

# 11

## SUSTAINABLE CITIES AND COMMUNITIES



2020-2024  
Publications

**298**



2020-2024  
Percentage of all  
Taiwan Publications

**6.2%**



Course Units

**547**



Student Engagement  
with Units on SDG 11

**12,040**

# Research

## **Data Governance and Civic Participation for Smart Cities**

Amid the rapid expansion of AI and smart city initiatives, Associate Professor Sung-Yueh Perng from the Institute of Science, Technology and Society noted that many so-called bottom-up processes are still led by technical or commercial actors. Biased data and high participation thresholds can distort how algorithms “see” cities. To build inclusive and resilient cities, he proposes a three-pronged approach: data governance, public participation, and policy co-creation. In terms of data governance: introduce representativeness and bias checks, de-identification with clear purpose limitations, and algorithm audits with public-facing explanations. In terms of participation: reduce barriers through plain-language information, data-literacy empowerment, and accessible multilingual interfaces; and amplify diverse voices via citizen juries and co-design workshops. In terms of policy collaboration: adopt AI impact assessments and enable tripartite collaboration among citizens, experts, and the civil service so that proposals translate into actionable projects. This pathway keeps technology human-centered and prevents data bias from misrepresenting the urban reality.

## **We All Live in a Spatial Database**

Assistant Professor Tien Ling from the Graduate Institute of Architecture blends GIS, spatial interpretation, and media art through courses, workshops, and creative practice, translating Taichung’s urban flows, Hsinchu’s spatial data, Taoyuan’s pond landscapes, HSR-driven transformations, and K-12 environmental observations into readable “spatial databases.” The exhibition at the Hao-Ran Library Arts & Culture Center showcases the following: on the first floor, the Taichung Project series, including the National Taichung Theater interactive projection *Your City Colors* and the MOE Aesthetic & Design Curriculum Innovation project *Selfie Mosaic*; on the second floor, *Hsinchu Tapestry*, *Pond Catalogue*, and HSR-themed *Island Acceleration* and *High-Speed Relations*, which probe landscape change and shifting perception under high-speed mobility. Previously shown in Venice and Ulaanbaatar, these works debuted in Hsinchu to cultivate spatial literacy and local sensibility, strengthen identification with urban landscapes and cultural contexts, and advance public participation and cultural preservation.

## Social Impact

### Transforming the Campus into a Low-Carbon Mobility Hub

On December 13, 2024, Hsinchu City launched an all-electric pilot bus service featuring the first direct route to the Science Park, linking the Hsinchu Railway Station, National Tsing Hua University, NYCU, the HSR Station, and the Biomedical Science Park. Within NYCU, six stops—Zhuhu Guest House, Gymnasium, Engineering Building VI, General Building I, Activity Center, and Zhuhu—have significantly improved commuting convenience for students, faculty, and researchers. Positioning the campus as a key node connecting the park-city-campus, the project dovetails with the planned Greater Hsinchu Light Rail Red Line to build a diversified, multimodal transport system. The initiative reduces private car dependence and carbon emissions, advancing the vision of smart mobility and a low-carbon city.

### Intergenerational Learning for an Inclusive Community

On July 31, 2024, NYCU's USR team and the TSMC Charity Foundation co-hosted "Youth-Senior AI Learning: Care Without Ceasing" at the Xiangshan Community Development Association (Hsinchu City). Working with 20 older adults from Dazhuang and 22 pupils from Dazhuang Elementary School, NYCU students designed Edge-AI rhythm-and-movement activities to spark cross-generational interactions. In partnership with the Chang Gung Memorial Hospital, the program integrated digital tools into health screening and monitoring. Supply chain corporate volunteers also joined to broaden the community support network. The initiative strengthens co-participation, improves digital and health literacy among seniors, and establishes a sustainable, inclusive learning space within the community.





## Education & Cultivation

### Industry–Academia Collaboration for Better Public Works

NYCU signed an MoU with CECI Engineering Consultants, Inc., Taiwan, focusing on civil engineering, MEP, smart transportation, traffic engineering, AI, and IoT. Through joint research, internships, and talent co-development, the partnership will accelerate technology transfer from the lab to the field, raising the quality, efficiency, and safety of public construction. CECI Engineering Consultants, Inc., Taiwan, has long participated in major national projects and has received numerous professional awards. Currently, approximately 7% of its employees are school alumni. This deepening collaboration will expand the industry-university cycle, improve occupational safety and workplace-friendly systems, inject a stable supply of talent and technological momentum into national infrastructure, and promote the upgrading of urban and transportation systems with intelligence, resilience, and a low-carbon approach.

### 6G Applications for Resilient, Sustainable Cities

NYCU hosted the symposium “Toward Sustainable Smart Cities: Vertical Applications of 6G,” convening leaders from industry, government, academia, and research to examine 6G’s key use cases and social impacts across transportation, energy, public safety, and urban governance. The program emphasizes open architectures, standards development (including O-RAN), and ICT security as critical enablers. On the same day, the B5G Open-Architecture Mobile Network Workshop turned the NYCU campus into a hands-on living lab for instruction and demonstrations, helping the participating organizations to ramp up and validate solutions quickly. Through talks, workshops, and real-world testbeds, the initiative is building a co-creation platform for 6G applications—advancing interoperability, ecosystem partnerships, and cyber resilience—and strengthening the low-latency connectivity, energy-efficient computing, and real-time data services required for sustainable, resilient cities.



## Stewardship

### Car-Free Day Kickstarts a Low-Carbon Campus

The University marked Earth Day (April 22) with a Car-Free Campus Day. The president and senior administrators led by example by walking to work, reinforcing campus-wide awareness and action regarding climate change. In parallel, the University launched a campus-wide carbon inventory to anchor future reduction targets and governance pathways. To reduce motorized dependence on the hilly Yang Ming campus, recent measures have included YouBike stations, car-sharing, and an inner-campus shuttle. On the Chiao Tung campus, with alumni support, the University introduced electric scooters and upgraded to smart, energy-saving streetlights, balancing mobility and convenience with efficient energy use. Advancing along three axes—behavior change, modal shift, and energy management—the university is building a low-carbon, mobility-friendly campus and strengthening its connection to a sustainable city.

### Building Sustainable, Resilient Campus Housing

To enhance the student living quality and overall campus experience, NYCU launched a comprehensive renewal of Student Dormitory 11 in 2021. By preserving the dormitory's original function, the project pursued a full-building upgrade rather than piecemeal repairs as a flagship model for future residence renovations. The contract was awarded in April 2023, construction began immediately, and the revamped facility was completed in July 2024. The project closes the longstanding gaps created by earlier construction eras, changing environmental conditions, and shifts in the education system. The design progressed along three axes: first, the reorganization of the site framework to reassess massing, circulation, and program layout, improving both living quality and operational efficiency; second, the expansion of shared public landscapes to strengthen open, communal spaces and cultivate a more interactive residential community; and third, tighter integration with campus life so that everyday dorm routines connect seamlessly to learning, activity routes, and student services. Together, these strategies deliver a sustainable and resilient residence that better serves today's students while setting a new standard for campus housing.



