

# INDUSTRY, INNOVATION AND INFRASTRUCTURE

*Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.  
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**370**



Publications in SCOPUS

**351**



Course units

**6.2%**



Percentage of all Taiwan publications

**8749**



Students who chose the course units



## Research

### Building a Sustainable Future through Technology

With a solid foundation in biomedicine and electronics, NYCU has made developments in emerging research fields such as biomedicine, AIoT, robotics, smart medicine, electronics and optoelectronics, and big data, focusing on interdisciplinary research and development (R&D) to create a sustainable future. In 2021, NYCU research teams made many breakthroughs that attracted widespread attention and praise. A total of 18 teams won the Ministry of Science and Technology's "Future Tech Awards," accounting for nearly one-fifth of the total number of awards. Among these, three teams won the "Award for Excellent Contributions in Technology Transfer" and two alliances received the "Excellent Industry-Academia Alliance" recognition. In addition, a number of NYCU research teams won the "National Innovation Award," the highest honor for innovation and R&D in Taiwan's biotechnology field, demonstrating NYCU's R&D capacity in biomedicine and health.

## Social Impact

### Raising Intellectual Property Rights Awareness

Every year, NYCU's Center for Industry–Academia Collaboration runs a series of intellectual property courses for NYCU faculty members and students, as well as the public, to raise awareness about intellectual property rights. In 2021, four courses on intellectual property rights were held, with lecturers that had ample practical experience in the industry. The courses were: “From Invention Disclosure to Writing Patent Applications,” “Campus Intellectual Property Protection from the Perspective of the Ministry of Education Campus Intellectual Property Protection Action Plan,” “Notes on Industry–Academia Collaboration and Technology Transfer Contracts,” and “Patent Analysis and Search.” A total of 203 people participated in the four courses. Through in-depth yet straightforward explanations of the concepts of intellectual property rights, these courses strengthened and improved participants’ understanding of intellectual property rights protecting their research and development results.

### Industry-Government-Academia Cooperation: Addressing Labor Shortages and Disasters

The Changhua County Government signed an MOU with NYCU, Quanta Computer, and Chunghwa Telecom to promote industry–government–academia cooperation on smart agriculture. Furthermore, the “Smart Agriculture Promotion Center” was officially established. Smart agriculture can help solve problems such as the aging population in rural areas and the lack of agricultural labor. Technological features that can monitor conditions and prevent disasters in real-time make smart agriculture and aquaculture extremely beneficial.

### Improving Children’s Information Literacy

NYCU's Service-Learning Center matched students from the Department of Electronics and Electrical Engineering with volunteers from TSMC’s 12B wafer production plant, who together organized a one-day technology experience camp in a joint effort to promote tech innovation education. Students and teachers from Nanliao Elementary School were invited to visit NYCU to play a coding-themed board game. Through the board game “Coding Ocean,” student volunteers from the Department of Electronics and Electrical Engineering taught the students basic coding concepts. Thanks to the game, learning how to code was not at all a boring experience. Participants were also taken on a tour of TSMC’s Museum of Innovation guided by TSMC volunteers, where they learned about the application of integrated circuits in daily life and the infinite possibilities for how TSMC innovations can continuously drive technological progress.

## Student Cultivation

### International Hackathon: Promoting Healthcare and Digital Transformation

With “healthcare” and “digital transformation” as the main themes, NYCU organized its first international hackathon competition, inviting companies such as LINE and HTC Deep Q to participate. Teams of students from seven universities in Taiwan participated in the competition, using tools provided by corporate partners to develop their ideas. The winning teams received not only prize money but also internship opportunities. In total, there were 21 teams with 102 students from 14 countries. The winning team, after 40 hours of online competition, was Team Finic, which comprised five Indonesian students from NYCU and National Central University.

Team Finic designed a LINE healthcare service with functions such as searching for nearby hospitals, tracking medical records, online medical consultation, and the Panic Button. The latter integrates cell phones’ location tracking feature to quickly search for nearby LINE users who can offer immediate help, overcoming the issue of language barriers, which can delay requests for help when calling 119, as well as highlighting Taiwanese people's eagerness to help others. This was the first time NYCU held a hackathon for both Taiwanese and international students. The entire competition was held in English, and participants used a chatbot provided by LINE, as well as open data, to develop ideas. NYCU hopes that through similar activities in the future, students will be encouraged to address social needs with creativity and create applications that can contribute to society.





