

# NTU



## NEWSLETTER

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## NTU Faculty Awarded for Outstanding Research

Author Kenneth Pai Lectures on Kun Opera  
Intel Joins NTU to Study M2M Communication  
Digital Archives Search System Goes Public

**Special Report**  
APAIE Annual Conference



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## NTU AT A GLANCE

President Lee Declares NTU Right Choice at Azalea Festival Opening



## From the President's Office

NTU enjoyed the honor of hosting the Asia-Pacific Association for International Education's 2011 Conference and Exhibition in March. APAIE, along with the National Association of Foreign Student Advisors and European Association for International Education, is one of the three leading education associations in the world. As the most important annual higher education meeting in Asia, the conference drew over 400 university presidents, directors of higher education organizations and university international affairs personnel to pursue exchanges under the theme "Asia-Pacific Education: Impacting the World."

I believe the APAIE conference provided a golden opportunity to Taiwan's institutions of higher education. It permitted their administrators to meet personally with university international affairs personnel from all over the world and to engage in deep dialogue as well as sign cooperation plans. The conference also gave NTU a major promotional boost and proved extremely effective in enhancing our international visibility.

The greatest benefit to come from the conference was the sharing of experiences. For instance, while we were taking part in the Presidents Summit, we heard how Japanese universities have managed to attract 130,000 international students and promote the internationalization of higher education in Japan. Such experience helps NTU in its strategic thinking.

Guest speakers included internationally renowned global trends expert Dr. Kenichi Ohmae, who overturned some myths regarding the BRIC nations, and Academia Sinica academician Dr. Chung-laung Liu, who discussed the evolution of education in the East and West.

李嗣涔

President  
Dr. Si-chen Lee

## NTU Successfully Hosts Largest Asia-Pacific Higher Education Conference

**N**TU hosted the Asia-Pacific Association for International Education's 2011 Conference and Exhibition, March 9-11. This conference—one of the world's top three higher education conferences—attracted over 900 higher education professionals, domestic and from over forty foreign countries. More than 100 exhibition booths provided opportunities for the delegates of participating institutions to make agreements and discuss cooperation plans. Not only was the 2011 APAIE Conference a resounding success, it drew the largest attendance in the conference's six year history.

This year's conference theme was "Asia Pacific Education: Impacting the World." Academia Sinica academician, Dr. Chung-laung Liu, presented the keynote speech, "From Confucius to Modern Times: Education at the Core of Asia Pacific's Dynamism," in which he compared Eastern and Western cultures and the evolution of their respective educational systems and discussed their relevance to contemporary education in the Asia Pacific region. He concluded that educators must, in their mission to impart knowledge and moral education, instill in the future leaders of society an expansive compassion and the ability to carry out tasks.



At the President's Roundtable, APAIE's university presidents shared ideas under the theme "Higher Education and Enterprises: Interplay and Internationalization" and discussed how education and enterprises influence each other, as well as the importance they hold for each other. Speakers included the chancellor of the University of Hawaii at Manoa, the vice president of Japan's Kyushu University, the chancellor of City University of Hong Kong and the president of Thailand's Mahidol University, which will host the 2012 APAIE Conference, as well as the chairman of Taiwan's Cyberlink Corporation.

Global trends expert Dr. Kenichi Ohmae addressed the conference on, "The Rise of Asia and the Role of



Higher Education: New Platforms of Economic Growth." Open to the public, Dr. Ohmae's speech attracted an audience of over 4,000. He affirmed that the outstanding performance of targeted Taiwanese industries has earned solid acclaim even though the world economy has not recovered fully. Ohmae also asserted that students these days should not limit their learning to the classroom, as the new technologies at hand, such as mobile phones and computers, offer optimal channels for absorbing new knowledge.

On March 12, NTU also held its first international higher education exposition. Representatives of renowned universities and cultural and education centers from more than forty countries manned over 120 booths to provide students with timely information on studying abroad. The expo attracted more than 3,000 visitors.

