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SUSTAINABLE CITIES AND COMMUNITIES

Make cities and human settlements inclusive, safe, resilient and sustainable.

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250



Publications in SCOPUS

209



Course units

5.9%



Percentage of all Taiwan publications

4111



Students who chose the course units

Research

Intelligent Sensor: I+NOSE Accurately Measures the Concentration of Toxic Gases in the Environment

Air pollution is currently a topic of concern for many people. In areas with severe air pollution, indicators are set up to remind people to take relevant protective measures. However, most air sensors currently on the market are imprecise, bulky, and have slow responses. To resolve these issues, Professor Jeng-Tzong Sheu of NYCU's Department of Electronics and Electrical Engineering established a Taiwanese smart sensor team to independently develop an ultra-low-power-consumption silicon nanobelt gas-sensing array chip (I+NOSE), along with gas-sensing systems for smart homes, environmental testing, and smart health-care. I+NOSE can control the Joule heating temperature of individual silicon nanobelts to optimize each element's response to different gases. It can also simultaneously sense multiple gases while maintaining its miniature size and providing features such as a fast response, good specificity, and high sensitivity. Through AI machine learning, the I+NOSE system can accurately measure the concentration of toxic gases in a home or open environment, or even the air that humans exhale. I+NOSE has the advantage of ultra-low power consumption, making it easy to integrate with smartphones and portable devices. Users can monitor the ambient air quality or the air they exhale through smartphones and portable devices anytime, anywhere.

Hsinchu Sixth Fuel Factory: A Museum of Integration and Common Good

The "Sixth Fuel Big Chimney Factory," which was part of the Japanese navy's sixth fuel factory in Hsinchu, is commonly referred to as the "Sixth Fuel Factory" or "the Big Chimney." A team led by Associate Professor Wen-Shu Lai of NYCU's Institute of Applied Arts began restoring the historic site as part of the "Hsinchu Living Museum" project. The team has become the site's guardian, developer, and collaborative partner, and the courtyard of the Sixth Fuel Factory has been transformed into a forum for locals. The project aimed to preserve the history, cultural space, and ecology of the surrounding area. Through humanistic reflection, smart technology, art practice, sustainable design, and ecological conservation, the team managed to preserve its connections to war, status as a habitat for the protected frosted bat, and the cultural characteristics of Taiwanese military villages. The team organized markets, international interactive theaters, and life education events, working with the government and NGOs to bring individuals and different ethnic groups together. In 2021, Professor Lai started a course, "Hsinchu Sixth Fuel Factory: Local Studies," which stimulated relevant discussions. Five open-air cinema screenings and symposiums were also held, at which academics, experts, and the public were invited to discuss ecological conservation issues.



Photo Credit : 李易運

Social Impact

The “Digital Habitat” Light Display at the 2021 Hsinchu Light-Coming Festival

The 2021 Taiwan Lantern Festival transitioned into the 2021 Hsinchu Light-Coming Festival, where the “Digital Habitat” light display area included works by up-and-coming Taiwanese artists. To pick out just one, the piece “Rolling Forest” in Central Park was designed by Assistant Professor Ling-Li Tseng of NYCU's Graduate Institute of Architecture. Her creative work was well-received and will remain in Central Park as a piece of public art. Inspired by the whimsical and natural shape of reeds along the Lon-En Canal, she designed an elegant yet seemingly random forest of curvy trees. Visitors can enter the piece to be surrounded by the copper-like curved trees, experiencing the magical beauty of light, the reflection of which by the curved metal changes as people come and go, creating a magical effect that offers an immersive experience.



Seden Society Puppet Theater Foundation’s Puppetry Artifact Collection

In 2020, the NYCU Libraries received a donation of over 2000 puppet theater-related objects from the Seden Society Puppet Theater Foundation. NYCU has gradually completed the restoration of these artifacts and established the NYCU Puppetry Digital Museum to protect Taiwan's cultural assets relating to puppetry. In 2021, NYCU partnered with Tshu-Bi Co., Ltd. (Bank of Culture) to begin the pre-production of a book and documentary on the Seden Society Puppet Theater Foundation. Interviews and clips were produced of 11 people related to the foundation, including Jin-Tze Chen, Hong-Hsi Li, Lai-Fu Li, and Te-Hsi Hsieh, among other puppet artists.

