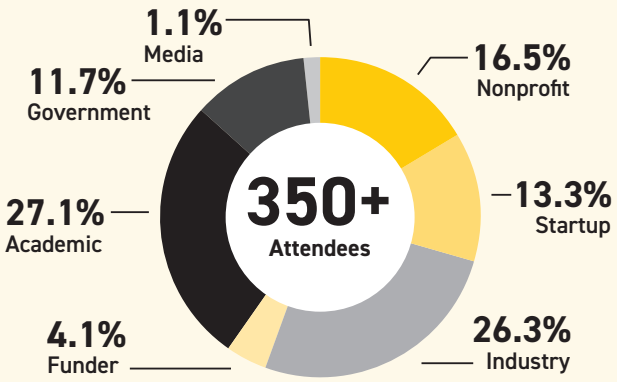
Day Two included discussions on the proper implementation of government policies for effective climate solutions that prioritizes people by including a diverse and skilled climate workforce. Climate Innovator Showcases featured ground-breaking solutions from companies like **Vycarb**, **CarbonQuest**, **Ulama**, **AirCapture**, **Innate Energy**, **MicroEra Power**, and **Thalo Labs**.

The Summit closed with a powerful word from NYCEDC President and CEO **Andrew Kimball**, who reminded everyone of the city government's commitment to building a vibrant, equitable, and sustainable economy in the state of New York.

A Zero Waste Event

With help from our friends at Earth Matter NY, **the Summit diverted 99.99% of discharged materials from landfills,** producing only 0.25 bags of trash. A huge thank you to all our attendees for making the Summit a true zero waste event.

Attendee Metrics



> "We have two crises...we have the climate crisis and we have a crisis of inequality. And as we take on climate change we need to make sure we're also creating a more fair, just, and equitable economy. Part of that is making sure that we have good paying jobs that bring people into them."

— **Lara Skinner**, *Executive Director, Climate Jobs Institute at Cornell University*

> "NYC is the second largest tech sector in the country ... We aren't just a center for tech with great tech companies and great tech employees. But we are a center for the implementation of technology for solving social problems."

— **Maria Gotsch**, *President & CEO, Partnership Fund for New York City*

November 19th & 20th
The Urban Tech Summit 2024 edition
"Intelligence for Climate Adaptation"

Visit **urbantechsummit.com »**

Government leaders from across the country shared valuable insights on the role of technology in infrastructure projects during our Tech & Innovation Center Series

Local Infrastructure Hub – Tech & Innovation Center Series

The Tech & Innovation Center (T&IC) Series is dedicated to assisting local leaders in navigating the wealth of information provided by the federal government regarding the expanded funding opportunities available through the Bipartisan Infrastructure Law. Launched in November 2022, the T&IC Series delves deep into technology opportunities, associated risks, and critical open questions pertinent to federal infrastructure funding opportunities.

These webinars offer participating cities comprehensive insights into the specific technology-related issues and opportunities for federal funding opportunities, featuring expert presentations on topics of broad relevance to cities' proposed projects. They also facilitate discussions on cities' existing technology readiness, illustrating the utility of a tech maturity framework as a tool for assessing and enhancing project proposals.

Furthermore, cities gain insights into integrating and sharing knowledge about cross-cutting technology and opportunities for public engagement. This knowledge empowers cities to leverage technology more effectively to enhance community involvement throughout all project phases, from proposal development to project delivery and evaluation.

2024 update

Now in its second year, the Hub continued co-producing with U.S. Digital Response (USDR) webinars where key insights were shared on urban infrastructure and technology initiatives funded through the Bipartisan Infrastructure Law, Inflation Reduction Act, and other federal programs. These sessions highlighted significant advancements in energy efficiency, urban resilience, cybersecurity, transportation innovation, and broadband deployment.

Some sessions last year included:

Energy Code Updates: The U.S. Department of Energy emphasized the importance of updating state and city energy codes to reduce CO_2 emissions from buildings, which contribute significantly to global emissions. Cities like Fort Collins have successfully led the way by adopting advanced energy codes and collaborating with state governments to access federal funding for these initiatives.

Urban Resilience with Digital Twins: Austin, Texas, demonstrated how "digital twins" – 3D models of urban systems – can enhance resilience by helping cities identify vulnerabilities and optimize resource deployment before, during, and after crises. These digital tools are being used to model air quality and emergency response scenarios, showcasing the potential of advanced simulation technologies.

Cybersecurity for Cities: As city governments increasingly face sophisticated cyber threats, sessions focused on the need for local governments to leverage federal and state resources, develop creative workforce pipelines, and integrate cybersecurity into their financial planning. Cities like Boston and Dallas shared strategies for improving cybersecurity practices and resilience.

Transportation Innovation: Federal funding under the Advanced Transportation Technology and Innovation (ATTAIN) program is driving safer and more efficient transportation in underserved areas. Programs like the Southern California Mobility Wallet aim to simplify transit access through integrated payment systems, while emphasizing customer-centric design and persistent efforts to secure funding.

