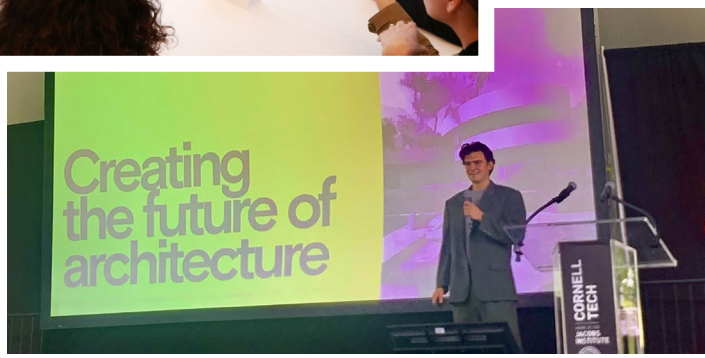
Urban Tech Hub

Annual Report 2023

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

JACOBS INSTITUTE
AT
CORNELL TECH

Contents



> The Hub is the most Cornell Tech part of Cornell Tech, showing students like me how technology can be used for good in our cities. It was the engine of my time in the Urban Tech program, helping me explore and develop my interest in government work. I'm not sure I would have landed my current job at the MTA without it."
>
> — **Preksha Agarwal**, *UT '23*

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

This past year has been one of tremendous growth and expansion for the Urban Tech Hub at the Jacobs Technion-Cornell Institute, where we welcomed a cohort of five urban tech fellows, hosted another successful Urban Tech Summit focused on climate technologies and began to see our impact increase as our public engagement moved beyond the five boroughs.

Since we launched the Hub at the height of the Covid-19 pandemic, thanks to the generous support of Stephen M. Ross and Related Companies, we've developed influential programs that are both accessible and advanced. Over the past three years we have seen dramatic changes in the cities, from the challenges of remote work and increasing inequity to the financial reckoning in the tech industry and the dramatic acceleration of new generative AI tools.

As the world, and specifically cities, adapt to a post-Covid reality, we've developed programs dedicated to leveraging the power of technology to help optimize urban systems, improve government service delivery and help cities adapt to future technologies. Our programs fall within four mission pillars; advancing applied urban research, expanding knowledge through education, inclusive public engagement and supporting entrepreneurialism.

This past year, our research projects included a cutting-edge tool that visualizes the impact of street trees in New York City as infrastructure, a report on how crucial a collaborative approach is to the creation of open source software for cities and a range of important urban challenges raised by our new cohort of fellows.

We are expanding our educational offerings to produce public programs for city leaders across the country through programs supported by Results for America and Bloomberg Philanthropies, including the Tech & Innovation Center Series and curating a course on Data Privacy and Security for Bloomberg's What Works Cities program.

After graduating our second pioneering cohort of students who went on to work as data scientists and entrepreneurs, we welcomed our largest incoming class of master's students this fall.

Looking to the future, we are excited for our next Urban Tech Summit this fall focused on the increasingly crucial role of technology in the decarbonization of cities. Our research will continue to investigate the impact of AI in cities and the role of digital twins in aiding our understanding of how to optimize urban systems.

As I reflect on our three years of growth, change and challenges at the Urban Tech Hub, I am humbled by the people I've met, the research we've explored, and the programs our teams have produced. It's my pleasure to invite you to peruse these pages and get a glimpse of how technology is shaping today's and tomorrow's cities.

Warm Regards,

Michael Samuelian
Founding Director,
Urban Tech Hub

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Given the challenges that the world faces from Covid, accelerating technological advancements, climate change, and increasing inequity, the Jacobs Technion-Cornell Institute's radical approach to experimentation has never been more important. Building on the strength of our Health Tech and Connective Media Hubs, the Urban Tech Hub is our latest effort to increase our public engagement and academic excellence.

My term as Director of the Jacobs Institute is now drawing to a close, and as I reflect back on the last seven years, I am so proud of all we've accomplished during these unprecedented times. We expanded programs while weathering the challenges of Covid, growing the number of Jacobs Masters students to an all-time high of more than 175. We have increased the number of Jacobs faculty from four to twelve, and representative of the unique opportunity of Jacobs, seven of these faculty members have their tenure home at the Technion.

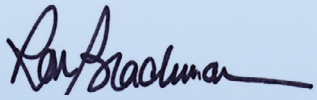
Our partnership with the Technion is stronger than ever, as reflected in our growing annual iTrek program that takes dozens of Cornell Tech students to Israel each January. We continue to host excellent Technion students for summer research experiences, and host numerous other Technion faculty and student visitors here on Roosevelt Island. We had a delegation of seven Technion deans spend a week with us in May, leading to an explosion of new collaboration opportunities.

One of my proudest accomplishments is the launching of our Urban Tech Hub. The strength of the programming of this Hub would not have been possible without an initial grant from Mitch Julis to help plan the structure of the Hub in the first place, and an extraordinary gift from Stephen M. Ross to help build the foundation of its first few years of programming. Many creative and dedicated faculty members participated in the planning process, and we now have several doing an outstanding job of teaching our novel core Urban Tech courses.

It has been an incredible seven years for me here at the Jacobs Institute, and I now look forward to seeing all of the even greater work to come under Michael's continued guidance of the Urban Tech Hub, and now Israel Cidon's leadership at Jacobs.

For my final word, I want to offer my deepest gratitude to Joan and Irwin Jacobs for the enormously generous gift that supported the creation of the Jacobs Institute. None of this would be possible without them.

Thank you!



Ron Brachman
Director, Jacobs Technion-Cornell Institute

CORNELL TECH

This past year has ushered in a profound shift in the public's relationship with technology, especially in the context of artificial intelligence (AI), machine learning (ML) and data science. AI has the potential to revolutionize our society and cities in powerful ways. Here at Cornell Tech, we are at the forefront of driving the AI era towards lasting economic and social prosperity, for New York City and the world. Through applied research, postgraduate education, and innovative startups, we are committed to developing the leaders and technologies that will define the AI era.

Our mission extends to building the essential foundations for emerging digital technologies while ensuring that our research incorporates social considerations. With an educational approach that combines the academic rigor of Cornell and the Technion with New York City's hustle. As always, we remain dedicated to expanding access to the world of technology, a commitment that aligns with Ezra Cornell's visionary "any person... any study..." promise, which has been at the heart of Cornell University for over 150 years.

We are growing our research, our student body and our faculty. We've been honored to welcome six new faculty members who bring expertise in AI, ML and innovative approaches to algorithmic development. Today, we are home to nearly 500 Master's students and over 100 doctoral students. We continue to expand our academic programs and are now offering part time education for the first time, a two-year MBA option and a new Master in Design Technology program.

Our studio-based curriculum continues to create a culture of building products and startups that take on the most pressing challenges technology can address. This past May, four incredible teams of Masters students won our Startup awards with products focused on simplifying ESG certification, facilitating authorization for health care providers, creating generative AI tools for architects and even creating custom-fit bras.

New York City has a powerful, inspiring and growing tech ecosystem that is second to none in talent, grit and creativity. Cornell Tech's mission is to supercharge this growth as the city's center of technological innovation and civic leadership. As we cast our eyes to the future, our vision encompasses more than just academic and research growth, but physical growth as well. I am excited that we are now in the planning stages of a significant campus expansion, ensuring that our infrastructure matches our ambitious academic goals.

Finally, I wish to extend my heartfelt thanks to every member of the Cornell Tech community and particularly the Urban Tech team for your dedication, passion, and perseverance.

Warm regards,

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

Research

The first pillar of the Urban Tech Hub's mission is to expand knowledge and share insights through applied research in cities. Our research is focused on the role that technology plays in optimizing urban systems, how new communication technologies can improve the delivery of public services and anticipating the impacts of new technologies in cities. As data science becomes more central to how cities are managed, understood and experienced, we are excited to be a central voice in this exciting time where data-driven decisions drive the future of our increasingly urbanizing planet.

Over the past three years our research has explored broad topics that help us better understand the field such as the urban tech industry composition in New York City in our Urban Tech Mosaic and foresight into the future of urban tech in our Horizon Scan. But we've also taken deep dives into how new technologies can help us better understand cities at a more granular level, such as our Tree Folio project that looks at the role of street trees as critical infrastructure in New York City and how cities make open source software together in Orchestrated Development.

Our urban tech fellows program is one of our newest platforms for inviting outside voices to campus. Inspired by the landmark Rebooting NYC report by our 2021 senior urban tech fellow Rohit (Rit) Agarwalla, we significantly expanded the program this past year to include five fellows. This cohort broadened our research reach 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.

As we look to the future, we are directing our energy on how cities will adapt to a changing climate, the role of digital twins in understanding the optimization of urban systems and expanding our collaboration with faculty to embrace the Age of AI in urban environments.

Research Approach

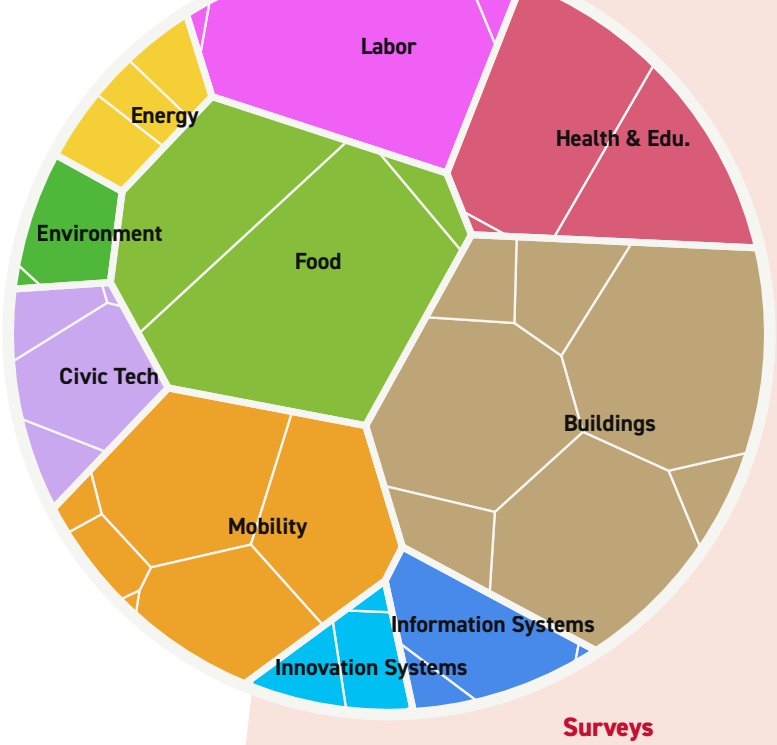
Over the last three years, the Urban Tech Hub has advanced three kinds of research designed to advance the field of urban tech — surveys, optimizations, and explorations.

Surveys document best practices and trends in 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 in this area 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 food. 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.

