

Urban Tech Hub

Annual Report 2021

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



JACOBS
INSTITUTE

AT
CORNELL
TECH @10





Welcome

It's been 10 years since New York City first announced the Applied Sciences Competition to shore up the city's economic health and long-term competitiveness. The establishment of the Cornell Tech campus was a visionary move resulting from that initiative, one that galvanized and reimagined technology research and education for New York and the world.

Our goal is to help create a better tech ecosystem by generating advanced research, businesses, products, and leadership through a new kind of interdisciplinary training. Within 10 years, we have achieved an astonishing amount, including spinning out 73 companies, graduating more than 1,200 students, and establishing an unprecedented international academic partnership with the Technion through the Jacobs Technion-Cornell Institute.

The next ten years present fresh challenges for tech, many of them centered in cities. At Cornell Tech, we are responding with new programs like the Urban Tech Hub, which has already had a significant impact through partnerships with local government, industry, and community organizations.

I am deeply proud of the progress we have made on this campus. As Cornell Tech enters its 10th year, there is much to be proud of and much more to come.



Greg Morrisett

Jack and Rilla Neafsey Dean
and Vice Provost, Cornell Tech

This is an exciting time at the Jacobs Technion-Cornell Institute at Cornell Tech. We were founded on a commitment to address issues that are of the utmost importance to New York City. Now, with a year of the newly launched Urban Tech Hub under our belt, this commitment has only become stronger.

The Urban Tech Hub applies digital technology to improve people's lives in cities. We identify challenges and opportunities, build urban tech engineering solutions, and train the next generation of tech leaders. We enrolled 15 pioneering Urban Tech students to join us last fall, and we are growing the program, more than doubling our student population this year.

This new Hub complements our two other Jacobs Hubs, which are focused on Health Tech and Connective Media. Urban Tech is different, however, in that it is led not by a faculty member, but by a civic leader from the public and private sectors, Michael Samuelian. A generous gift from Stephen M. Ross and the Related Companies has provided us with a robust foundation on which to build our program.

The projects, people and research in this Annual Report reflect our deep commitment to addressing urban challenges during these difficult times.



Ron Brachman

Director, Jacobs Technion-
Cornell Institute

With great challenges come great opportunities, and perhaps there was no more challenging year in recent history than 2020. We launched the Hub at the height of the pandemic in New York, as cities around the world were reeling. At the same time, the accelerated adoption of new digital and communication technologies exposed underlying inequities, including the digital divide in the city.

The mission of the Urban Tech Hub is to bridge government, industry, and academia. Central to our vision for how technology and cities interact is people, and that's why we approach every urban challenge from the perspective of the people and communities impacted.

It is my pleasure to share with you our first year of accomplishments, including our public series "What's Next for Urban Tech?" and our first publication, *Rebooting NYC*. These programs, projects, and partnerships all have one thing in common: they are grounded in the dynamism and diversity that make our great cities greater.

As New York City begins to recover from the COVID pandemic, the Urban Tech Hub will play a central role in shaping a future where new technologies and good urbanism intersect, making cities that are stronger, fairer, and more resilient.



Michael Samuelian

Founding Director, Urban Tech Hub

Mission

We address pressing urban challenges and discover new ways that digital technology can drive solutions and engage thought leaders and communities to realize the positive impact of urban technologies.

What is a Hub?

Simply put, a Hub is a center of activity and experimentation that bridges the gap between academic resources and public needs. At Cornell Tech, the Urban Tech Hub has a threefold mandate: to undertake applied research on urban challenges; to leverage the convening power of a university campus to bring people together; and to educate the next generation of homegrown NYC tech talent.

Hubs are agile and flexible, able to adapt research in response to changing public and industry needs. This flexibility enables the Jacobs Institute and Cornell Tech to remain current even as industry and technology are constantly changing in ways that are impossible to predict.

Urban Challenges

CITIES ARE REBOOTING. We all expected that reopening cities would be harder than shutting them down. But few appreciated just how challenging it would be. In New York City, public transit, housing, schools, retail, tourism, and office life are all still severely disrupted.

Regardless of how long it takes to go back to some kind of day-to-day routine, the virus has permanently reshaped our urban future. It exposed striking inequalities, and vulnerable communities were hit particularly hard. A full recovery means systematically dismantling the biases and blockages that created so much isolation and vulnerability. City governments need a full reboot, running a new batch of code.

URBAN TECH IS REBOOTING TOO. Digital technology has rapidly transformed how we live, work, and play in cities. With software in our pockets syncing everything from taxis to takeout and tango lessons, we've squeezed more desks, beds, and restaurant seats into the same old street grids than ever before, creating astonishing dynamism and untold wealth in the process.