NTU has actively expanded its internationalization drive in recent years, and the successful hosting of the APAIE conference showcased the university's strengths on the international stage and will be a benchmark for future international conferences at NTU. NTU wishes Mahidol University great success in hosting the 2012 APAIE Conference and looks forward to playing an active role and sharing the experience it gained from hosting this year's conference.



# Intel and NTU Open Machine-to-Machine Communication Research Center



Intel, the world's leading semiconductor company, and NTU, Taiwan's top university, established the Intel-NTU Connected Context Computing Center on January 26. Intel researchers will work closely with NTU professors and graduate students to tackle the challenging problems of machine-to-machine (M2M) communication, which is forecast to be the leading technology in the coming decades. In addition, the center will also invite many famous overseas M2M scholars and experts to participate in the center's exciting projects.

The research and consulting firm Harbor Research reports that many observers believe M2M "will drive the largest organic growth opportunity in the history of business." M2M, or the Internet of things (IOT), refers to technology that enables machines to connect and interact with each other without human intervention. In just the last two decades, the Internet, which connects people to people, has transformed the lives of human beings tremendously. It isn't difficult to imagine how greatly the world would be improved, in areas ranging from energy efficiency, intelligent transportation, health care and food production to environmental monitoring, anti-terrorism and smart living spaces, if all objects were interconnected. Clearly, the scale of the IOT will be several orders of magnitude greater than that of the current Internet. Furthermore, these trillions of interlinked objects and machines are expected to have wisdom; that is, they will be able to learn from the past (awareness of context), work together (connect), predict and take action (compute) for the future, and this will pose serious challenges to researchers and industries in the coming decades.

Professor Liang-gee Chen, center director, states that the center will emphasize cutting edge research with potential for great industrial impact and focus on multi-

disciplinary technology and integration.

The center has formed four special interest groups that pursue four challenging research directions in M2M: Green Sensing Platform (SIGGSP), Autonomous Reconfigurable Connectivity (SIGARC), Context Analysis and Management (SIGCAM), and Smart Sensing and Applications (SIGSSA). The SIGs will work synergistically to achieve the omniscience of M2M through connected context computing.

SIGGSP is addressing the technology, design, implementation and optimization issues of smart sensor



Ⓐ Appearing at the unveiling of the new Intel-NTU Lab are, from left to right, Vida Ilderem (Vice President, Intel), Cheng-hong Chen (Deputy Minister, National Science Council), Si-chen Lee (President, NTU) and Liang-gee Chen (Director, Intel-NTU Lab).

nodes (in contrast to so-called dust nodes) for high-end sensor-network applications. SIGARC aims to develop technology to facilitate effective connectivity for the realization of vehicle-to-vehicle M2M communication. SIGCAM is working to provide analysis and management technologies at a system level for processing the immense amount of data to be generated in the M2M era, and is also targeting several other crucial challenges across all layers, including management and security. SIGSSA is tackling research challenges that will emerge as a result of future M2M technologies from the perspective of applications, such as intelligent transportation systems, energy conservation and health promotion.

It is anticipated that this novel cooperation mechanism will allow Intel and NTU to rapidly overcome the technical barriers of M2M communications. Moreover, through widespread applications of new technologies, M2M will provide a great economic impetus to Taiwan and the rest of the world while at the same time improving the lives of all people.



**N**TU has been on the fast track in its drive to internationalize its campus in recent years, and it has already participated in a number of important international conferences on higher education so far this year. These events include the 2011 Annual Conference of the Association of International Education Administrators in San Francisco, the University Administrators Workshop at Kyoto University, the APRU Senior Staff Meeting in Thailand, an APRU IT Video Conference, as well as Going Global 2011 in Hong Kong, which is the first time this event was held outside of Great Britain.