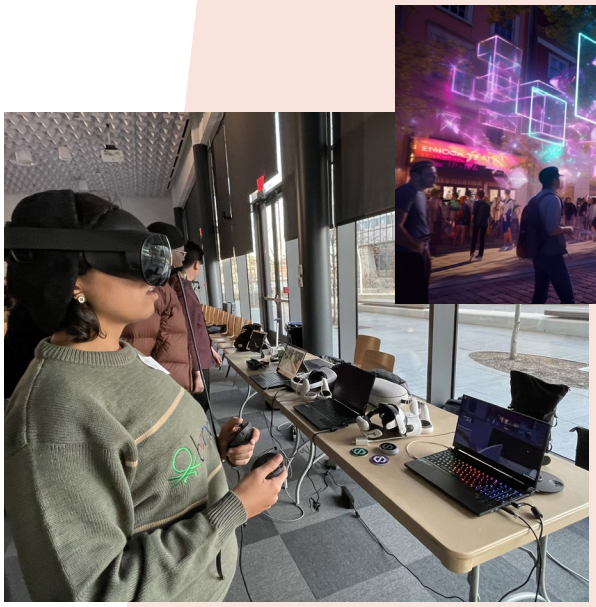
Explorations investigate emerging needs, technologies, and long-range consequences of urban and technological change. Part of this work involves charting anticipated developments across the many sectors that shape the city — transportation, building systems, and energy distribution. But it also requires 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 parallel 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.

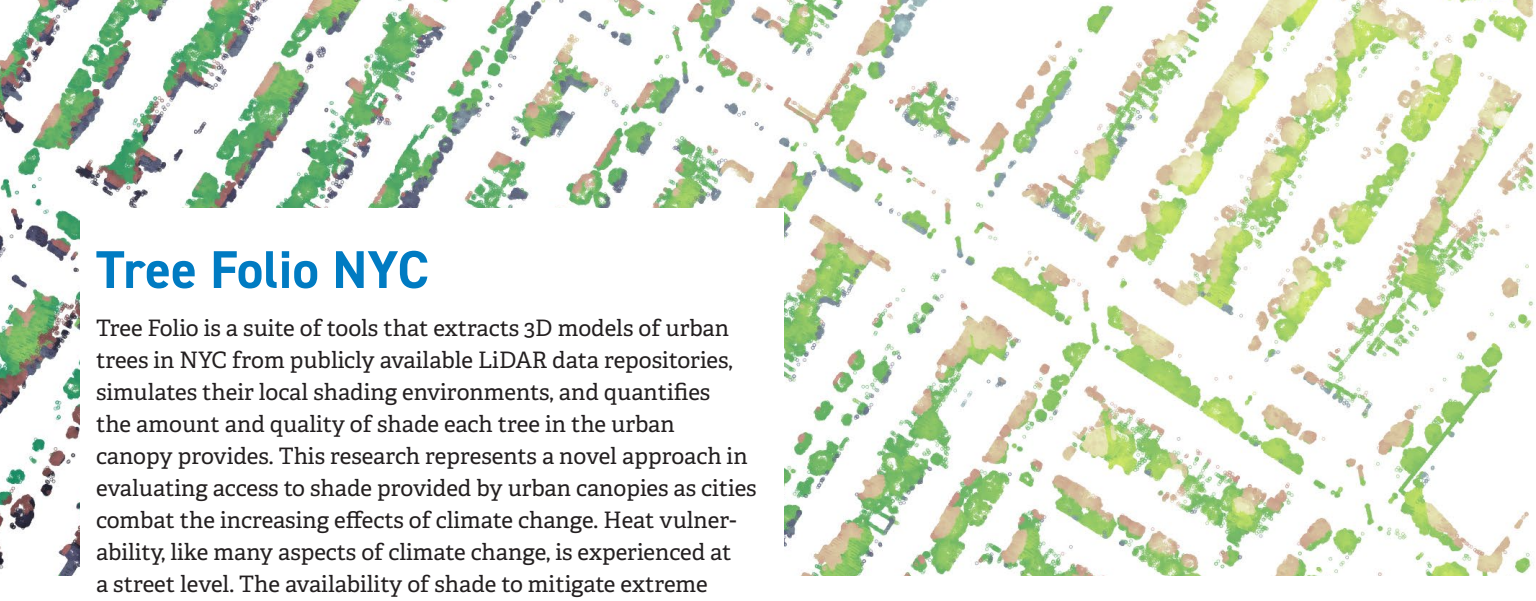


Surveys
The Urban Tech Mosaic: The Systems Powering the Next New York

Optimizations
Rebooting NYC: An Urban Tech Agenda



Explorations
Metaverse Metropolis



Tree Folio NYC

Tree Folio is a suite of tools that extracts 3D models of urban trees in NYC from publicly available LiDAR data repositories, simulates their local shading environments, and quantifies the amount and quality of shade each tree in the urban canopy provides. This research represents a novel approach in evaluating access to shade provided by urban canopies as cities combat the increasing effects of climate change. Heat vulnerability, like many aspects of climate change, is experienced at a street level. The availability of shade to mitigate extreme heat locally depends both on the number, size and quality of trees in a neighborhood and the relationship between trees and the local built environment. Factors including street orientation, street width, and the heights of neighboring buildings can have a dramatic impact on the shading benefits an individual tree provides.

The goals of this research are to better understand current access to shading in New York City, inform future planting strategies to respond to local needs, and visually communicate the benefits trees provide to planners, policy makers, and the public. For all the benefits they provide, planting trees requires money, labor, energy, and community buy-in. Poorly placed trees could have higher failure rates and could fail to deliver the benefits desperately needed by the city's most vulnerable residents.

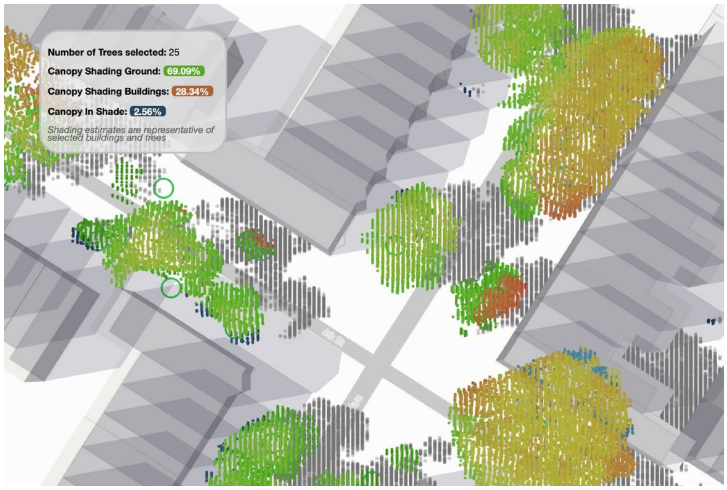
While Tree Folio has focused on New York City, the research has developed tools to extract 3d models of each tree directly from publicly available LiDAR data, simulate the tree's local shading environment, and assemble data sets of the tree models and summarized shading data. As LiDAR has expanded coverage across the US, including most urban areas as of this project, these tools have been built to be available for cities of any size to better understand their urban canopies.

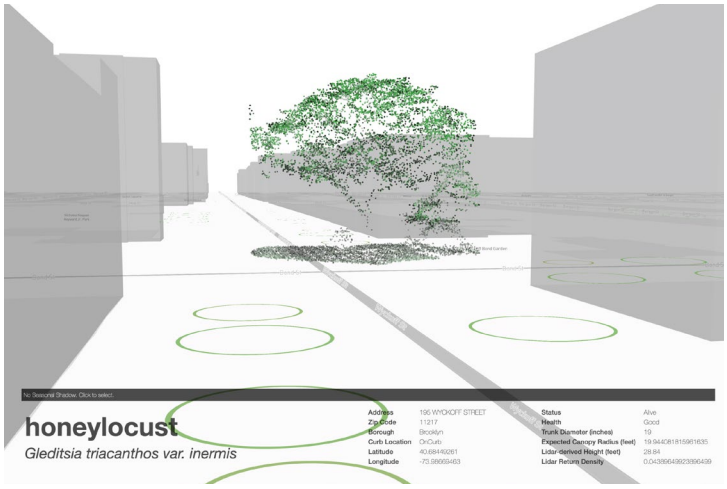
Tree Folio NYC is a research project by the Design Across Scales Lab at Cornell AAP, funded and in collaboration with the Jacobs Urban Tech Hub

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).

For more information on how Tree Folio works, see the "Build" section on page 29.

> "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 »**

Orchestrated Development

Can Governments Work Together to Build Technology?

As cities grow more complex, municipal governments rely on software to manage urban systems, which in turn becomes increasingly difficult to upgrade and maintain. Open Source Software (OSS) offers an alternative in terms of cost and flexibility, but requires enormous efforts to create and deploy. How can governments work together to share this burden? What new tools, processes, and stakeholders are needed to spark, scale, and sustain open source development for cities?

What is Open Source?
Why does it matter for government?

Open Source Software (OSS) is software whose source code is available to the public, allowing anyone to view, use, modify, and distribute the software. For governments, OSS is a great alternative to proprietary software because of its cost-savings and flexibility — OSS can be designed to solve specific government needs.

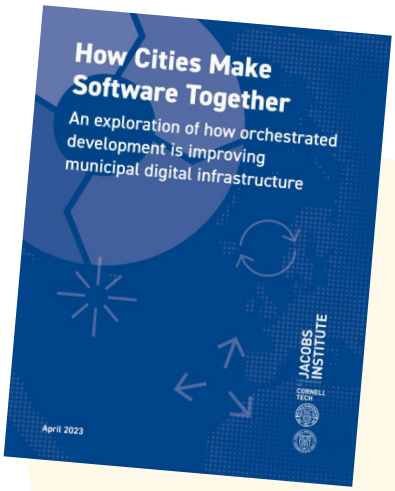
In April the Urban Tech Hub published "*How Cities Make Software Together*" which introduced a new framework that solves for the pitfalls of government developing open source technology. Referred to as "Orchestrated Development", the framework argues that a symbiotic relationship between government and non-profit intermediaries are the key to successful ideation, development, and sustainability of open source software. More specifically, intermediaries can provide specialized technical and governance knowledge to assist governments in increasing their capacity to build technology in-house.

The inspiration behind Orchestrated Development came from the exploration of six case studies of governments and nonprofits successfully cooperating to not only build software, but to ensure that the software continues to be usable long after a formal partnership. These case studies illuminated novel ways governments, intermediaries, and philanthropies leverage their unique strengths to build robust public technology processes.

Ultimately, Orchestrated Development is not just about building new technology; it emphasizes that how we build is just as important as what we build.