Technology Pilots and Scaling: The importance of technology pilots in paving the way for larger infrastructure projects was highlighted, with insights from Long Beach and the Port Authority of New York and New Jersey on how to successfully pilot, evaluate, and scale innovative technologies.

Zero-Emission Buses: Cities are using federal funds to invest in low- and no-emission buses and related infrastructure, such as charging stations. These investments not only advance sustainability goals but also create opportunities for workforce development in transit mechanics and related fields.

Safe Streets and Roads: New data capture technologies, including cameras and LiDAR, are being used to monitor and reduce traffic-related incidents, with the potential to significantly improve street safety. However, cities must also be prepared to address privacy concerns and enhance their data management capabilities.

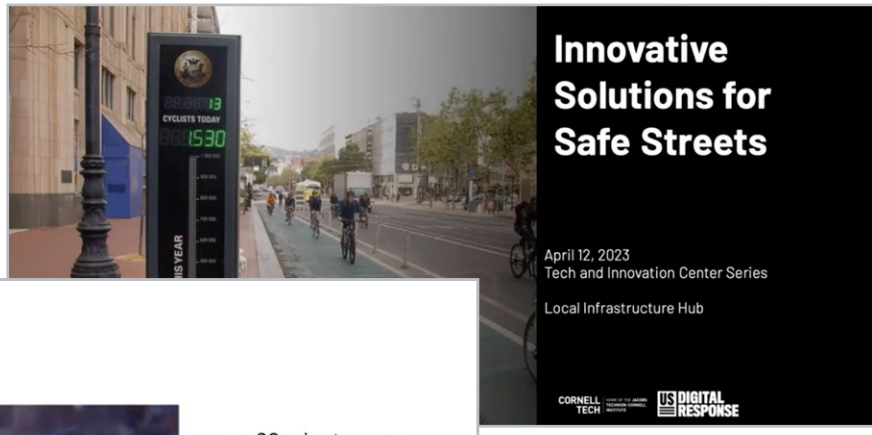
Broadband Expansion via Microtrenching: The deployment of broadband infrastructure through microtrenching offers a faster and less disruptive method for installing utilities. However, this approach requires careful management to avoid potential vulnerabilities related to traffic loads and environmental factors.

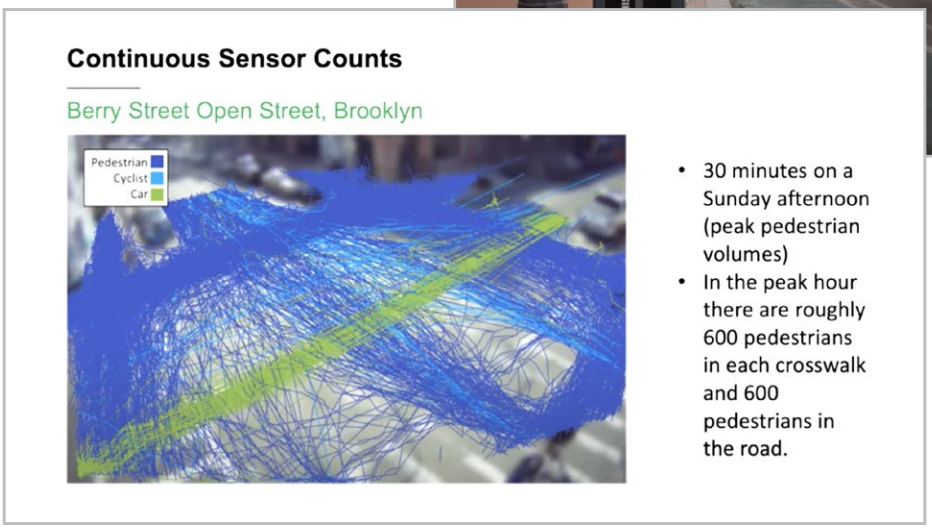
These discussions underscore the critical role of federal funding and innovative technologies in advancing urban infrastructure, improving resilience, and enhancing the quality of life in cities across the United States.

The T&IC Series is funded by Bloomberg Philanthropies, The Ballmer Group, Emerson Collective, Ford Foundation, and The Kresge Foundation to help cities. The Urban Tech Hub and USDR are joining The United States Conference of Mayors, National League of Cities, and Results for America in delivering Hub content.

> "The sensors we're trialing right now capture up to nine different vehicle types from pedestrians cyclists mopeds stand-up scooters seated scooters to capture what's going on and how people are are maneuvering...we hope to deploy a network all across the city to give us really robust information about different neighborhoods and to have a better view of the city to better target our our safety projects."