Voluntarily Relinquishing Campus Space So Residents Can Enjoy

To improve the safety of Hsinchu City's Jiangong 1st Rd., Jianxin Rd., and other roads taken by students of Jiangong Elementary School on their way to school, NYCU voluntarily relinquished some campus space to give Hsinchu residents wider sidewalks and more room to wait for red lights, doing its part to keep the city safe. This is the second time that NYCU has worked with Hsinchu City to open up the campus, giving more spacious roads to local residents.

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Student Cultivation

DIY Circular Farm Made from Recycled Bottles

The research team led by Professor Jehng-Jung Kao of NYCU's Institute of Environmental Engineering successfully developed the world's first prototype DIY circular farm (DIYGreen) made with recycled bottles. It has many environmental protection features and other benefits, making it a great teaching material for environmental sustainability education. The team designed a standardized pot or frame with a base of recycled bottles, which captures rainwater and reuses it for plant growth. The water travels to the soil layer through capillary action in water-diverting strips so that the plants do not need frequent watering. Furthermore, vegetables can be harvested in about 20–35 days, depending on the season. The recycled bottles allow water to be reused for the plants, and any kitchen waste can be directly tossed into the recycling earthworm breeding box developed by the team to become organic vermicompost.

Professor Kao invites teachers at all school levels to use DIYGreen for teaching or other related activities. Without any need for land, students can set up easy-to-maintain circular farms, which they can create on a flat concrete surface (nearby their apartment, in a corridor, on a balcony, or on the roof). They can plant vegetables, fruits, or flowers. The process is ecofriendly and yields fruits and vegetables that are safe to eat. The team even launched standardized pots in 2021, which people can take home and maintain to easily experience the fun of eco-friendly gardening.



Stewardship

College of Hakka Studies Allows Locals to Deposit 22 Ancient Documents and Artifacts for Free

The College of Hakka Studies has been committed to the preservation of Hakka cultural relics for many years. The International Center for Hakka Studies was established under the College of Hakka Studies, becoming the world's first database of books, documents, and cultural relics regarding Hakka culture. In 2021, the NYCU College of Hakka Studies collaborated with local residents for the first time, agreeing to house 22 ancient documents and artifacts at no cost. These were offered up by local representatives and descendants of Liu Cheng-Hao, an important figure in the history of the development of Qionglin Township in Hsinchu County. The 22 documents and artifacts include: the first settlement records for the middle reaches of Toucian River, a gong used by officials, the cane hat of an Atayal tribe leader obtained by a settler after a battle, and a wrist ring from the matchlock guns used by indigenous people. The oldest artifact dates back 236 years. This cooperation represents a major milestone in establishing a database of Hakka culture. NYCU plans to fully digitize the documents and artifacts to preserve them in perpetuity and allow interested researchers to access digital resources conveniently.

A Safe and Affordable Campus Transportation System

NYCU is committed to providing various safe and sustainable transportation services for teachers, students, and the public. NYCU has long provided shuttle buses for teachers and students, but with the redevelopment of the campus, there was a drastic rise in the demand for on-campus transportation. Therefore, NYCU signed up for the Ministry of Transportation and Communications' "Bus Stops on Campus" program, introducing bus route 559 to the campus. Since February 2021, the shuttle service has been expanded in response to the merging of the two universities, providing students and faculty members with free transportation between the Yangming and Chiaotung campuses. Approximately 600 people take this shuttle bus each week. Since 2017, several YouBike stations have also been set up. The YouBike service is now used over 10,000 times per month and has received widespread praise from students and faculty members. The Chiaotung campus has gone even further and introduced an e-scooter-sharing system, which has been running since 2020.