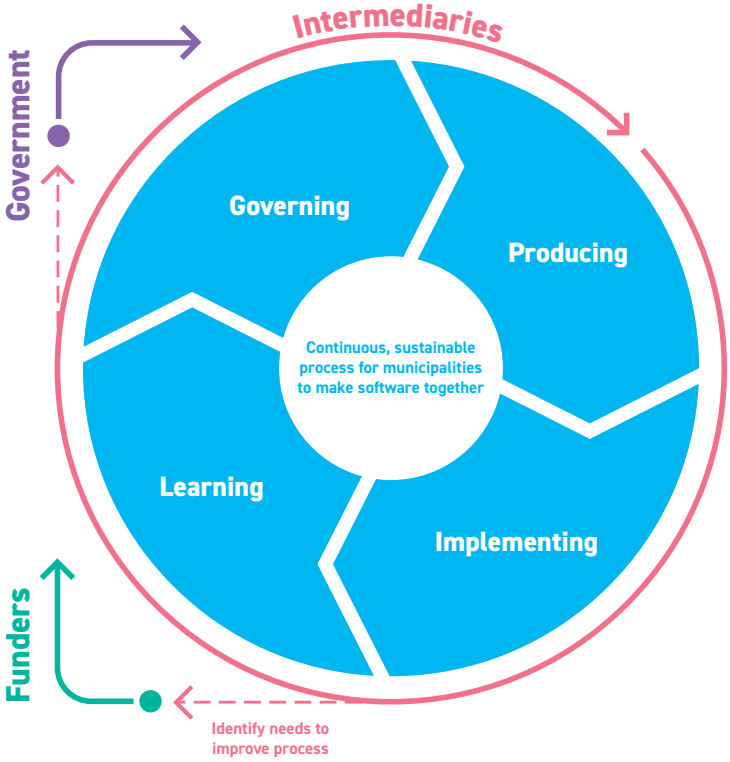
This research was funded by a grant from the Digital Infrastructure Fund, a program of Ford Foundation, Sloan Foundation, Mozilla, Omidyar Network, and Open Society Foundations.

Nneka Sobers, Anthony Townsend



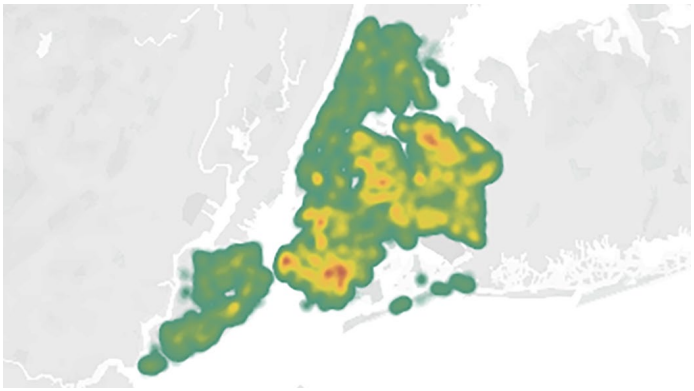
> "Orchestrated Development is not just about building new technology; it emphasizes that how we build is just as important as what we build."

We have identified four common processes that intermediaries direct to help municipalities avoid the pitfalls of traditional open source development.



Faculty Research Projects

As part of our collaborative research approach, the Hub works closely with Cornell Tech faculty who are engaged in cutting edge research in the fields of optimization, computer vision and human computer interaction. These projects complement our overall Hub research by giving us opportunities to go deeper into how technologies can change how cities and urban systems are currently managed and be optimized and improved.



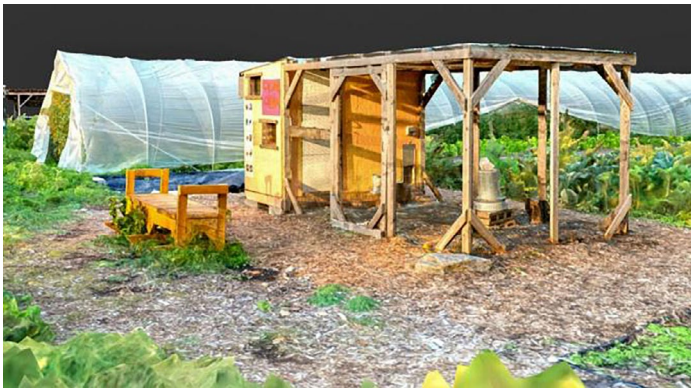
Equity in Residential Crowdsourcing

New York City's 311 system receives more than 3 million requests a year — a rich source of crowdsourced information used to guide municipal decisions both immediate (e.g. which downed trees to clear) and strategic (e.g. which streets to resurface). But disparities in income, education, and social capital mean some neighborhoods are more likely to make more complaints (and receive faster responses) than others. How might city agencies better understand the needs of those who don't complain?

Working with NYC's Department of Parks and Recreation, a team led by Assistant Professor Nikhil Garg (in collaboration with Zhi Liu, Gabriel Agostini, Anum Ahmad, Ben Laufer, and Emma Pierson) aims to quantify these reporting disparities and account for them when allocating resources and priorities.

Using statistical methods to estimate reporting delays in different boroughs and for different types of incidents, the team was able to detect where report times lag across the city. They are currently building a dashboard for NYC Parks staff to visualize response times and reporting rates to help managers understand these disparities and to optimize their operations.

For the next phase, Garg and his colleagues are exploring pairing 311 calls with sensor data to better map flood response and emergency coordination during storms. The ultimate goal is to partner with corresponding city agencies to deploy these tools and study how they impact government service delivery, especially concerning optimizing operations and increasing equity.



Using Sensing and VR Technologies to Support Urban Farming

Urban agriculture promises to expand the selection of fresh, sustainable and affordable produce in local communities, along with offering opportunities for learning skills and forging new connections. There's only one problem: a relative lack of urban farms and corresponding lack of farmers. How might technology provide an introduction to agricultural practices for students unable to visit one easily?

With this goal in mind, a team led by Associate Professor Tapan (Tap) Parikh, Assistant Professor Rajalakshmi Nandakumar, and Associate Professor Noah Snavely set out to use virtual reality (VR) to provide immersive experiences of urban farms and farming practices, bridging the gap for those unable to visit in person. Their virtual farm is modeled on Red Oak Farm in Stuyvesant, NY, combining a 3-D model with embedded videos and gamified elements to educate and engage users.

One of the challenges urban farmers face is degraded soil from decades of industrial contamination. As a separate but complementary piece of research, the team set out to develop an inexpensive and low-power radio frequency-based wireless sensor able to detect metal concentrations (e.g. lead) in urban plots without soil disturbance — a tool with potential for widespread use in city parks, urban gardens, and beyond.

While the VR and sensor projects are separate, the latter offers possibilities for educating students and practitioners about soil health and contamination issues, and helping to scale and share remediation efforts across the city and with environmental justice communities worldwide.

Trashbots

Having successfully deployed a pair of trash barrel robots (a.k.a. "trashbots") in Manhattan's Astor Place last year — much to the amusement and occasional consternation of New Yorkers — Wendy Ju, Associate Professor at the Jacobs Technion-Cornell Institute at Cornell Tech, and her team (led by Ph.D. students Fanjun (Frank) Bu and Ilan Mandel and supported in the field by Melina Tsai, Nicole Shin, and JiaYing Li) have expanded their project to Downtown Brooklyn in order to study how people interact with everyday robotic objects in public spaces. As one might expect, one of their research questions explores whether the 'bots will be treated differently in Brooklyn versus Manhattan.

"What are people's behaviors and attitudes when trashbots first approach them in public?" Ju asks. "How do people's reactions change depending on their behavior and their immediate social environment — such as the number of other people they're with? Do people from different demographic groups and locations treat the robot differently? If so, what are the differences and what are the causes?"

Previously, the team found that New Yorkers perform a complex act of sensemaking when it comes to robots, implicitly making assumptions about their owners, purpose, location, actions, and so on to assess why they are present and how to react. In most cases, passersby assumed the pair of robots were a team behaving as either waiters or pets.

"We found that people had thoughts not only of the robots or the interactions the robots engaged in, but also the role or the idea of the robots, and how other people would respond if they saw the robot, or what the implications on society were," says Ju. "They wanted to understand details about the deployment — are the robots a commercial product? An art project? Public infrastructure? Because having that knowledge would change the way they would interact with the robot."

The next phase of research will focus on expanding this project to all five boroughs in New York City.

Urban Friendly e-Retail

E-retailers face a logistical paradox: urban warehouses should be located as close to customers as possible for timely delivery, but these locations also place hard inventory constraints on the number and selection of products stocked there. What is the optimal quantity and mix of product inventory and urban locations to satisfy local customers, especially as these efforts scale? And how might e-retailers alleviate food- and retail deserts in conjunction with local businesses rather than compete with them?

To this end, Assistant Professor Omar El Housni and Howard and Eleanor Morgan Professor Huseyin Topaloglu (along with student collaborators Yicheng Bai, Sean Michael Xiao, and Yang Song) are designing algorithms to solve the "assortment optimization problem." This entails combining inventory planning and assortment planning to better match supply and demand through personalized recommendations and batching orders for more efficient delivery. One experiment entailed using local retailers as de facto distribution centers to increase assortment and reduce delivery times while bringing small businesses into the fold.

The next phase of research (supported by the NSF) will focus on coordinating strategic and operational decisions such as product design, pricing, and delivery to further streamline e-commerce operations and logistics.

The Next Round of Faculty Seed Grant Awardees

Sustainable Urban Electrified Transportation Service Networks: Cooperative Logistics and Charging
Professor's Anna Scaglione & Andrea Lodi

Quantifying and Addressing Urban Spatial Inequality
Professor's Nikhil Garg & Emma Pierson

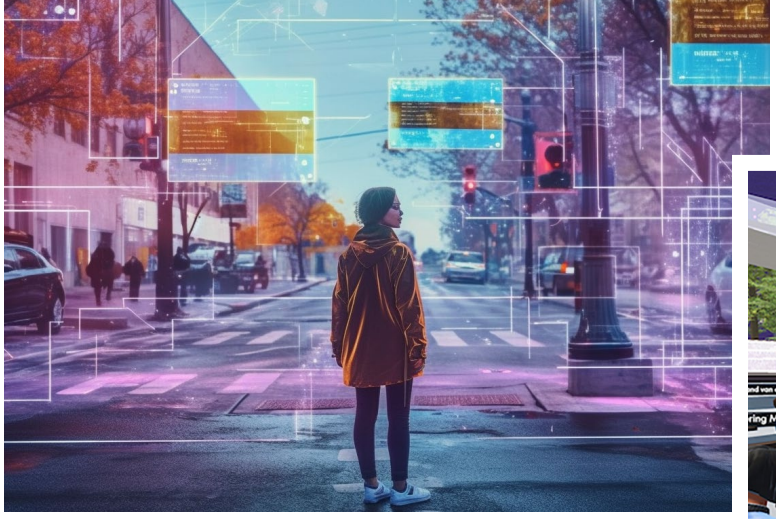
Urban Tech Fellows

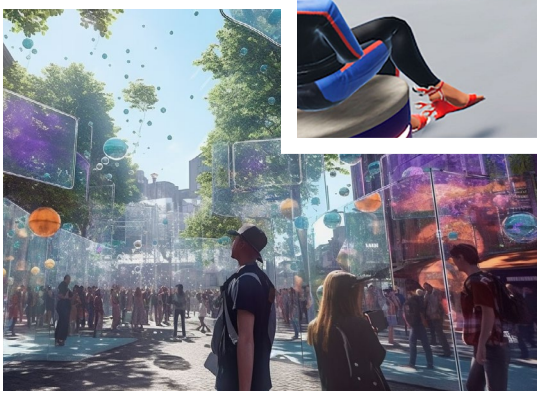
Building on the success of our inaugural urban tech fellow in 2021, Rit Agarwalla, the Hub expanded our fellows program substantially this past year. The goal of our urban tech fellows program is to bring outside voices to campus to expand the reach of the Urban Tech Hub and Cornell Tech beyond Roosevelt Island. This program is an example of the Hub's view of public engagement, as a collaboration that is didactic and inclusive of multiple points of view.