— **Stephanie Shaw**, *Chief of Staff, Office of Street Improvement Programs at NYC DOT*





ARPA-I Listening Tour

On June 14th, 2024, the Urban Tech Hub hosted the sixth and final workshop of a National Listening Tour in support of the newly-formed Advanced Research Projects Agency – Infrastructure (ARPA-I). Modeled after highly successful federal innovation agencies such as the Defense Advanced Research Projects Agency (DARPA), and similar programs focused on energy (ARPA-E) and health (ARPA-H) sectors, ARPA-I's mission is to fund high-risk, high-reward next-generation transportation technologies that will maintain America's position as a global leader in the sector.

This event brought together transportation infrastructure innovators from across the Northeast from government, industry, academia, and advocacy to focus on setting priorities for the newly formed ARPA-I. Following a welcome by Robert Hampshire, Deputy Assistant Secretary for Research and Technology at the U.S. Department of Transportation and Dr. Chris Atkinson, Deputy Director for Technology, ARPA-I, participants engaged in a day-long series of breakout sessions homing in on innovation topics ranging from new sources of data to advanced modeling.

Robert Hampshire, Deputy Assistant Secretary for Research and Technology, U.S. Department of Transportation. Photos: U.S. DOT

Pilot Pitchfest

In December, Urban Tech Fellow Cara Eckholm hosted a PilotPitchfest, inviting New York City agencies and researchers to deliver quick, low-stakes, two-minute pitches on innovative projects to be executed in 2024. Open to any New York-based researcher or government agency employee, the event brought together 260 attendees, who witnessed 30 different pitches, competing for a share of $80,000 in prize funds and co-hosted by NYCEDC and Cornell Tech.

The event culminated in the selection of two impactful projects launched in Summer 2024. One project, led by NYU in collaboration with the NYC Department of Transportation, focused on using computer vision to automate bike lane inspections. Another project, led by Brooklyn College and NYCHA, explored validating the impacts of leaf mulching on urban soils.

NYC Transportation Data Connect Symposium

The NYC Transportation Data Connect Symposium, held on January 24-25, 2024, brought together transportation experts from City and State agencies, consulting firms, tech companies, and academia to explore how established and emerging technologies can accelerate New York City's processes and unlock the potential for more projects to move forward. Co-organized by Urban Tech Fellow Paul Salama and the Mayor's Office of Policy and Planning, and hosted at the Microsoft Garage, the symposium facilitated cross-sectoral dialogue that identified key improvements to transportation analysis, planning, and review.

On Day 1, presenters discussed opportunities for using big data, computer vision, and AI, among other technologies. On Day 2, working groups identified challenges and proposed solutions for issues such as integrating new technologies, probe data use and validation, and streamlining existing processes. The event's collaborative format laid the foundation for the 21 recommendations in the *How NYC Moves* report, providing a roadmap for applying technology solutions to New York City's unique transportation context.

Metaverse Threatcasting

Urban Tech Fellow Greg Lindsay convened a cohort of current- and former public officials, civic leaders, policy experts, and technology practitioners who met virtually over six months in January-June 2023 and finally in person in July 2023 to explore this prompt: *What are future uses of augmented reality in cities, and what are the implications for managing public space and safety?* Using a foresight methodology called "threatcasting," the participants explored potential futures, reflected through stories of diverse individuals reacting and responding to threats and opportunities.

Their responses yielded a trio of threat areas matched with a corresponding trio of opportunities focused on augmented reality's implications for privacy, crime, and communities, along with how to harness this emerging urban tech for public uses. These "findings" were then in turn paired with a set of "flags" – indicators of a threat or opportunity emerging – and "gates," concrete steps to mitigate or accelerate this emergence.

Educate

The third pillar of the Urban Tech Hub's mission is Education, and Cornell Tech provides the Hub with a powerful platform for innovation, not only in technology but also in our educational approach. Our pioneering Master's degree program allows students to design the cities of the future in this dual-degree program that merges technical rigor with urban systems understanding.

The Jacobs Technion-Cornell Dual Master's Degree in Urban Tech provides a comprehensive foundation in how cities function, viewing them as "systems of systems." Students apply machine learning, data science, human-computer interaction, and product design to address complex urban challenges. With a curriculum grounded in computer science and urban dynamics, the program offers opportunities to specialize in areas like urban mobility, resource management, and smart cities, culminating in hands-on experience through building and deploying real-world urban tech solutions.

Master of Science in Applied Information Science (Technion) & Master of Science in Information Systems (Cornell) with a Concentration in Urban Tech

The Urban Tech program affords students the ability to study, create, and deploy a variety of forms of urban tech, with a focus on using digital-related technology to make cities stronger, fairer and more resilient. Students design the future of connected, livable, and adaptable cities while living in the heart of the ultimate urban ecosystem: New York City. Courses show students how to apply machine learning, data science, human-computer interaction, and product design to the social, economic and technical challenges of a city in this transformational program.

As we graduated our third cohort of pioneering students, we saw them go on to work for a range of companies including, startups, consulting practices and government agencies.

Urban Tech students visit Hudson Yards to learn about innovative approaches to energy production and management in the development's cogeneration plant.