### AIEA

Dean of International Affairs Tung Shen attended the AIEA 2011 Annual Conference, February 20-23. The three-day event included nearly 100 informative sessions, which addressed higher education policies in the United States as well as the relevance for the United States of the educational conditions in such places as Northern Europe, Africa, India and the Middle East. The conference also discussed leading issues in internationalization. Some of the fascinating conference presentations can be accessed on AIEA's website at <http://aieaworld.org/events/2011-conf-presentations.htm>.

### APRU

APRU was established in 1997 with the goal of advancing cooperation among academia, the research community and industry. The association works to improve and promote exchanges within the Asia Pacific Rim region economically, scientifically and culturally. APRU's members are all elite regional universities. NTU is the only local university to be invited to join APRU, and the university has targeted the association as one of the important organizations in which to actively participate in the coming years.

### APRU Senior Staff Meeting

The 8th APRU Senior Staff Meeting was held at Thailand's Chulalongkorn University, March 9-11. Prof.

## NTU Promotes Internationalization by Taking Part in Higher Education Conferences



NTU President Si-chen Lee engages in discussion at a Going Global session in Hong Kong.

Yan-wing Leung, chair of the Department of Foreign Languages and Literatures, attended the meeting on behalf of NTU. The meeting theme was "The Role of Universities in Addressing Sustainable Health Challenges in the 21st Century." The discussions among the university representatives stimulated insightful new concepts, making the meeting a great success.

### APRU IT Video Conference

Organized by the University of Oregon, the first APRU IT Video Conference of 2011 commenced at 10:00am on March 3, Taiwan time. Eleven APRU member universities linked up to take part in the distance conference. In addition to NTU, participants included the University of Malaya, Australian National University, University of Melbourne, Kyoto University, University of Oregon, Tecnologico De Monterrey, University of Indonesia, National University of Singapore, University of Sydney and National Autonomous University of Mexico. NTU was represented at the meeting by Dr. Shih-tong Ding, associate director of the Center of Learning and Teaching Development's Division of Learning Support.

The conference included a comprehensive assessment of the planning and layout of university teaching spaces. While the consensus view was that students should be regarded as the starting point in the design of teaching spaces, it was conceded that many challenges remain regarding the effective use of facilities in educational training, communication between and promotion of instructors, and even the allocation of university resources and budgets.

## Academia Historica Digital Archives Search System Goes Public

The NTU Research Center for Digital Humanities and Academia Historica announced the formal opening to the public of the Academia Historica Digital Archives Search System (available in Mandarin at <http://ahdas.dmh.gov.tw/>) on March 8. Besides creating the opportunity for collaboration between the two parties, the new system makes it more convenient to use Academia Historica's abundant digitized material for teaching and research.

The system utilizes a post-query classification system developed by the Research Center for Digital



Officials and faculty members of NTU and Academia Historica pose for a photo at the signing ceremony for the Academia Historica Digital Archives Search System.

Humanities. Digitized materials that were fully prepared by Academia Historica as far back as 2002, but were scattered across different databases, have been made available through the new system. The system comprises a massive amount of materials, including over 400,000 items of cataloged materials and more than five million

digitized files. These materials cover presidential and vice-presidential historical artifacts as well as general historical files concerning the Republic of China.

Since its establishment, the center has worked to develop systems and tools that meet the needs of its users to advance digital research within the humanities. Due to the accumulation of an enormous volume of digitalized materials over the years, a query on the old search system could only generate the total number of items, leaving users to search by browsing each item individually. While continuing to provide searches of key words and categories, this new system achieves greater speed, accuracy and convenience by also permitting searches based on level, historical period, topics, person names and place names.



## NTU Creating Pleasant Green Spaces at New Chubei Campus



NTU has created a beautiful green space at the main gate of the new Chubei Campus at the end 2010. Urban planning regulations require the new campus-- 22 hectares in area in high-tech Hsinchu County-- to prepare a 20-meter green belt around the campus perimeter.