Our fellows are invited to spend a year on campus to explore a topic or issue of how technology can or might address current pressing urban challenges. In addition, fellows also can collaborate with students, faculty and other researchers, bringing fresh perspectives to campus and increasing our internal engagement. In many cases, fellows also worked directly with New York City government and built new Hub connections to public agencies and community advocates.

We were delighted with the range of issues studied, from the tactical problem of integrating technology into existing public intake systems for affordable housing to the future of how cities should address the Metaverse; our fellows hosted events, published oped's and helped advance the role that technology plays in making cities better managed and more equitable.

> "The urban tech fellows programs is emblematic of our mission to bring outside voices to campus, diversify our research and broaden our reach."





Explorations of future public spaces in the metaverse.

Greg Lindsay

Exploring the intersection of cities and augmented reality, bringing together public and private partners to define standards and best practices for safety and equity in a new, more persistent and immersive era of the Internet.

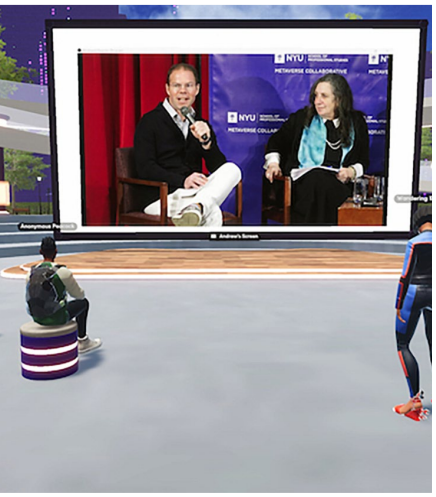
When Pokémon Go briefly became a phenomenon in 2016, thousands of players stampeded through American city parks, trespassed en masse, and may have injured nearly 30,000 people due to distracted driving. Clearly, the return of augmented reality (AR) at urban scale has serious implications for cities. As Apple readies its new Vision Pro headset for launch, how should public officials prepare for another potential wave of disruption?

Greg Lindsay (formerly the director of applied research at NewCities) explored these questions in The Metaverse Metropolis, a six-month masterclass in the policy issues raised by urban AR and attended by a cohort of current and former public officials from across the United States. The series concluded in July with "threatcasting" workshops hosted online and at the Microsoft Garage in Manhattan. Participants found that, left unchecked, AR will become the interface for AI and a host of other technologies used to exploit vulnerable people and communities. But AR also creates opportunities to see cities in a whole new light, and deepen urban experiences.

"How should cities regulate, manage, and encourage technologies that are unrealized or immature — but may have huge consequences down the road?" asks Lindsay. Building staff literacy and capacity is one step, he concludes in his forthcoming report. Understanding how existing rules and regulations might be applied is another. And closely partnering with companies willing to ask permission (rather than forgiveness) is another.

One example of the latter is inCitu, a startup using open permitting data and location-based AR as civic engagement tools to educate and persuade residents skeptical of new development. Already active in New York City, the company is launching this fall in Washington D.C. and Charleston, South Carolina through partnerships with local public officials.

"The Metaverse" may be a dirty word these days, but AR still promises to transform cities in unforeseen ways — with a bit of help from foresight.



A virtual AR workshop embedded participants in the metaverse.

Cara Eckholm

Developing a roadmap for accelerating urban innovation in New York City.

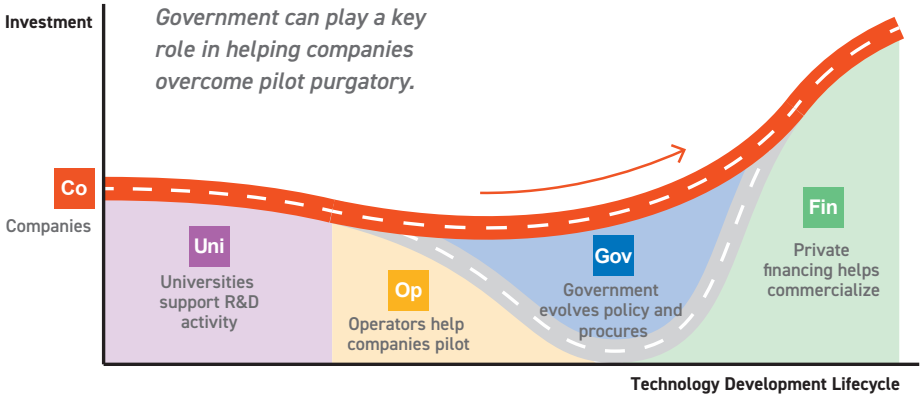
In December 2022, the Governor and the Mayor of New York released the "New" New York plan — an ambitious set of forty initiatives to revive the city after the pandemic. The list included Initiative 31: "Make New York the global hub of urban innovation." The city arguably already had a claim to the title, with the nation's strictest green building code, congestion pricing waiting in the wings, and more than 600 companies applying to pilot products last year, ranging from building retrofits to micro mobility charging stations.

But New York, like its peers, suffers from "pilot purgatory," often moving slowly on awarding commercial contracts and amending policy to successfully scale pilots. Procurement limbo is especially damaging to low income-, minority-, and women-founded companies, who face structural disadvantages in securing private funding. Enter the Inflation Reduction Act (IRA) and its fellow spending bills, which will triple federal funding on technology addressing climate change, with the majority of funds slated for developing and deploying early-stage technologies, with a special emphasis on climate justice.

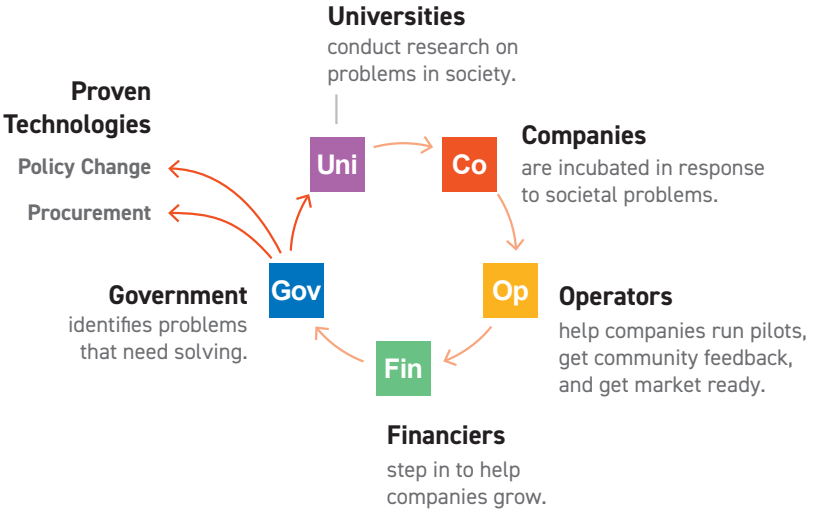
And enter urban tech fellow Cara Eckholm, a member of the "New" New York panel and former climate tech entrepreneur and investor who led a six-month research collaboration with NYCEDC to draft the Pilot: New York City report aimed at solving pilot purgatory. Recommendations include bolstering the city's innovation capacity through closer ties with local universities, modernizing procurement through "challenge-based" methods granting city agencies wider latitude to define the problems they aim to solve, and supporting the creation of a Pilot Network offering a simple, streamlined, and supportive starting point for companies launching in New York.

"By virtue of New York's scale, it has the unique ability to wield its purchasing power to bring new urban climate technologies to market, which benefit New Yorkers ," says Eckholm. "Agencies like the New York City Housing Authority have used this power to great effect, and I look forward to working with the City of New York to help other agencies address pilot purgatory." The final implementation plan and report will be released in Fall 2023.

Government can play a key role in helping companies overcome pilot purgatory.



Urban innovation consists of an ecosystem of five actors: government, companies, non-profit program operators, academics, and financiers. Below is an example of how these actors might work together to propel technologies from idea to mass-market adoption.



Paul Salama

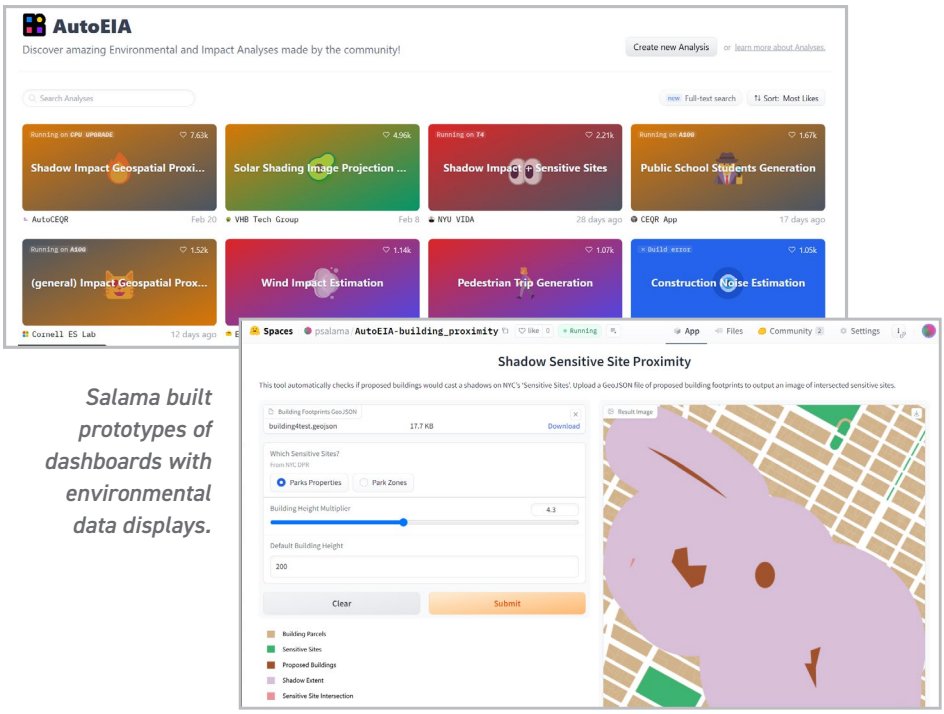
Developing standardized API & framework for environmental impact analyses to modularize & streamline public review processes

There may be no greater impediment to construction and development in the U.S. than environmental impact review regulations, which have become a flashpoint in Congress following the passage of the Inflation Reduction Act and debates over permitting reform. These requirements typically add significant costs and delays to projects — including an estimated 4.5 years for federally-funded projects. But the largest cost may be the untold number of affordable apartments, clean energy projects, and infrastructure improvements that go unrealized because of it.

Environmental reviews often involve repetitive, manual analyses contributing to these delays. Fellow Paul Salama (previously co-founder of the mobility startup ClearRoad) identified a gap in adoption for tech solutions with the potential to automate and streamline environmental analysis. In response, he is designing a platform, dubbed AutoEIA, to facilitate and host a repository of analysis tools, based on (platforms such as) Hugging Face, enabling public sector and consultant end-users to freely mix-and-match software modules to meet their needs.

"We need speed and responsiveness to meet the massive crises of climate and housing shortages..." says Salama, "It's shocking how underutilized established tech is for review processes." He is currently prototyping several shadow analysis modules applicable to New York City's environmental review process (CEQR) as a proof of concept for AutoEIA, with the aim of spinning off this work into an independent project dedicated to building and collecting modules & tools reusable across jurisdictions.