> "The Urban Tech program equipped me with the tools to analyze real-world problems, indirectly through class projects and directly by working at the Hub. Hands-on coursework immersed us in the city, where I could evaluate the complex systems at play. I learned how to use technology effectively and ethically to address large scale urban problems – which I now apply in my job daily."

— **Amy Boncelet**, *UT'24 and now Transportation Electrification Data Scientist at ICF*

Urban Tech Courses

Urban Data
Prof. Emma Pierson

This course empowers students by bridging the gap between the data-related questions they can ask and those they have the technical skills to answer. It provides a broad overview of urban data opportunities and challenges, familiarizing students with key datasets and tools for visualization and analysis. Students learn to access, clean, and visualize urban data; apply techniques like regression, clustering, and mapping; and understand principles of "good data citizenship," including bias quantification, privacy, and communication with non-technical audiences. Through lab work and projects, students analyze real-world urban data sources, such as policing, Census, and social media data.

Urban Systems
Michael Samuelian, FAIA, AICP

This course explores the complex systems that shape urban environments, from infrastructure to social and economic networks. Students examine cities as "systems of systems," where interactions between elements create new patterns and challenges. The course focuses on leveraging technologies like IoT, data science, and AI to address sustainability, resilience, and equity. Through readings, case studies, and projects, students learn to map, model, and simulate urban systems, developing innovative solutions for real-world challenges.

Urban Design Strategies and Case Studies
Yaseem Pattie

What is urban design, and how does it impact innovation? In turn, how can innovation, especially in technology, address urban issues? This course explores urban spaces, both indoors and out, including streetscapes, neighborhoods, co-working facilities, campuses, and labs to understand how they affect the ways that people work, live and play in cities.

Smart Cities: Requirements, Ambitions, and Limitations
Dr. Anthony Townsend

The smart cities movement was born during the Global Financial Crisis of 2008, when multinationals slashed spending on IT and governments ramped up stimulus spending. Big vendors like IBM, Cisco, and Siemens seized the opportunity to port enterprise tech to the municipal sector. This course examines the shift from smart cities to urban tech, and the landscape for engineering cyber physical urban systems today.

Discrete Optimization for Urban Planning and Mobility
Andrea Lodi (ORIE, INFO)

The course is organized around five major case studies on the use of discrete optimization and data (AI at large) for smart cities. Namely, 1) bike sharing, 2) bus transportation planning, 3) fairness in ambulance allocation (and police patrol), 4) downed tree reporting (NYC Department of Parks and Recreation), and 5) parcel delivery.

Sustainable Urban and Energy Delivery Systems
Anna Scaglione (ECE, INFO)

This course describes energy delivery infrastructures and their operations, with the objective of identifying roadblocks to a more sustainable system. The course also explores future technologies that apply advances in machine learning and optimization, to curb greenhouse gas emissions, reducing the dependency of the system on fossil-fuel power generators and promoting renewable integration. The models introduced capture electric power demand driven by human consumption in urban environments and key enterprises, the cyber-physical infrastructure to transport electric energy, and how the demand is economically met, by describing how energy markets operate.

Engineering Smart Cities (Hybrid)
John Albertson (CEE)

This course prepares students to tackle the technical challenges to designing and operating smart and dynamic infrastructure systems. Students learn to combine data and models to control overall system performance in the face of uncertainty. The class focuses on smart city infrastructure systems that are self-aware, with continual surveillance of the built and natural environment and an autonomous capacity to control resource allocation. This course builds upon fundamental engineering principles and teaches students to employ emerging sensor technologies, accompanying data analytics, resource demand forecasting, and model predictive control theory.

Atlas of Urban Tech

The Atlas of Urban Tech collects case studies created by urban tech students analyzing how city governments and urban innovators are using digital technology to make cities stronger, fairer, and more resilient. These case studies were created by students enrolled in the "Smart Cities: Requirements, Ambitions, and Limitations" course, taught by Anthony Townsend.