The university has been delighted to beautify its new campus with creative landscaping. The university assigned the NTU Experimental Forest to develop the green spaces on the new campus, requiring that they model the visual ambiance of the NTU Main Campus, showcase ecological design and reflect the feel of the local community and environment.

The new space, the first stage of a three-stage project, is an open L-shaped area near the campus' main gate and road. Bushes form the two Chinese characters *tai* and *da* of NTU's name in Mandarin, Taida. Abundant azalea bushes--

reminiscent of Palm Tree Boulevard on NTU's main campus-- cluster together in waiting to show off their colorful blossoms each spring. The campus pagoda, picnic seats and a woodchip pathway are all made of wood. The trees originally populating this former farmland are preserved, and circular benches are placed around them. And, a garden of fragrant flowers has been prepared to stimulate the viewers' sense of smell as well as sight.

The green areas in the second and third stages of this landscaping plan have been cleared of trash and brush and seeded with grass, and will be completed when finances permit.

## TWO ELECTRICAL ENGINEERING AND COMPUTER SCIENCE PROFESSORS ELECTED IEEE FELLOWS

Two faculty members of the NTU College of Electrical Engineering and Computer Science, Prof. Tei-wei Kuo and Prof. Chih-jen Lin, were elected as 2011 IEEE Fellows in December, lifting the number of the college's IEEE Fellows to 31. The college boasts the highest number of IEEE Fellows in Taiwan and is proud of the international recognition its professors continue to earn for their world class scholarship.

Prof. Kuo, cited by IEEE for his "contributions to real-time embedded systems and flash memory storage systems," is a distinguished professor in the college's Department of Computer Science and Information Engineering and Graduate Institute of Networking and Multimedia. Kuo made significant contributions to basic theoretical research and technological innovation in the study of real-time embedded systems and memory storage systems.

In basic theoretical research, his greatest academic achievement was to develop analytical methods for assessing the real-time performance of program schedulers. Prof. Kuo's concepts continue to guide academic research in schedulability analysis. The theories he developed for energy efficient resource scheduling proved to be a breakthrough over previous empirical methods and established an important foundation for scheduling theories at the lower limits of theoretical values.

Kuo is renowned for his research and development work and applications in systems technology. Many years ago, he and his research team predicted the development of flash memory storage systems. The memory address projection approaches, index processing, files systems and reliability technology proposed by Prof. Kuo had a profound impact on subsequent systems applications and technology research and development. His work is also among the few systems operation technologies that are recommended by the authorities of the open-source file software YAFFS (Yet Another Flash File System).

In recent years, Kuo's team demonstrated its prowess in embedded operating system and development tools. The team is working closely with industry as well and looks forward to creating technological breakthroughs and leadership opportunities for the private sector. Prof. Kuo's election to IEEE Fellow is an



affirmation of the academic and practical contributions he has made in real-time embedded systems and flash memory storage systems.

Prof. Lin was recognized as an IEEE Fellow for his "contributions to support vector machine algorithms and software." He made major advances in the research of machine learning while working in NTU's Department of Computer Science and Information Engineering, Graduate Institute of Networking and Multimedia and Institute of Industrial Engineering.

The machine learning software LIBSVM (Library for Support Vector Machines) developed by Lin's research team is widely used in both the academy and industry and has been downloaded around the world hundreds of thousands of times. LIBSVM was cited in more than 6,000 research papers according to the statistics of Google Scholar in December 2010. This figure indicates that this is very likely the most highly cited research result in computer science in Taiwan. Prof. Lin stepped into the world of machine learning research only after having returned to Taiwan following his overseas studies, and it is here at NTU that he produced these internationally recognized achievements.

IEEE elects members as IEEE Fellows each year and limits the number of new fellows each year to the one thousandth of its total membership. Though candidates are subjected to a stringent selection process and competition is intense, the College of Electrical Engineering and Computer Science has witnessed its faculty members being named IEEE Fellows each year without fail for the last twelve years. The college is proud that this record stands up to those of the world's finest universities.