Based on this work, Salama has also been tapped by the NYC Mayor's Office to facilitate an effort to incorporate new technologies into the city's transportation analysis methods, including validating new data sources. Next steps include a workshop in fall 2023, followed by recommendations and a plan of action to be incorporated into the City's CEQR.



Salama built prototypes of dashboards with environmental data displays.

Mirtha Santana

Exploring how we might use technology to improve the experience of New Yorkers applying for public benefits.

The median time required to approve applicants after they've won New York City's affordable housing lottery was 171 days in fiscal year 2022, prompting Mayor Eric Adams to confess at the time, "We did not focus on, did we place people in the housing? That is what we need to focus on. Having units stay empty is not solving a problem."

Since then, the problem has only gotten worse, rising to a staggering 262 days in fiscal year 2023. How can technology help streamline this process for applicants and property owners alike? This was the question fellow Mirtha Santana (previously chief program officer at RiseBoro Community Partnership and now co-CEO of the Health Equity Collective) set out to answer.

> "Building alone will not solve our housing crisis." says Santana "The city must focus on improving our affordable housing leasing process by developing tools that center the user."

Branda Ayo and Yemaya McLaughlin (members of the Task Force) dreaming of a better leasing process.

Through months of research and while working with a Task Force comprised of 6 people with lived experience, she found the biggest hurdle is New York City's failure to design programs with the user's experience in mind — especially for low-income applicants who struggle with the city's paperwork and bureaucracy. As an alternative, she created an interactive questionnaire designed to guide applicants through the approvals process step-by-step using plan language.

"The city must develop tools centering the users," says Santana. "Technology and human centered design can improve the experience of applicants and landlords alike"

Her goal is to further develop the tool for practical use by applicants and anyone else struggling to understand approvals by providing personalized guidance based on their particular step in the process. The site will be released in Fall 2023.

Rasmi Elasmar

Advancing the vision and practice of developing digital public infrastructure by the people, for the people.

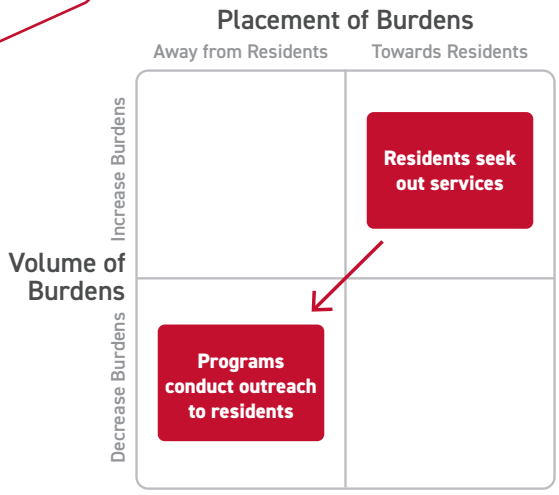
One of the more neglected forms of urban tech are the intake forms, user accounts, and databases that define how residents access critical public services such as food, housing, healthcare, and education. The barriers to discovering, applying for, and receiving such services are opaque to the point of invisibility, hidden in the cracks between incompatible systems.

The administrative burden of navigating these systems through meeting requirements and supplying documentation is typically borne by the user. How might cities reimagine their technological underpinnings to shift these time and psychological costs from residents to city agencies and their partners?

Fellow Rasmi Elasmar has set out to do just that, outlining a series of technical strategies that government agencies can adopt to improve outreach and enrollment in their programs. He has also developed a prototype "digital public assistant" to help individuals quickly navigate and apply for different services, demonstrating what may be possible with changes to governments' digital infrastructure. These strategies rely on the creation of a standardized taxonomy of public service information requirements to enable data portability and integration across programs.

"Because of how these programs are designed, there is an immense burden placed on residents to find and produce information about themselves when applying," says Elasmar. "These burdens often make the difference between whether or not people can put food on the table. While technology isn't a solution in and of itself, it can help shift the burden of information management away from residents to the programs themselves." While this approach does raise questions around data privacy, the strategies Elasmar identified take advantage of information that already exists — albeit scattered across silos — and provide ways for residents to have greater control over how their information is managed and used.

As a prototype, Elasmar is developing a "public assistant" to aid residents in discovering and applying for city services. "These efforts can feel impossible because they require changes in both policy and technology to be effective," he adds, "but they are worth pursuing, because they build a better city for everyone."



Plotting out where and how burdens are "shifted" for each technical intervention.

Engagement

The second major pillar of the Urban Tech Hub's mission is to engage New York City's vibrant tech ecosystem. We bring together diverse voices to identify and address the challenges that cities face today. From hosting on-campus events to strategic partnerships, the Hub works closely with New York's incredible community of tech doers and thinkers from government, academia and industry.

Unlike traditional academic centers, our perspective as applied researchers and educators measures impact not just through scholarly papers but by our voice in op-eds and articles published in influential industry media outlets.

We actively develop accessible tools to increase the public understanding of the role of technology in cities. Engagement with industry ranges from startups to larger tech companies, and we work hand in glove with government and nonprofits.

Our engagement strategy consciously converges with our educational mission. The Hub's public programs are crafted to broaden horizons for government officials, industry leaders and the general public, inviting them to explore the profound impact of technology on urban governance and to envision the positive impacts of future technologies in cities.

Impact - Urban Tech Hub in the News

The research conducted by the Urban Tech Hub garnered widespread recognition, both in digital and in print. Our impact was shared across prominent publications, from the pages of the New York Times and the Washington Post to CNN and Instagram. Throughout the year, our voices shaped the discourse on critical urban matters and technology's transformative role.

We offered insights and opinions on pressing urban issues, ranging from how technology can spearhead the recovery of cities from the impacts of the Covid pandemic to our research on advancing the development of open-source software. Our influence extended well beyond academia and into the heart of real-world communities.

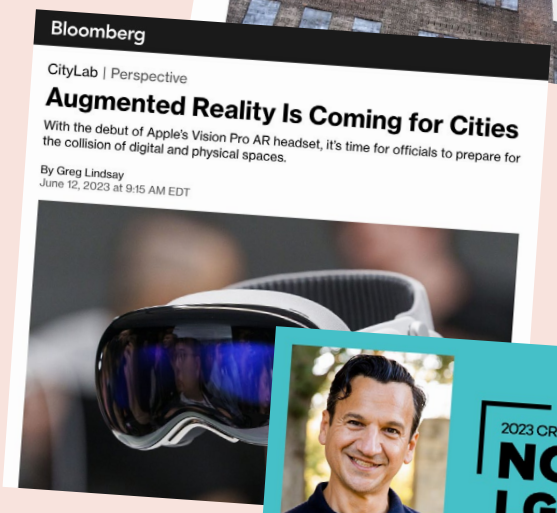
Moreover, we were proud that our Founding Director, Michael Samuelian received public recognition, further underlining our commitment to New York City. Recognized as a Power Player in Sustainability, Energy, and Climate by PoliticsNY.com and celebrated as a Notable LGBTQIA Leader by Crain's New York.


The New York Times

OPINION
GUEST ESSAY

Will Ambitious Plans for a 'New' New York Get Crushed in Albany?

March 29, 2023


Bloomberg

CityLab | Perspective

Augmented Reality Is Coming for Cities

With the debut of Apple's Vision Pro AR headset, it's time for officials to prepare for the collision of digital and physical spaces.

By Greg Lindsay
June 12, 2023 at 9:15 AM EDT


#CrainsNotables

2023 CRAIN'S NEW YORK BUSINESS
NOTABLE LGBTQIA+ LEADERS

Michael Samuelian
Founding Director of the Urban Tech Hub, Campus Planning and Sustainability
Cornell Tech


CRAIN'S NEW YORK BUSINESS

NEWS REAL ESTATE HEALTH CARE POLITICS SPECIAL FEATURES AWARDS DATA & LISTS

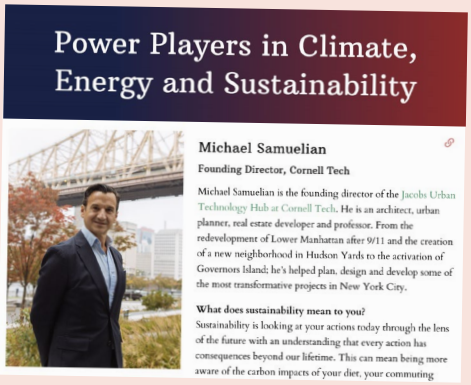
Op-ed: Urban tech can help manage some major local challenges

Michael Samuelian
Anthony Townsend


Gothamist A non-profit newsroom, powered by WNYC.

NEWS

These 'trash bots' have been helping keep Brooklyn's Albee Square clean


POLITICSNY

Power Players in Climate, Energy and Sustainability

Michael Samuelian

Founding Director, Cornell Tech

Michael Samuelian is the founding director of the Jacobs Urban Technology Hub at Cornell Tech. He is an architect, urban planner, real estate developer and professor. From the redevelopment of Lower Manhattan after 9/11 and the creation of a new neighborhood in Hudson Yards to the activation of Governors Island; he's helped plan, design and develop some of the most transformative projects in New York City.

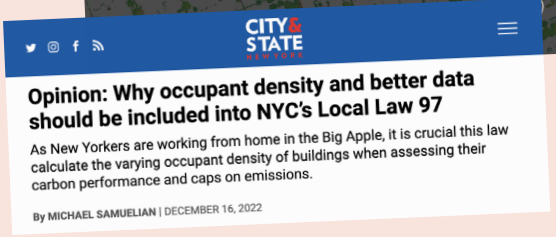
What does sustainability mean to you?

Sustainability is looking at your actions today through the lens of the future with an understanding that every action has consequences beyond our lifetime. This can mean being more aware of the carbon impacts of your diet, your commuting


Cornell University

CORNELL CHRONICLE

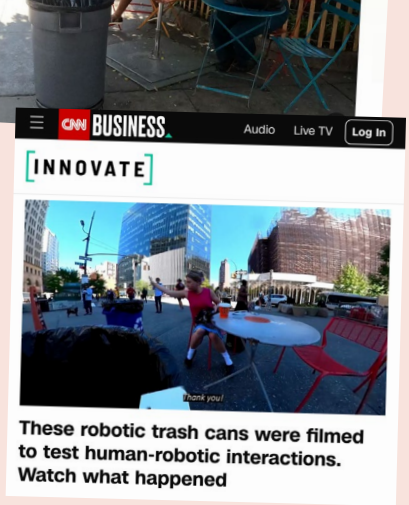
Throwing shade: Model maps NYC street trees' cooling benefits


CITY & STATE NEW YORK

Opinion: Why occupant density and better data should be included into NYC's Local Law 97

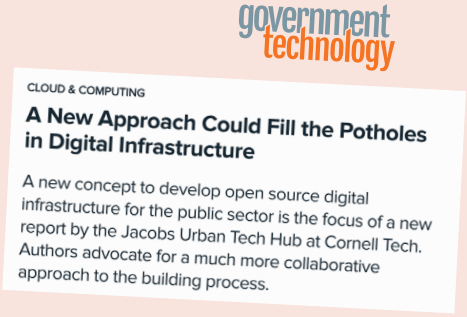
As New Yorkers are working from home in the Big Apple, it is crucial this law calculate the varying occupant density of buildings when assessing their carbon performance and caps on emissions.