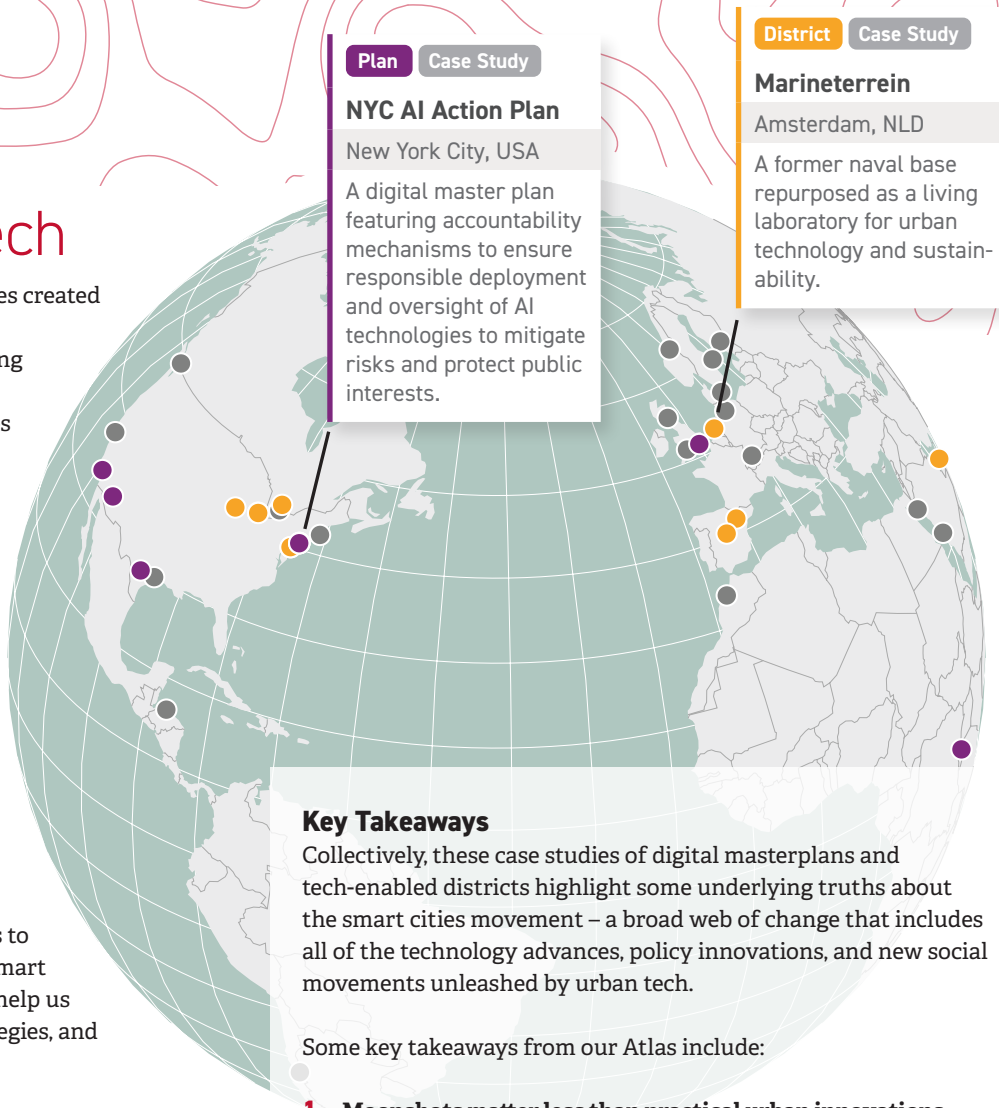
Launched in August 2023 with an initial group of 16 case studies, and expanded in July 2024, the Atlas is fast becoming a critical repository for students, scholars, and global practitioners Currently, the Atlas contains more than 30 case studies from around the world covering two categories of smart city projects:

Digital master plans are comprehensive, long-range plans adopted by municipalities to guide policy, planning, and investment in smart city and urban tech solutions. These cases help us understand the technology priorities, strategies, and interventions of city governments.

Tech-enabled districts are neighborhood-scale real estate development projects that combine buildings, utilities, and digital services to create value for tenants, residents, and visitors. These cases help us understand the opportunities, risks, and rewards facing private sector investors.

Student Contributors (2024): Paige Brown, Leihao Fang, Dylan Hanback, Rajshri Jain, Jacqueline Kim, Haoming Li, Ka Wing Lui, Meet Oza, Aamanya Jinal Palkhiwala, Andrew Park, Linjing Rao, Amit Shanbhoug, Chanan Suksangium, Rowan Wu, Yubang Wu, Shacen (Vera) Xie

> "None of the plans or districts put big bets on a single technology, or do technology for technology's sake. Instead, they strive to define and deliver diverse portfolios of practical innovations that address today's problems now."



Key Takeaways

Collectively, these case studies of digital masterplans and tech-enabled districts highlight some underlying truths about the smart cities movement – a broad web of change that includes all of the technology advances, policy innovations, and new social movements unleashed by urban tech.

Some key takeaways from our Atlas include:

1. **Moonshots matter less than practical urban innovations.** None of the plans or districts put big bets on a single technology, or do technology for technology's sake. Instead, they strive to define and deliver diverse portfolios of practical innovations that address today's urban problems now.
2. **City stakeholders choose which technologies succeed.** The stories we tell about new technologies are full of inevitabilities (e.g. "self-driving cars will cause urban sprawl"). These plans and districts highlight the power that diverse groups of stakeholders have in deciding which urban technologies succeed – by setting priorities, creating incentives and regulating uses.
3. **Cyber-physical integration is hard, but pays off.** Urban tech combines digital technology, the built environment, and human interfaces. Building occupancy sensors are useless if they aren't connected to the building systems. And a smart building's predictive cooling algorithms must account for how people actually move around throughout the day. This integration is hard, and requires collaboration across disciplines and organizations. But it is where the real opportunity for value creation is found.