Now, many of these dreams are on hold. Even so, technology will inevitably play a role in building better cities for the future. But the next generation of urban tech must be built on a solid ethical foundation, so it doesn't create new problems or exacerbate the ones it is trying to solve.

The Urban Tech Hub Today

The Urban Tech Hub launched in a year when the challenges of a global pandemic changed life as we know it. Some residents left cities while others took to the streets to protest the murder of George Floyd. Deep-rooted issues of equity and racial justice rose to the surface of daily conversations as people reflected on the systemic problems that predated the pandemic.

Technology played a central role in all of this, for better and worse. The accelerated adoption of digital communications made it possible for many of us to do our work or go to school safely. At the same time, the extent of the digital divide, and the stark human impact of unequal access to these tools, became even more clear.

As we look forward to our second year of operation, cities are slowly reopening and technology continues to play an increasing role in how we manage and live in cities. We believe that the current climate presents unique opportunities to reorient the conversation around urban tech and to emphasize equity and resiliency.

Timeline

Fall

- Established our first Urbanist in Residence, Anthony Townsend
- Welcomed 15 Urban Tech Master's students in 2020
- Held our first public workshop series, "What's Next for Urban Tech?"
- Awarded first external grant from the Sloan and Ford Foundations

Spring

- Welcomed our first Senior Urban Tech Fellow, Rit Aggarwala
- Published first research paper, *Rebooting NYC: An Urban Tech Agenda for the Next Administration*
- Held an interactive tech workshop with the Central Park Conservancy
- Hosted a "Critical Technologies" conference and workshop with the Technion

Research

The Jacobs Urban Tech Hub undertakes applied research projects that focus on how cities can adapt to the accelerated adoption of technologies, while preserving the digital and human rights of their citizens and residents.

Rebooting NYC

In May, we published a draft of our first research project, *Rebooting NYC: An Urban Tech Agenda for the Next Administration*, led by Rit Aggarwala and a team of Cornell Tech researchers.

Rebooting NYC is an applied research initiative dedicated to identifying challenges facing New York City that can be addressed with existing technologies.



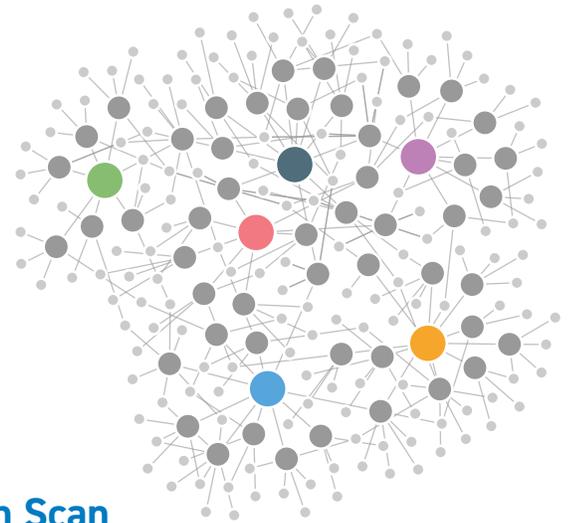
While we know that not all urban problems can be solved with technology, many of them can. But there are significant institutional barriers to adoption of new technologies by city government. It's our hope that the next administration takes on this agenda to improve the performance of urban systems and the quality of life for all New Yorkers.

This report was the product of more than 120 interviews with tech and civic leaders, current and former government officials, and everyday New Yorkers. The interviews focused on challenges that technology can address both in improving the performance of urban systems and in building social equity.

The report focused on five main areas:

- Laying the groundwork by protecting privacy and ensuring the city can implement technology well
- Ensuring that all New Yorkers can participate in the digital economy
- Optimizing urban systems with widely available and trusted technologies
- Expanding the use of digital tools to increase public participation and expand access to government services
- Futureproofing policy to anticipate emerging technologies in advance of their arrival

We are now seeking feedback and conducting further research towards a final version.