By MICHAEL SAMUELIAN | DECEMBER 16, 2022


CNN BUSINESS Audio Live TV Log In

INNOVATE

These robotic trash cans were filmed to test human-robotic interactions. Watch what happened


government technology

CLOUD & COMPUTING

A New Approach Could Fill the Potholes in Digital Infrastructure

A new concept to develop open source digital infrastructure for the public sector is the focus of a new report by the Jacobs Urban Tech Hub at Cornell Tech. Authors advocate for a much more collaborative approach to the building process.

SCNY Urban Tech Summit 2022

Climate Mobilization: The Power of Urban Tech

The 2022 Urban Tech Summit served as a crucial platform for researchers, industry leaders, and government decision-makers to explore the intersection of urban technology and climate action. Over two informative and engaging days, the event dissected various facets of urban tech solutions, from accelerating the transition to renewable energy to fostering climate resilience in cities. The event included diverse panel discussions from a range of stakeholders, engaging climate action workshops and short pitches from entrepreneurs deploying new technologies to address climate change in cities.

The Summit showcased the pivotal role of urban tech solutions in addressing climate change. From renewable energy adoption to sustainable mobility and workforce development, the discussions emphasized innovation, collaboration, and equity as key drivers for meaningful climate action in cities like New York. These insights are vital for shaping urban tech agendas and driving change in the fight against climate change, ensuring a sustainable and resilient future for cities worldwide.

Sessions Included

The Greening of the Grid Challenge: Addressing climate change necessitates a rapid shift towards renewable energy generation, storage, and transmission. This transformation hinges on substantial investments in new technologies. Discussions in this session revolved around the retrofitting of existing infrastructure for renewables and the imperative of collaborative efforts between cities, companies, and local communities.

Technology's Role in a Just Climate Transition in NYC:. The NYC Climate Dashboard, developed by the NYC Comptroller's Office, tracks progress in meeting climate goals while enhancing transparency and accountability to foster a just transition towards a low carbon, resilient city. In this session, discussions revolved around how technology can facilitate these objectives and engage communities for improved climate outcomes.

Empowering Local Climate Solutions: To effectively combat climate change, the innovation ecosystem must empower local institutions, support startups, and establish global innovation partnerships. This workshop explored strategies to harness research and development for climate action.

Climate Tech Financing: As the world's financial capital, New York City plays a pivotal role in raising trillions of dollars to underwrite decarbonization efforts. Investors discussed their expectations, the barriers to increased investment, and the necessary government policies and partnerships to facilitate New York City's transformation.

A Greener New York: Local Law 97: Retrofitting New York City for sustainability is a monumental task, encompassing the reduction of building emissions, repurposing commercial space, and lowering housing costs. Young leaders discussed the technologies, processes, and policies required to achieve these goals.

Urban Transportation and Technology: Electric and autonomous vehicles have promised sustainable urban transportation. This discussion assessed their effectiveness in light of changing transportation trends post-pandemic.

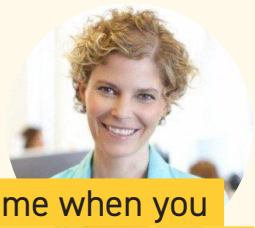
Fireside Chat with Andrew Kimball: Day two commenced with a fireside chat featuring Andrew Kimball, discussing the importance of decarbonizing urban transportation and delivery systems.

Resilient Climate Workforce: The workshop addressed workforce development in the renewable energy sector and the need for education and training to meet growing workforce demands.

Ensuring Equity in Climate Mobilization: This session emphasized the importance of ensuring that urban tech promotes climate justice and rectifies past injustices.

> With what's coming out of the Green Labor Market...we have to be prepared to work with the private sector when these jobs become available."

— **Clare Newman**, *President & CEO at Trust for Governors Island*



> Most of the time when you want to do important things, you have to be uncomfortable."

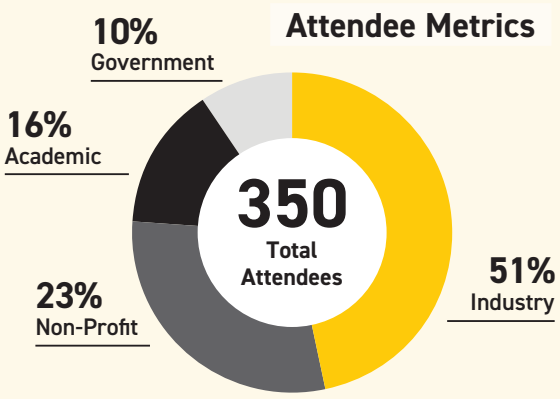
— **Kate Frucher**, *Managing Director | Co-Founder at The Clean Fight*

> I've never seen anything like the quantity and quality that has come into climate tech. We are seeing a whole lot of people moving into this field, which is amazing."

— **Micah Kotch**, *Partner at Blackhorn Ventures*

> When you connect the dots about why someone should care about something then you can help them learn."

— **Tonya Gayle**, *Executive Director at Green City Force*



November 14th &15th - The Urban Tech Summit 2023 edition "Cities Driving Decarbonization Technology"

Visit **urbantechsummit.com »**

Data-Driven Urban Tech

Co-sponsored with Cornell's Center for Data Science for Enterprise and Society, this workshop brought together researchers and practitioners from academia and industry to discuss challenges and recent advances in the field. Panels and presentations showcased how machine learning, optimization and other algorithmic tools can make cities more equitable, efficient and sustainable.

Technological innovations are creating opportunities for cities to rethink the way in which they address pressing and complex challenges. These include: mitigating and adapting to climate change, which has prompted researchers to design innovative prevention tools and disaster relief measures with the goal of making cities more robust; responding to the algorithmic economy, which has revolutionized our interactions with each other in the city; innovations in real-time information to help users' decision-making, including smart infrastructure that aims to create a more sustainable ecosystem; and other developments across mobility, healthcare and, in general, public and private services, including the adoption of autonomous vehicles, computer-assisted healthcare, analytics for water management, robust supply chains, among others. These developments bring myriad new questions around security, privacy, efficiency, equity, and complexity, alongside old challenges in urban planning.

> "This event confirmed the fundamental role that statistical learning and mathematical optimization can and need to play to make our cities more sustainable and simply more pleasant places to live."
>
> — **Andrea Lodi**, *(Co-organizer) Andrew H. and Ann R. Tisch Professor, Cornell Tech*

> "The presentations were extremely interesting and eye opening. PhD and Master students were inspired by the challenges presented by practitioners and the achievements presented by the researchers."
>
> — **Katya Scheinberg**, *(Co-organizer) Professor, Cornell University*

Canadian Technology Accelerator

The Hub was engaged by the Canadian Consulate to be their lead NYC program partner for their Canadian Technology Accelerator (CTA) in the fall of 2022. The CTA "Smart City" program provided extensive support for Canadian "Smart City" entrepreneurs seeking to grow their business in the U.S. The program delivered value through unique, curated access to potential U.S. investors, customers and strategic partners, as well as instigate introductions to sector experts and the "Smart City" ecosystems in the Consulate General of Canada in New York's territory.

Ten participating proptech and mobility companies received extensive background intelligence on the NYC real estate and technology market (including regulatory environments, financing, customer acquisition, and investor attraction), as well as curated connections and dedicated sector experts who will help with targeted introductions and connections.

CityAge: The New Infrastructure

How Tech Can Help New York Build For 2050 (Not 1950)

The Hub was delighted to co-sponsor CityAge New York on campus in December 2022, an event that highlighted the challenges and opportunities that infrastructure provides in dense urban environments like New York. This symposium brought together leaders from the City of New York, the Port Authority, and the MTA, each contributing insights into the future of urban infrastructure. A range of themes emerged from these discussions, most notably the rejuvenation of central business districts through innovative urban design, and the reimagination of urban mobility to align with the evolving demands of a modern city.

CityAge New York further dissected the potential of integrating urban design, innovative technology, and renewable energy systems to achieve the crucial goal of decarbonization by 2050. The discussions underscored the need to foster both digital and physical connectivity to help communities drive forward socio-economic growth. Furthermore, in recognition of the anticipated environmental and socio-economic challenges of the coming decades, the symposium highlighted the urgency to weave resilience into both new construction and legacy infrastructure. As we navigate towards 2050, the conversations at CityAge New York helped to shape a better understanding on how technology and urban infrastructure will sculpt the future fabric of our cities.

Speakers included

Meera Joshi
Deputy Mayor for Operations, New York City

Seth Pinsky
CEO, 92nd Street Y

Rick Cotton
Executive Director, Port Authority of New York and New Jersey

Jamie Torres-Springer
President, MTA Construction & Development

Eric Macfarlane
First Deputy Commissioner, New York City Department of Design + Construction

Sarah Salati
Executive Vice President & Chief Commercial Officer, New York Power Authority

Thomas F. Prendergast
Executive Vice President, AECOM

David Gilford
Head of Policy and Strategic Partnerships, Sidewalk Infrastructure Partners

Jill Lerner
Principal, KPF

Metaverse Metropolis

Our urban tech fellow Greg Lindsay produced a series of events in the spring of 2023 designed to highlight the pitfalls and potential of augmented- and virtual reality at urban scale.

In March, Cornell Tech hosted “Placemaking Across Realities” in partnership with Numena and Spectra Cities, the latter being a startup by Ryan Rzpecki, founder of JUMP, aiming to co-create and prototype urban districts in virtual spaces.

In April, the Hub partnered with New York University’s School of Professional Studies and the Amsterdam-based Sharing Cities Alliance to launch the inaugural Metaverse and Cities Summit. Featured speakers included New York City CTO Matthew Fraser and Foursquare co-founder and chairman Dennis Crowley.

In July, the Microsoft Garage hosted the capstone Metaverse Metropolis Symposium, a half-day conference featuring speakers such as LA Metro chief innovation officer Seleta Reynolds, coupled with a half-day workshop led by the Arizona State University Threatcasing Lab director Brian David Johnson.

Education

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, featuring a unique concentration in urban tech, along with our research and public engagement objectives, underscores the Hub's commitment to revolutionary and inclusive education. This approach is making a significant impact not only across the country but also around the globe.

In May, representatives from the Urban Tech Hub were invited by Bloomberg Philanthropies City Data Alliance to give opening remarks at their meeting of mayors in Baltimore. Urbanist-in-Residence Anthony Townsend presented findings from the Hub's Horizon Scan focused on "Wild & Well: Urban design taps life science to improve well-being."

"At the Urban Tech Hub, I was equipped with a robust foundation to design solutions that elevate city functionality while emphasizing the well-being of its inhabitants. The unparalleled support, connections, and enriching dialogues from academia, government and industry experts have been pivotal in my professional trajectory."

— Sarang Pramode, *UT '23*

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

The Jacobs Technion-Cornell Dual Master's Degrees in Urban Tech provides students from a variety of undergraduate backgrounds a common view of how cities work and vocabulary for thinking of cities as systems of systems. 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 second cohort of pioneering students, we saw them go on to work for a range of companies, from startups to consulting practices and government agencies. We are particularly proud that three of the four Startup up award winners included urban tech students. These new companies include; GAIA, an architecture generative AI company, ESGER, an enterprise dedicated to helping companies navigate ESG reporting requirements. All of these award winners receive $100k in funding to seed their company vision and an extra year here on campus to build their new enterprise in our renowned Runway Spinouts Program.