# NATIONAL SCIENCE COUNCIL 2010 OUTSTANDING RESEARCH AWARD RECIPIENTS

On January 26, 2011, the National Science Council announced the recipients of its Outstanding Research Award for 2010. The recipients from National Taiwan University were:

## Position / Name / Department / Academic Specialty

Professor **Hung-jen Wang**, Department of Economics, economics

Professor **Hui-fen Tien**, Department of Internal Medicine, College of Medicine, blood, tumors and genetic mutation

Professor **Po-lun Chiang**, Graduate Institute of Clinical Medicine, College of Medicine, infantile rheumatic disease immunization vaccine R&D, tumor immunology

Professor **Tsung-lin Wu**, Graduate Institute of Communication Engineering, telecommunications engineering

Professor **Tsung-hsin Lu**, Department of Chemical Engineering, chemical engineering

Professor **Shih-kuang Lee**, Institute of Applied Mechanics, automation engineering

Professor **Keng-tsung Wang**, Chemistry Department, chemistry

Researcher **Fang-cheng Chou**, Center for Condensed Matter Sciences, physics

Associate Professor **Yi-yi Lin**, Department of Atmospheric Sciences, earth sciences

Professor **Kung-ju Lin**, Graduate Institute of Photonics and Optoelectronics, photonic engineering

Professor **Chih-jen Lin**, Department of Computer Science and Information Engineering, information engineering

Professor **Yu-pin Lin**, Department of Bioenvironmental Systems Engineering, area studies

Researcher **Li-chiung Lin**, Center for Condensed Matter Sciences, solid state physics

Professor **Feng-hui Lin**, Institute of Biomedical Engineering, biomedical engineering

Professor **Fi-John Chang**, Department of Bioenvironmental Systems Engineering, bioenvironmental engineering and technology

Professor **Pao-ti Chang**, Department of Physics, physics

Professor **Yao-wen Chang**, Graduate Institute of Electronics Engineering, microelectronics

Professor **Yu-liang Kuo**, Department of Environmental and Occupational Medicine, College of Medicine, environmental medicine, occupational medicine, toxicology, epidemiology

Professor **Chih-hung Chen**, Department of Electrical Engineering, medical engineering

Professor **Ping-hui Chen**, Department of Mechanical Engineering, thermal-fluid energy

Professor **Pei-ming Ho**, Department of Physics, physics

Professor **Li-min Huang**, Department of Pediatrics, College of Medicine, basic medicine, clinical medicine, molecular biology, pediatrics

Professor **Chih-chung Yang**, Graduate Institute of Photonics and Optoelectronics, photonic engineering

Professor **Hsiu-hui Yeh**, Graduate Institute of Microbiology, College of Medicine, genomic medicine, biology of cancer

Professor **Shu Yeh**, Department of Accounting, finance and accounting

Professor **Chih-ping Wei**, Department of Information Management, management II



## EUROPEAN URBAN CULTURE FESTIVAL EXPLORES FIVE EUROPEAN PORT CITIES



EU Centre in Taiwan Director Tzong-ho Bao, NTU Library Director Hsueh-hua Chen and Prof. Michelle Tsung-yi Huang discuss the planning behind and future outlook of the European Urban Culture Festival at the opening of 2010 festival.

The 2010 European Urban Culture Festival took place at NTU last November and December. Organized by the European Union Centre in Taiwan and NTU Office of International Affairs in coordination with the NTU Library and NTU Office of Student Affairs, the event presented students with a variety of opportunities to delve deeply into the history and culture of five unique European seaside cities, and to learn about the transformations of their cityscapes over time. Lasting over a month, the festival featured a series of events, including a symposium, film festival and book fair, that explored the theme "The Erratic Evolution of Europe's Port Cities."

The cities highlighted in the festival are all historical port cities that have managed to turn new pages in their development. They include Amsterdam and Rotterdam in the Netherlands, Manchester and Liverpool in England, and Barcelona in Spain.