Horizon Scan

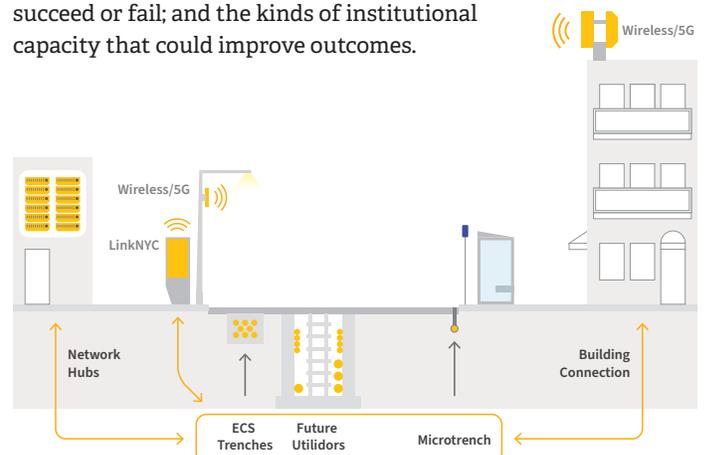
The Horizon Scan is a map of urban tech's potential focusing on six big stories that will shape the decade ahead, authored by Anthony Townsend. It highlights the discoveries and inventions that can make cities more connected, livable, efficient, and accessible—and the risks we must navigate along the way.

Urban tech is a young field, but it is quickly catalyzing a wide range of innovations. As we look ahead at the growing intersection of urbanization and digitalization, our forecasts encompass everything from supercharged infrastructure to deeper privacy concerns, phenomena that will shape the opportunity and risks in the decade ahead for urban tech.

Assessing Partnerships for Municipal Digital Infrastructure

The Urban Tech Hub received its first outside foundation grant from the Sloan and Ford Foundations to undertake research related to municipal digital infrastructure. City governments ensure public health and safety, provide education and transportation, and support businesses and livelihoods. Software is an indispensable tool in this vital work. But the way cities build and buy software is broken. Vendors are moving into positions as data intermediaries and they may be impossible to dislodge later.

This project, led by Anthony Townsend, will explore how city governments collaborate with peers to create digital infrastructure; what makes these joint efforts succeed or fail; and the kinds of institutional capacity that could improve outcomes.





Academics

Jacobs Technion-Cornell Dual Master of Science Degrees with a Concentration in Urban Tech

The newest master's degree in this transformational program at the Jacobs Institute allows students to apply machine learning, data science, human-computer interaction, and product design to the social, economic, and technical challenges of a city. Our first-of-its-kind curriculum challenges students with the rigor of a computer science core, a firm grounding in how cities work, and room to test big ideas by building real products in a collaborative studio setting.

New Urban Tech Courses



Urban Design Strategies students in New York City envision pedestrian-friendly walkways, improved lighting, safety – all with less noise – at Long Island City's Queensboro Plaza subway stop (May 2021). Students: Matan Amihai/Jeremy Shaffer/Cheng Gong/Jinglun "Harrison" Yu

Urban Systems 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 how cities operate as networks.

Urban Design Strategies & Case Studies grounds students in the basics of urban and spatial design principles, as well as the surrounding environmental, sociological, political, and economic dimensions. The course engages New York City as a laboratory and augments foundational and theoretical examples with case studies throughout the city.

“The Urban Tech program has empowered me to work at the intersection of technology, policy, and the built environment and challenged me to imagine new solutions for tomorrow’s urban challenges.”

— Rebecca Lassman

Rebecca is a second-year student in the Urban Tech program. She is passionate about creating more just, livable, and sustainable cities through the thoughtful application of data and technology.



Our Students

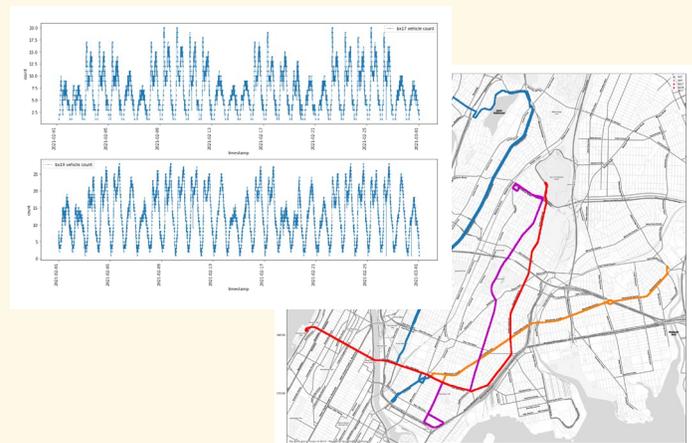
In 2020, we welcomed our first cohort of Urban Tech students. This pioneering group of 15 students from across the country and around the world embarked on a two-year program that brings together digital technology and good urbanism. Our first cohort of students comes from diverse backgrounds ranging from computer and information science to urban planning and economics.

Student Specialization Project

Bus Data Analysis

Lars Kouwenhoven UT '22, Jeremy Shaffer UT '22, Jamie Geng CM '22

The past 18 months saw a number of remarkable developments in the New York City MTA bus system. Travel speeds jumped as lockdowns cleared streets of traffic, and then slowed to a crawl again as the city reopened; occupancy sensors were installed on some 40% of the bus fleet. In October 2020 the Urban Tech Hub began collecting this data and is using it to calculate and visualize service metrics such as travel speeds and overcrowding.