> "The urban tech program challenged me to think deeply about solutions to problems that impact every aspect of how we live and interact with our environment. Combined with the Urban Tech Hub - which actively engages students in and outside the classroom - Urban Tech at Cornell Tech is building a tight-knit community that I'm thrilled to be a part of."
>
> **— Conor Lyman**, *UT '23*

Student Work

Urban Systems: Hard System Map

Linjing Rao, UT '24

Urban Systems: Strengthening Midtown

Amy Boncelet, UT '24; Kim Sha, UT '24; Yubang Wu, UT '24

Urban Design: TriBeCa, Manhattan

Olena Bogdanov, UT '24; Hau Chu, UT '24; Thomas Wallace, UT '24

Urban Design: Sunnyside, Queens

Amy Boncelet, UT '24; Tsung-Yin Hsieh, UT '24; Sourabh Singh, UT '24

Urban Tech Courses

Urban Data

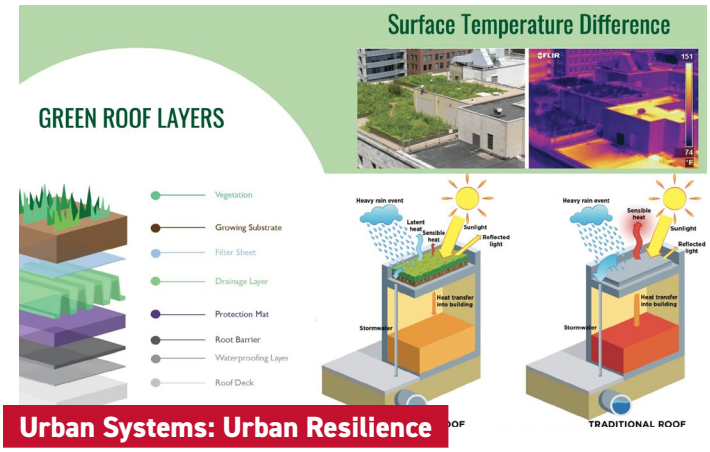
Prof. Emma Pierson

This course empowers students by closing the gap between the data-related questions asked and the ones we have the technical training to answer. The course provides a broad overview of the opportunities and challenges related to urban data and helps familiarize students with key datasets and the tools and methodologies to visualize and analyze them.

Urban Systems

Michael Samuelian, FAIA, AICP

Urban Systems is the study of the elements or agents that make up a city along with their relationships and connections. This course explores how a city is composed of complex interactions of urban systems, ranging from infrastructure and transportation networks to social, cultural and political systems. Students are introduced to the concept of the city as a "system of systems" and the needs of users operating and interacting within such systems.

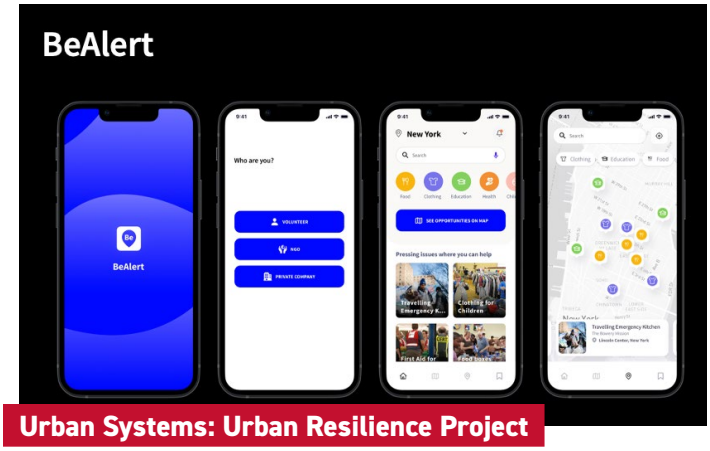


Urban Systems: Urban Resilience

Guangwei Jiang, UT '24; Linjing Rao, UT '24; Matthew Shen, UT '24

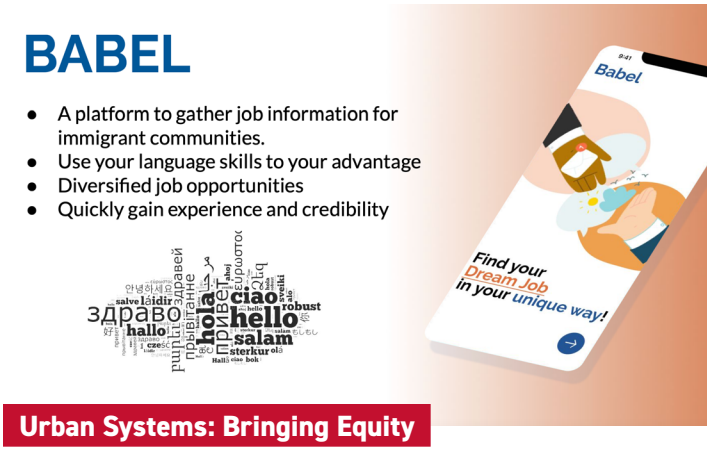
Urban Systems: Urban Resilience Project

Olga Acuña Leanos, UT '24; Hau Chu, UT '24; Tsung-Yin Hsieh, UT '24



Urban Systems: Urban Resilience Project

Olena Bogdanov, UT '24; Sourabh Singh, UT '24; Thomas Wallace, UT '24



Urban Systems: Bringing Equity

Guangwei Jiang, UT ' 24; Linjing Rao, UT ' 24; Matthew Shen, UT '24

Urban Design Strategies and Case Studies

Yaseem Pattie & Steven Stainbrook

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 2007-8, 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.

Politics and Policy of Urban Sustainability

Rohit (Rit) Aggarwala

Cities are increasingly recognized as a key level of government for environmental and sustainability policy. As at all levels, politics and policy are intensely intertwined, and perhaps more so at the local level because the decisions involved often affect constituents directly and intimately — in their neighborhoods, in their homes, in their commutes. This course explores both the politics and the policy of sustainability in the municipal context.

What Works Cities

Urban Tech Hub Prepares Cities With A Digital Rights Approach To Technology

In a new collaboration with Results for America, the Urban Tech Hub hosted a specialized 10-week program for Bloomberg Philanthropies' esteemed What Works Cities Certification initiative. What Works Cities Certification – the first-of-its-kind standard of excellence for data-driven, well-managed local government – recognizes and celebrates local governments for their exceptional use of data to inform policy decisions, allocate funding, improve services, evaluate the effectiveness of programs and engage residents. From topics related to procurement to data management and cybersecurity, cities can take a specialized What Works Cities course to learn how they can enhance their service delivery. To earn What Works Cities certification, cities must master best practices in data privacy, security, and data-driven decision making.

During the course, technology leadership from eight US cities joined the Hub's Nneka Sobers and Meg Young to learn best practices in data privacy, security, and data-driven decision making. With guidance from the Hub's instructors, the participating cities crafted strategies on how to incorporate a digital rights approach to their technology acquisition, privacy, and security practices.

What is Digital Rights?

Digital rights encompass the privileges and responsibilities related to the ethical, secure, and equitable use of digital technologies.

After completing the course, participants were equipped with actionable insights and implementation plans, covering everything from equitable community engagement to agile tech procurement, as well as privacy impact assessment drafts. According to a post-course survey, participating cities stated that they are able to implement 93% of the digital rights best practices they learned in the course between 6 - 12 months after they completed the course.

As a result, each participating city is better positioned to achieve What Works Cities certification and become a leader in digital rights. This marks a significant step toward shaping a more inclusive, ethical, and secure digital urban landscape.

Nneka Sobers, Meg Young

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. Commencing in November 2022 and spanning 18 months, the Tech & Innovation Center 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. Additionally, they 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 effectively to enhance community involvement throughout all project phases, from proposal development to project delivery and evaluation, thereby advancing equity within their communities.

The T&IC Series is an effort 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.

Visit **whatworkscities.bloomberg.org »**

The Future of Urban AI

Global Dialogues on the Future of Urban Artificial Intelligence

In fall 2022, the Hub launched a series of global dialogues on "The Future of Urban AI". This collaboration with Paris-based think tank Urban AI, continues our exploration of the AI trends and signals documented in our Horizon Scan.

Future historians will look back on 2022 as the year deep learning broke out of the box. It had only been a decade since the technology burst onto the scene, when the AlexNet convolutional neural network smashed records in the 2012 ImageNet Large Scale Visual Recognition Challenge (ILSVRC), computer vision's Grand Prix. But despite a rapid spread into every domain of science and industry, deep learning remained behind the scenes, buried deep in the cloud or stashed under the hood of self-driving cars.

The twin bombshells of DALL-E 2 and ChatGPT, released by San Francisco-based startup OpenAI in November, changed all that. Suddenly deep learning was right in our faces. Anyone with a smartphone could order up synthetically generated images and prose, tapping a simulated intelligence with the vast archives of the web at its disposal. With delight, we started to play with these new handheld deepfake factories. But the deep meaning of deep learning could no longer be ignored. It wasn't simply for targeting ads or driving machines down interstate highways. It was for making the culture, in a turbocharged burst of creativity powered by our own natural language.

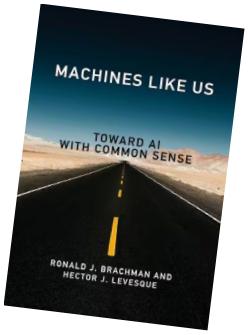
It is, however, still early days. Today, the starting point for an exploration of the future of urban AI begins in what technology forecasters call "the trough of disillusionment", the period after initial hype for a new technology has worn off, and the hard work of putting it to ethical, productive use begins. After a decade of hype about self-driving cars and the growing literature on implicit bias embedded within production AI in the public sector, we are wary. But now we have a much clearer idea about which tools we might develop or use, and where to apply them.

A second season is planned in fall 2023 under the theme "From Big Data to Generative AI", spanning eight sessions ranging from generative AI's use in participatory urban design to algorithms for infrastructure-fixing robots.

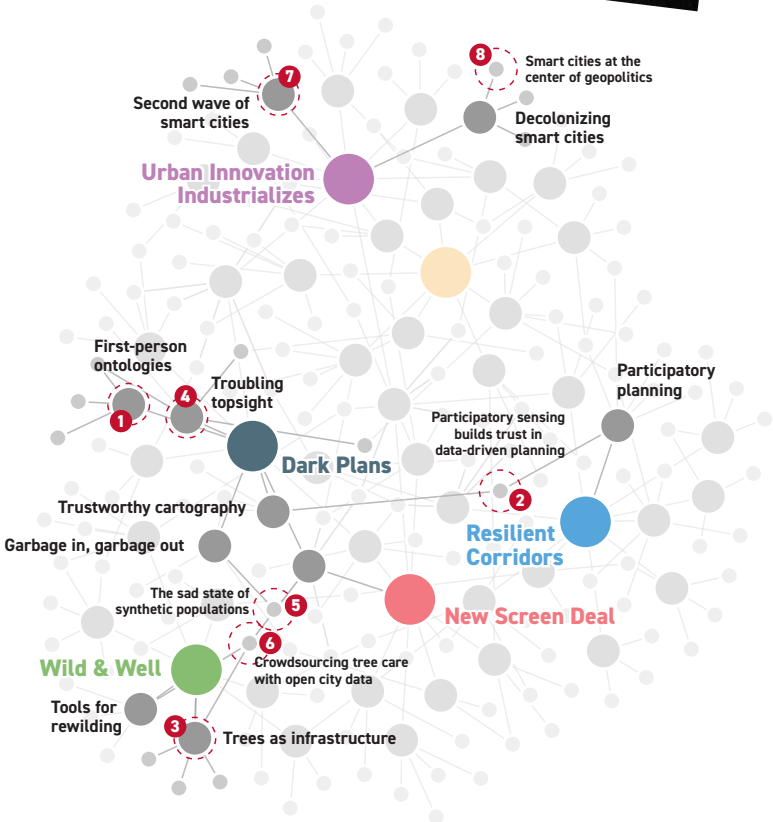
Anthony Townsend

URBAN AI

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



Our own Jacobs Director Ron Brachman kicked off this series with a discussion of his new book "Machines Like Us" where he described the challenges of giving AI "common sense".