Visit **atlasofurbantech.org »**

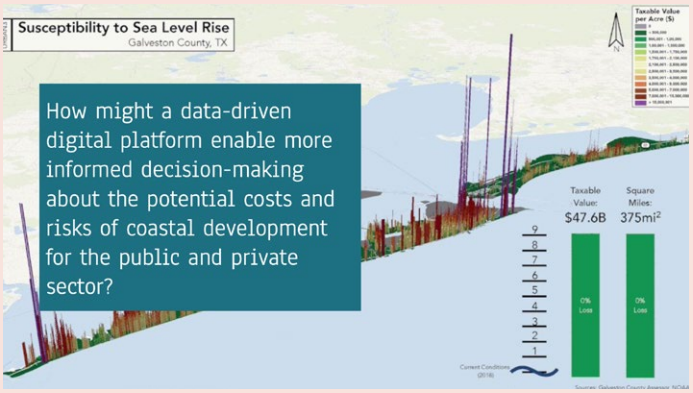
Student Work

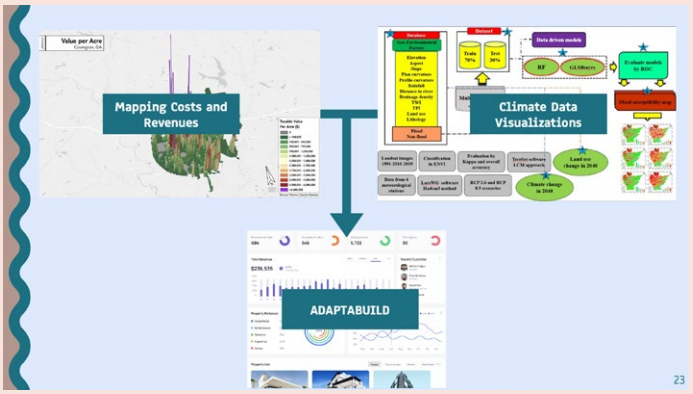
In the core **Urban Systems** course, urban tech students tackle some of the most pressing challenges facing New York City, from flooding to public safety, student teams identify urban challenges and then develop novel technology solutions to address them.

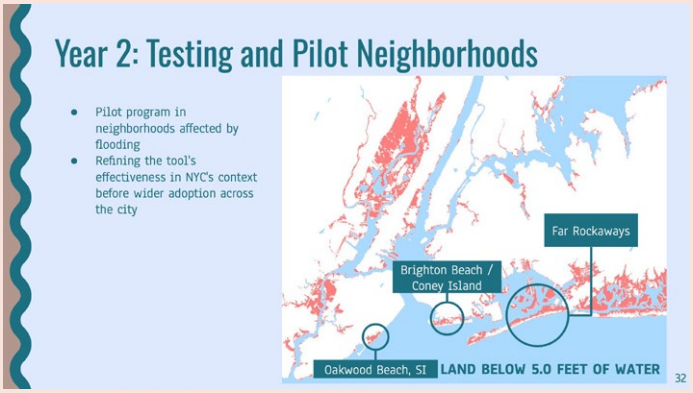
Adaptabuild

Predictive Mapping and Financial Modeling for Resilient Urban Development

Paige Brown, Jackie Kim, Jiayi Li, Thomas Wiener, Rowan Wu



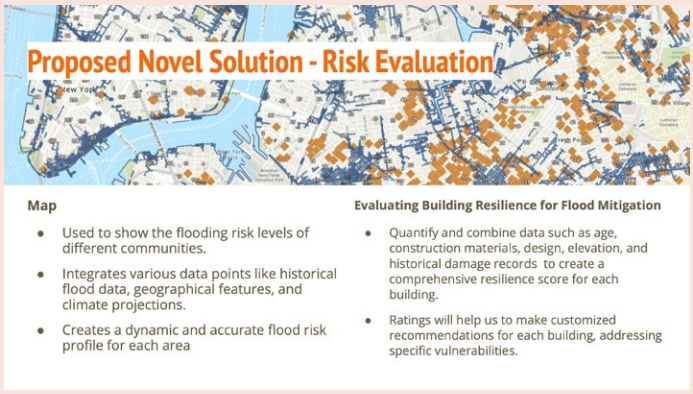




Developing Urban Resilience Strategies through Urban Technology Integration

How Flooding Affects NYC Restaurants

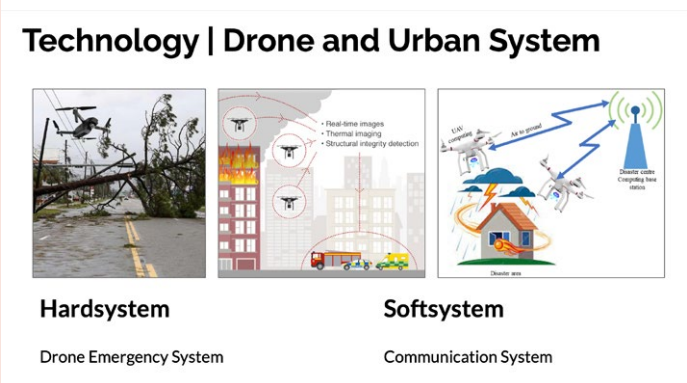
Heitung Sun, Leihao Fang, Nina Wang, Yi Chen, Yingyi Shu