Ecosystem Engagement

A central component of the Hub's mission is to bring people together and strengthen connections in the robust tech ecosystem that New York enjoys. The Hub leverages the convening power of a campus environment to promote open dialogue, transparency, and knowledge sharing.



“What's Next for Urban Tech?”

While New York was in the throes of the second wave of the pandemic last fall, the Urban Tech Hub launched an inaugural series of workshops on the future of urban tech titled “What's Next for Urban Tech?”

Curated by Anthony Townsend, urbanist in residence at the Hub, the online series looked at the role of digital ethics, procurement, density, and predictions in urban technology.

Remote Pediatric Asthma Monitoring



**Weill Cornell
Medicine**

Asthma is a common chronic disease in children with a highly variable course. It can be triggered by a wide variety of internal and external factors. In-person visits to a clinical setting with a health care provider do not provide sufficient information on the variety of factors which affect patients' disease control, and self-report is not always reliable or detailed enough to allow for the provider to make informed management decisions. COVID has changed the way many patients and families seek medical care, shifting away from in-person office visits to remote telemedicine visits.

The Hub is partnering with clinicians from Weill Cornell Medicine to find ways to more continuously monitor asthma patients in order to better anticipate and prevent emergency situations.

Office Buildings Emissions Analysis



The Urban Tech Hub is partnering with global engineering firm JB&B to advance research for a NYSERDA grant titled “A Foundation for Responsive Buildings: A Proposal to Develop an Hourly Building Data Platform Proof of Concept.” This multi-year research project is being undertaken along with major New York City commercial building owners to develop a better understanding of the GHG emissions of office buildings in the city.

This project is being undertaken in collaboration with Cornell AAP Professor Timur Dogan, who will lead the technical review of the project data collection methodology and analysis.

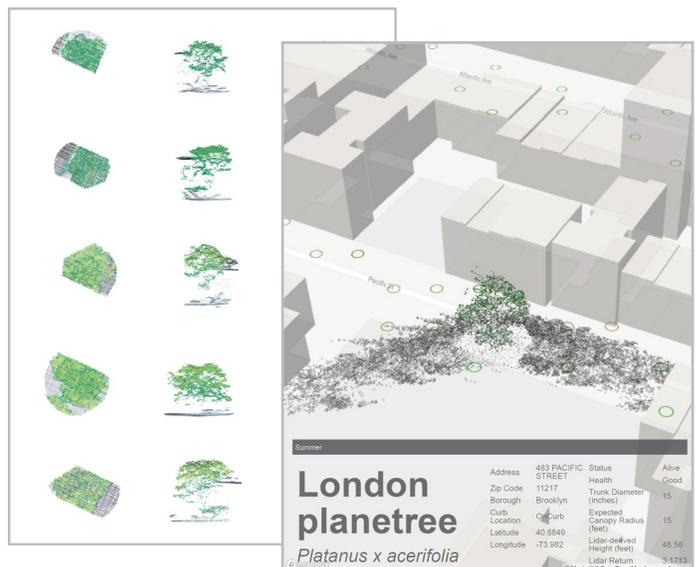
Urban Forestry Dashboard



NYC Parks

The Urban Tech Hub is partnering with the New York City Parks Department to identify trends and patterns to help strengthen urban forestry programs through a greater understanding of inputs and outputs in order to increase accuracy and efficiency, maximize use of resources, and anticipate and meet future needs. Research involves analysis of service requests and agency responses; tree risk identification methodologies; equity-based approaches to tree canopy valuation; and user-centered approaches to visualization of operational data and predictive models.

This project provides access to exclusive data on more than 800,000 trees throughout the city, providing many opportunities for faculty, post-doctoral fellows, and master's students to engage on this work in a variety of collaborative and self-directed ways.



“Tree Folio, NYC” produced by Design Across Scales Lab at Cornell AAP with AAP Research Associate Alexander Kobald and AAP RA Joe Ferdinando (M.Arch 2022).

People

Michael Samuelian
Founding Director



Michael Samuelian is the Founding Director of the Urban Tech Hub at Cornell Tech, a new center of activity that bridges tech industries and academic research to address pressing urban challenges and public needs. He is an urban planner, real estate developer, professor, and most recently the President and CEO of the Trust for Governors Island. From the revitalization 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 works at the intersection of urbanization and digital technology. He is Urbanist in Residence at Cornell Tech's Jacobs Institute, where his research focuses on scenarios and ethical frameworks for urban tech innovation. Anthony is the author of two books, *Ghost Road: Beyond the Driverless Car* (2020) and *Smart Cities: Big Data, Civic Hackers and the Quest for A New Utopia* (2013), both published by W.W. Norton & Co. His consultancy, Star City Group, works around the world with industry, government, and philanthropy on urban tech foresight, policy, and planning studies.