## Student Cultivation

### Interdisciplinary Applications and Cultivating Entrepreneurship

NYCU has set up programs and courses to cultivate students' entrepreneurial and innovative abilities for their future careers. Students are encouraged to participate in competitions to build up entrepreneurial capabilities and solve real-world problems in creative ways. For example, since 2014, the NYCU School of Biomedical Science and Engineering has implemented the Ministry of Education's "Innovative Entrepreneurial Talent Cultivation Program," offering nine introductory and advanced interdisciplinary courses. So far, the program has trained over 100 multidisciplinary young talents and the staff of dozens of start-up biomedical companies. Over the years, the program has received five gold awards, three silver awards, two bronze awards, eight popularity awards, two awards for the most potential, one award for team excellence, and six honorable mentions—totaling 27 awards—as well as ranking first in Taiwan. Moreover, in 2021, the NYCU College of Biomedical Science and Engineering's "Savvy," "Ok Burn," and "Exo-W BIOTECH" training teams were handed four awards at the Ministry of Education's "National Innovation and Entrepreneurship Competition," including one gold prize, two honorable mentions, and one popularity award.

NYCU values the cultivation of interdisciplinary BioICT talents, encouraging students to form interdisciplinary teams for international competitions to foster knowledge exchanges with students from top universities around the world. The NCTU\_Formosa team participated in the 2021 iGEM Competition of Synthetic Biology hosted by MIT. With "periodontal disease prevention and dental restorative E. coli" as its research topic, the team won the gold medal, standing out among over 300 teams from universities around the world. Meanwhile, the team NYCU-Taipei delved into the use of nattokinase to prevent vascular embolisms under the title "NATTO\_IT\_OUT," which won the team its 11th gold medal.

NYCU also shines in terms of its research and development in the semiconductor field. NYCU's faculty members and students participated in the 21st Golden Silicon Awards—Semiconductor Design and Application Competition in 2021. Among 255 teams from 33 colleges and universities, NYCU won two gold prizes in design, one bronze prize, the Best Creativity Award, and one gold prize in application. Award-winning designs included the following:

1. The team led by Associate Professor Yen-Cheng Kuan of the International College of Semiconductor Technology and Professor Chih-Wei Liu of the Institute of Electronics trained vehicles to accurately calculate their distances from other vehicles and obstacles, thus greatly improving the safety of future autonomous driving.
2. The team led by Professor Sheng-Di Lin and Associate Professor Chia-Ming Tsai of the Institute of Electronics utilized the "near-infrared" zone of automotive LiDAR systems to build a light transmitter and photon-receiving element. Then, the team used computers to calculate the distance between vehicles and external objects through the time difference of the traveling light beams. This solved the problem of insufficient light sources and interference from adjacent car radars caused by the use of cameras in the collision avoidance systems of self-driving vehicles, thereby improving the safety of such vehicles.
3. Furthermore, the team led by Professor Ke-Horng Chen of the Department of Electronics and Electrical Engineering used the third-generation semiconductor material gallium nitride (GaN) to improve the efficiency of an existing charging resistor chip.



## Stewardship

### IAPS Reinforces the Industry's Capabilities

The Center of Industry Accelerator and Patent Strategy (IAPS) at NYCU has actively cultivated new business ventures since it was established in 2013. So far, the center has cultivated more than 750 new startups and research teams. Each year, science and tech research teams supported by the IAPS have raised more than NT\$300 million; furthermore, the center was awarded the Innovation Incubation Award at the 2021 National Innovation Awards. Of particular note, the IAPS helped social enterprise Blueseeds establish a sustainable investment mechanism and promote the application of agricultural blockchains. In 2021, Blueseeds won the "Best for the World 2021" award from the international organization B Lab, demonstrating its commitment to promoting responsible production and consumption cycles through new business models.