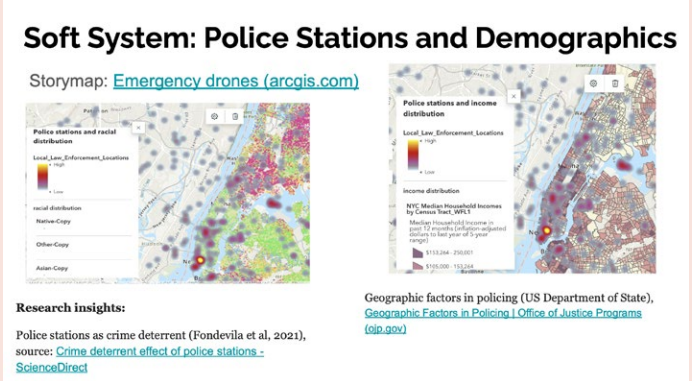


Emergency Drones

How Drones can be used in disaster recovery to support public safety systems

Amit Shanbhoug, Zack Pakin, Andrew Park, Alma Kapan, Ryan Lewis

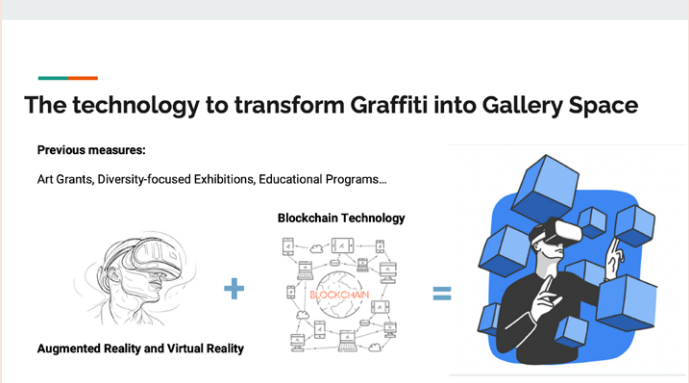


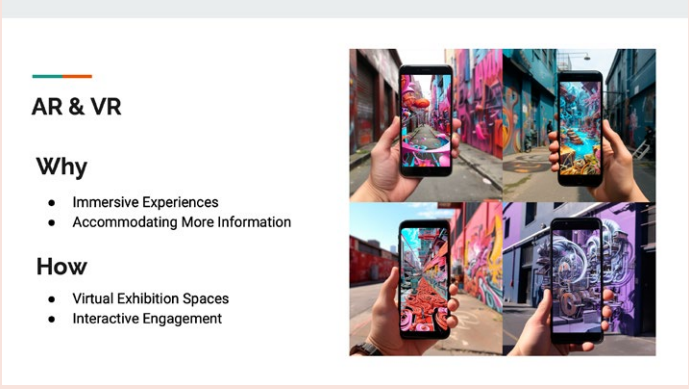


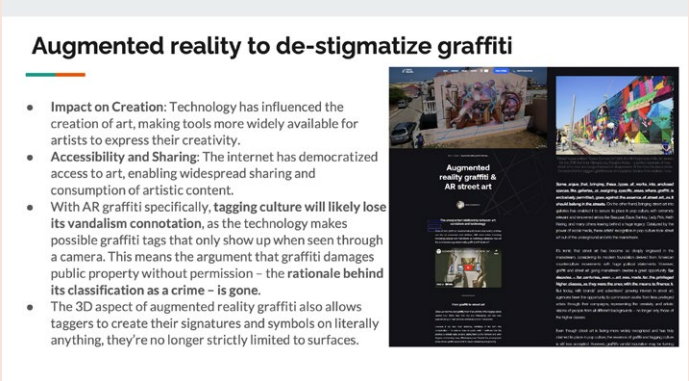
Empowering street art powered by modern tech

How AR technologies can support street artists and expand grass roots cultural systems

Alma Kapan, Chen Chi, Tingrui Zhang, Yingyi Shu







Who We Are

Michael Samuelian
Founding Director

Michael Samuelian is the Founding Director of the Urban Tech Hub and the Director of Campus Planning and Sustainability. 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 of 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.

Anna Scaglione
Director of Urban Tech Master's Program

Anna Scaglione M.Sc.'95, Ph.D. '99 rejoined the faculty of Cornell Engineering in September 2021 as a professor of electrical and computer engineering based at Cornell Tech. Prior to returning to Cornell, she was a Professor of Electrical, Computer and Energy Engineering at Arizona State University. Dr. Scaglione's expertise is in the broad area of statistical signal processing with application to communication networks, electric power systems/intelligent infrastructure and network science.