2022 Sessions

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

1. AI, Urban Systems and Common Sense
with Ron Brachman (Director of the Jacobs Technion-Cornell Institute at Cornell Tech)

2. Toward participatory sensing
with Kris Vanherle (Co-founder at Telraam)

3. The Quantified Canopy
with Sara Beery (Assistant Professor at MIT, Visiting Faculty Researcher at Google)

4. Cityscope: from Smart Cities to Street Knowledge
with Ariel Noyman (Research Scientist at the MIT Media Lab)

5. Synthetic Populations and the Future of Transportation Modeling
with Arthur Getman (Senior Solutions Engineer at Replica)

6. Crowdsourcing Tree Care with Open Data
with Julia Zimmermann (Research Associate at CityLab Berlin)

7. How AI is reshaping the Urban Environment
with Paul Healy (Principal at Commonweal Ventures)

8. Geopolitics of Smart Cities
with Ana Chubinidze (CEO at AdalanAI)

Build

Combining insightful research with concrete action is at the core of solving urban challenges. At the Jacobs Urban Tech Hub, our existing pillars — Research, Education, and Engagement — lay the foundation for this work. Complementing our existing pillars, we're unveiling 'Build', our newest pillar that captures Cornell Tech's commitment to balancing theory and practice. 'Build' unlocks our team's ability to bring our research to life through real-world digital products. Designed as a collaborative engine, 'Build' emphasizes two key facets: championing startups through Cornell Tech's Studio and Spinouts programs, and crafting digital tools that elevate city systems to be more accessible, inclusive, and responsive.

Startups

Every year, Cornell Tech students prepare for the opportunity to compete for Cornell Tech's Startup Awards. The Startup Awards four student-founded companies $100,000 in pre-seed funding to pursue their startups after graduation. The awards were announced at Cornell Tech's Open Studio, the campus' end-of-year celebration of startups and presentation of cutting-edge research, projects, and companies founded at Cornell Tech. A panel of tech industry leaders and executives, along with members of the Cornell and Cornell Tech faculty and staff, selected the winning student teams. To date, Cornell Tech has created nearly 100 companies through this and our Runway Startups Programs.

This year, 2 out of the 4 winners are companies founded by urban tech students:

GAIA, whose intelligent design tools help architects unleash creativity, design faster, and streamline collaboration

Esger, a SaaS platform simplifying the ESG certification process for small and medium-sized businesses (www.esger.co)

Additional urban tech startups founded by our Cornell Tech alumni and affiliates include:

Aren is an end-to-end AI-powered platform for assessing the built environment which allows data-driven decision-making and risk management, powered by computer vision and machine learning (www.aren.ai)

OnsiteIQ is a Construction Insurtech startup that leverages computer vision and artificial intelligence to provide visual documentation and risk assessment to the construction industry (www.onsiteiq.io)

UrbanMix is a real-estate Project and Portfolio Management software to bring the reuse of existing buildings into the smart city era. It utilizes a 3D Digital Twin with a machine learning engine to simplify workflows, automate decision-making, and increase developers' returns (www.urbanmix.tech)

To date, the 99 startups founded and spun out on campus over the last decade — including Startup Studio Spinouts and the Runway Startup Postdocs at the Jacobs Technion-Cornell Institute — have raised more than $300 million in funding and employ more than 500 people in New York City."

Products

While we champion student-founded urban tech startups at Cornell Tech, the Urban Tech Hub is also developing our own suite of digital tools. We go beyond code to embody a philosophy of building public-interest technology for and by the public sector, and our tools are created from the ground up with a human-centric design and agile development approach.

In building these in-house products, we forge vital feedback loops with government officials, academic researchers, and residents, ensuring technical tools respond to the needs of people who are affected by the urban challenges. Guided by an equity lens, our design process elevates communities often sidelined in tech advancements, making inclusivity a design requirement, not an add-on. We also prioritize responsible innovation, weighing both immediate and long-term social, ethical, and environmental impacts.

In collaborating closely with civic partners, every line of code and design reflects our unwavering pledge: to not just theorize, but to realize transformative approaches of leveraging technology to make urban systems to be cities stronger, fairer, and more resilient.

Tree Folio www.treefolio.org

Tree Folio NYC provides a user-friendly toolset for city agencies and nonprofits to optimize tree canopy management. By identifying trees that are optimally placed for shade provision, as well as those that aren't, it offers actionable insights for improved tree planting and maintenance. The focus on individual trees allows Tree Folio to fit neatly alongside existing urban datasets like infrastructure and mobility, supporting more holistic urban analyses. Tree Folio can also empower neighborhood organizations and conservancies to advocate effectively for local tree canopy initiatives. With LiDAR data from 2010 to the present, Tree Folio tracks urban canopy changes, helping identify consistent problem areas and measure the success of management strategies. While developed with New York in mind, the broader accessibility of LiDAR means Tree Folio's methods hold potential for other cities, regardless of their resource base.

For more information on Tree Folio, see 'Research' on page 8.

OPEN ZONING

Open Zoning

Navigating zoning often feels like a complex maze, leaving many unsure about where and what they can build in their community. These complexities slow the creation of accessible urban development, especially more diverse housing options. Amid our current housing crisis, this predicament exacerbates the 'missing middle' housing gap, curtailing the creation of affordable, multi family homes — key building blocks for vibrant communities.

To solve this crisis, the Urban Tech Hub and Harvard's Graduate School of Design have teamed up to develop a novel zoning tool called 'Open Zoning'. Open Zoning is transforming arcane zoning text into meaningful, actionable insights for everyone, creating a new way forward for the bottom-up response to the housing crisis. Its approach includes building a first-of-its-kind digital bridge between the complex language of zoning regulations and a more understandable visual language everyone can understand. No longer will zoning information be buried in complex legal jargon; instead, we are decoding zoning, making it legible and actionable for everyone - small developers, civic researchers, and policymakers.

To date, we have developed an Open Zoning proof-of-concept that encompasses an open-sourced and machine-readable zoning data standard, paired with an intuitive digital interface. This pairing does not simply translate policy into readable formats but transforms abstract codes into tangible information that makes it easier for everyday people to understand what zoning policies allow in their city.

Open Zoning is a new model for policy transparency and civic action. By focusing on filling the missing middle housing gap, Open Zoning is laying the foundation to support the development of low-scale multifamily housing. With Open Zoning, complex zoning regulations are not just accessible, they are also meaningful.

Who We Are

Michael Samuelian
Founding Director

Michael Samuelian is the Founding Director of the Urban Tech Hub at Cornell Tech 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.

Anthony Townsend
Urbanist-in-Residence

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.

Nneka Sobers
Assistant Director of Product Development

Nneka Sobers is an urban designer and product strategist who strives to help citymakers leverage technology to increase public good. Working at the intersection of urban planning, design research, and civic technology, Nneka takes a systems-level and empathetic approach to developing accessible tools that help connect people to city systems. Prior to joining Cornell Tech, Nneka was a Product Manager at NYC Planning Labs, as well as a co-founder of a civic tech startup that helped low-income communities manage self-organized infrastructure systems powered by a barter-based digital economy.

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.

Ron Brachman
Director (Emeritus) of the Jacobs Institute

Ron Brachman served as Director of the Jacobs Technion-Cornell Institute at Cornell Tech from 2016 through 2023. Before joining Cornell Tech, Brachman was the Head of Yahoo Labs and Yahoo's Chief Scientist. From 2002 to 2005, he was Director of the Information Processing Technology Office at DARPA and prior to that held research leadership positions at Bell Labs and AT&T Labs. Among his many influential writings are a co-authored AI textbook and the co-authored 2022 book, Machines like Us: Toward AI with Common Sense. Brachman has won multiple awards and is a Fellow of AAAI, AAAS, ACM, and IEEE.

2023 Urban Tech Fellows

Cara Eckholm

Rasmi Elasmar

Greg Lindsay

Paul Salama

Mirtha Santana

2023 Faculty Collaborators

Omar El Housni
Assistant Professor,
Operations Research &
Information Engineering

Emma Pierson
Assistant Professor,
Information Science
TECHNION

Nikhil Garg
Assistant Professor,
Operations Research &
Information Engineering
TECHNION

Tapan Parikh
Associate Professor,
Information Science

Wendy Ju
Associate Professor,
Information Science
TECHNION

Noah Snavely
Associate Professor,
Computer Science

Andrea Lodi
Professor
TECHNION

Huseyin Topalogu
Professor, School of
Operations Research
& Information
Engineering

Rajalakshmi Nandakumar
Assistant Professor,
Information Science

Visiting Lecturers

Rohit (Rit) Aggarwala
Yasmeen Pattie
Stephen Stainbrook

Students Coordinators

Conor Lyman
Max Dumas
Preksha Agarwal
Eesha Khanna
Sarang Pramode
Jiahao Dong
Jenny Liu
Linjing Rao
Guangwei Jiang
Sourabh Singh
Vikranth Kanumuru
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THANK YOU

We'd like to thank our new supporters from the past year, including Results for America and Bloomberg Philanthropies.

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

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

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

What's Next?

Welcome Israel Cidon!

We are excited to welcome Israel Cidon as the next Director of the Jacobs institute in August 2023. Israel comes to Jacobs from VMware Research, where he served as Vice President and Researcher working on high-performance, world-wide networks that bridged IoT, data centers, public clouds and more, enabling and optimizing geo-distributed modern applications. Prior to his time at VMware, he worked as a faculty member at The Technion–Israel Institute of Technology, published over 180 peer reviewed papers and served as Dean of Electrical and Computer Engineering from 2006 to 2010.

SCNY Urban Tech Summit 2023

Now in its 3rd year, on November 14th and 15th, we will focus on the NYC Urban Tech Ecosystem's efforts to Decarbonize through new technologies....We are curating a collection of talks, panels and interactive workshops to delve deeply into the three Tracks central to decarbonization; Infrastructure, AI & Data Platforms and People.

Stay Tuned for new Urban Tech Fellows

Building on the success of our incredible cohort of urban tech fellows last year, we will be soliciting our next round of fellows in late fall of 2023. This next group of fellows will focus on climate adaptation and how technological advancements can address the challenges posed by changing climate patterns and mitigate their impacts.

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