Rit Aggarwala
Senior Urban Tech Fellow



Rohit T. "Rit" Aggarwala is an experienced executive and thought leader in sustainability, environmental, and urban issues. Before joining the Urban Tech Hub, Rit was a member of the team at Sidewalk Labs, an urban innovation firm. He is also the co-chair of the Regional Plan Association's Fourth Regional Plan for the New York metropolitan area and an adjunct professor at Columbia University's School of International and Public Affairs. Rit played several roles in creating and implementing Michael R. Bloomberg's philanthropic efforts promoting urban sustainability. From 2006 to 2010, Rit served as Director of New York City's Office of Long-Term Planning and Sustainability, which was created to develop *PlaNYC: A Greener, Greater New York*, a long-term plan to ensure New York City's continued prosperity, growth, and health through the year 2030.

Sharon Ayalon
Postdoctoral Associate



Sharon Yavo Ayalon is a Postdoctoral Associate at Cornell Tech, developing visualizations and simulations to achieve social impact in planning. Currently, she has been focusing on mapping social distancing stories from New York City and the demographic changes resulting from privatization processes. Her Ph.D. explored the link between urbanism and artistic activity in cities. This research was awarded the President of Israel's Grant for Scientific Excellence and Innovation. With a background as an architect, she combines her research interest with creating art installations, performances, and curatorial practice. She received her Ph.D. from the faculty of Architecture and Town Planning at the Technion IIT.

Sarah Goodyear
Editor



Sarah Goodyear is a journalist, podcaster, and author who has written widely about cities and the way they work. Her writing has appeared in CityLab, Next City, Grist, the *New York Daily News*, and many other venues. She is cohost of the podcast *The War on Cars*, which covers the effects of automobile dependence on our society and the environment.

Our Newest Addition

Nneka Sobers
Research & Program Manager



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. Nneka received a Master of City Planning from MIT with a concentration in City Design and a B.A. in Urban Planning with a minor in Landscape Architecture from Virginia Tech.

The Year Ahead

The Urban Tech Hub launched in one of the most challenging times in New York's recent history, but these challenging times have given us a strong foundation to build upon and a sense of urgency to fulfill our mission. As we look toward our second year of operation, we are excited to expand our programming with the first Urban Tech Summit on Roosevelt Island, to deepen our research projects with the release of a 10-year urban tech horizon scan, and to develop more partnerships with industry such as the launch of a new challenge with Google.

Now, more than ever, it is clear that the future of cities depends on building more resilient, connected and sustainable environments to respond to changing realities. By convening the next generation of creative minds in technology, the Urban Tech Hub is driving a new era of urban innovation that will improve how we live, work, and play in cities around the world."

— **Stephen M. Ross**
Philanthropist and Chairman
of Related Companies



Release Horizon Scan

"The Future of Urban Tech: A Ten-Year Horizon Scan" is a map of urban tech's potential. It charts the discoveries and inventions of the decade ahead and the risks we must navigate along the way. This horizon scan represents a year's worth of research, drawing upon thousands of published sources. From this raw data, we distilled more than 214 unique perspectives describing what's to come and provoking us to imagine the future in all its complexity, nuance, and wonder.

Complete *Rebooting* Report

The *Rebooting NYC* team will be conducting stakeholder interviews and roundtables to get feedback on its draft recommendations, seeking especially to ensure that traditionally underrepresented groups' perspectives are heard. These, along with additional research, will be incorporated into a final report to be published by the end of the year.

Host Urban Tech Summit

A three-day convening bringing together researchers, thinkers, and practitioners to discuss the future of urban technology and smart cities around the world, as well as to undertake a deep dive into the concepts raised in the *Rebooting NYC* report.

Launch Google Startup Challenge

In partnership with Tech:NYC and Google Startups, the Urban Tech Hub is leading an effort to find the best new ideas to support New York City's recovery and job growth.

Expand Master's Program

In fall 2021, we are welcoming another 19 students into the Urban Tech program, well above our goal. This cohort builds on the success of our initial group of pioneering master's students. With an average age of 25 and 3 years of work experience under their belt, this cohort hails from a half-dozen countries, and is composed of more than 40% women and 30% underrepresented minorities. Like the inaugural cohort before them, the group is a mix of urban planners, computer scientists, engineers, and economists.

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