Anthony Townsend
Senior Research Associate

Dr. Anthony Townsend is a prominent urban planner and technologist, acclaimed for his research on the nexus between urban development and technological innovation. Anthony leads all of the Hub's research initiatives and curates the annual Urban Tech Summit. He 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.He has collaborated with cities, companies, and institutions around the world, paving the way for the next generation of urban innovations.

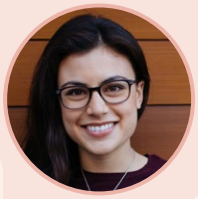
Israel Cidon
Director, Joan & Irwin Jacobs Technion-Cornell Institute

Israel Cidon is a computer networking researcher at the Technion-Israel Institute of Technology, where he was the Dean of the Andrew and Erna Viterbi Faculty of Electrical and Computer Engineering. He has also co-founded several technology companies and worked in research and managerial positions in the high-tech industry.

> "Graduating from the MS in Information Systems – Urban Tech program at Cornell Tech was a transformative experience. I joined to deepen my knowledge in data science, and with the rise of Generative AI, the program became even more rewarding. My work with the Urban Tech Hub and participation in the Future of Urban AI talks allowed me to explore the intersection of AI, smart cities, and sustainability, especially in developing economies. This journey broadened my perspective on how technology can create more efficient and equitable urban spaces."
>
> — **Sourabh Singh**, *UT'24*

2024 Urban Tech Fellows

Vianney Brandicourt



Tara Pham

2023 Urban Tech Fellows

Cara Eckholm

Rasmi Elasmar

Greg Lindsay

Paul Salama

Mirtha Santana

2023 Faculty Collaborators

Nikhil Garg
Assistant Professor,
Operations Research &
Information Engineering

TECHNION

Andrea Lodi
Professor

TECHNION

Emma Pierson
Assistant Professor,
Information Science

TECHNION

Visiting Lecturers

Yasmeen Pattie

Students Coordinators

Amy Boncelet UT'24
Leihao Fang UT'25
Rajshri Jain UT'25
Alina Kapanova UT'25
Jackie Kim UT'25
Ryan Hardesty Lewis UT'24
Andrew Park UT'25
Linjing (Mary) Rao UT'24
Amit Nataraj Shanbhoug UT'25
Yixuan Wang UT'25
Rowan Wu UT'25

Graphic Design

Ben Oldenburg

THANK YOU

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A special thank you to Stephen M. Ross and the Related Companies for their founding and sustained support for the Hub.

Past Supporters include, Mitch Julis, the Tides Foundation, JB&B, Google for Startups and the Alfred P. Sloan Foundation.

The Jacobs Technion-Cornell Institute was established through the generous support of Joan and Irwin Jacobs.


Credit: Max Touhey

What's Next?

Urban Innovation Fellows

The Urban Tech Hub, in partnership with the City of New York, is pleased to announce its inaugural Urban Innovation Fellows program launching this Fall.

The goal of this two-year program is to catalyze a more robust innovation process within New York City government. The Fellowship will recruit six elite Urban Innovation Fellows with tech backgrounds and a breadth of experience in both the public and private sectors to work directly in New York City government agencies to undertake projects that accelerate tech adoption by those agencies. The Fellows will help identify and remove roadblocks that prevent public agencies from more fully leveraging private sector technology solutions, and simultaneously assist startups in working through government procurement processes.

The range of projects the Fellows will work on involve leveraging machine learning, artificial intelligence, and data analysis as well as community engagement and industry outreach in areas relating to the built environment – including transportation, sanitation, sustainability and affordable housing.

Visit **urban.tech.cornell.edu**

Welcome Ashwini Chhabra

We warmly welcome Ashwini Chhabra to the Urban Tech Hub as the inaugural Director of the Hub's new Urban Innovation Fellows Program. Before joining the Hub, Ashwini was the Chief Public Policy Officer of TIER Mobility, a Berlin-based micro mobility operator with operations in over 500 cities across Europe. Prior to that, Ashwini founded Electric Avenue, a NYC-based consultancy focused on sustainable mobility, and also established and led the Policy Development teams at Uber and Bird. He previously also held several positions in transport policy in Mayor Bloomberg's administration.

SCNY Urban Tech Summit 2024

Now in its 4th year, Cornell Tech's Urban Tech Summit returns on November 19-20, 2024, focusing on the theme of "Intelligence for Climate Adaptation." Organized by the Urban Tech Hub at Cornell Tech's Jacobs Institute, this year's Summit will explore cutting-edge artificial intelligence (AI) technologies to create more resilient urban environments.

Over two days, leading experts from industry, academia, and government will discuss how AI and machine learning (ML) can address critical challenges like extreme heat, flooding, renewable energy, building systems, and urban logistics. The event will feature keynote speakers, panel discussions, start-up pitches, and interactive workshops that foster innovation and collaboration among city officials, researchers, technologists, industry leaders, and community advocates working to build stronger, more adaptive cities.