The festival's symposium addressed the vibrancy and transformations of these port cities via the three topics "Green Heaven with Bicycles and Bizarre Architecture: Amsterdam and Rotterdam as Livable Cities," "A Feverish Night of Football and Rock'n Roll: Having Fun 24/7 in Manchester and Liverpool" and "Outlandish and Playful Architecture: Urban Acupuncture in Barcelona."

During the period of the festival, the NTU Library held a book fair in its new book display area. The fair included books from the library's collection related to these five European port cities and urban transformation as well as materials provided by the EU Centre in Taiwan, Office of International Affairs and the representative offices of the Netherlands, Great Britain and Spain.

The festival curator, Prof. Michelle Tsung-yi Huang of the Department of Geography, organized the series of festival events to present a representative view of the pulse of urban society and spirit of humanity one experiences while visiting the featured cities. The festival proved to be a great success in inspiring curiosity among the NTU student body and faculty to explore these great metropolises. Future European Urban Culture Festivals will continue to introduce and explore other European cities under the spirit of cultural promotion and education.

## Life Science College Collaborates with University of Exeter

The College of Life Science and the University of Exeter College of Life and Environmental Sciences kicked off a series of substantive exchanges in 2010. In April, Dean Chu-fang Lo and Prof. Jer-ming Hu, director of the college's Center for International Academic Exchanges, led a five-person delegation to Exeter. Prof. Murray Grant of the College of Life and Environmental Sciences' research division then visited NTU in July.

Following these two meetings, the schools expressed firm interest in developing academic ties and establishing dual-degree programs. This led to the English college's Associate College Dean for Research Allen Moore heading an eight-person team to visit NTU, November 16-18.

The two colleges agreed that in the current stage of cooperation the professors who participated in the November meetings would serve as mediators for the setting up of laboratories for collaborative research projects and that interaction would be expanded to include student exchanges.



Date: November 16, 2010 Venue: Auditorium, 1F Life Science Bldg, NTU

## Life Science Dean Lo Speaks at Beijing Institute of Technology



Faculty members of the Beijing Institute of Technology School of Life Science escort Dean Chu-fang Lo of the NTU College of Life Science on a tour of the school's laboratory facilities.

College of Life Science Dean Chu-fang Lo accepted the invitation of the Beijing Institute of Technology School of Basic Education and Institute of Education to participate in two lectures on general education, December 21-22. Dean Lo also visited BIT's School of Life Science to engage in the first academic exchanges between the two institutions.

Dean Lo delivered a lecture on "Biotechnology and Society" to freshmen undergraduates at the School of Basic Education, and presented a lecture and took part in a forum on "General Education at NTU" for faculty and graduate students at the Institute of Education.

At the School of Life Science, Dean Lo received a briefing on the school's programs and heard research reports from the school's professors. Lo also toured the school's research facilities and laboratories. The school's astrobiology, biochemistry and molecular biology programs are particularly strong, and it conducts research for China's national defense sector, therefore its research resources and facilities are top-notch.

Despite her tightly scheduled visit, Dean Lo gained a sense of the great aspirations BIT's faculty members feel for their institution as well as the dedication and passion they share with their students. Lo found that sharing the same language went a long way in facilitating deep discussion, and she was very impressed with the quality of the BIT student body. The School of Life Science is actively engaged in the scientific community and has expressed its strong desire to cooperate with NTU. The two institutions

## Japanese, Taiwanese Students Study Taiwan's Biodiversity in Summer Field Course

Twelve Japanese and Taiwanese students joined hands in a summer field course exploring the tropical ecology and biodiversity of Taiwan, September 4-13. Offered jointly by NTU, Taiwan's Tunghai University and the University of the Ryukyus, a Japanese NTU partner university, the course took the students to Green Island, an offshore island in the Pacific, and Lienhuachih, a mountain forest in central Taiwan, where they gained hands-on experience about fieldwork and research methods.

Four of the students were from NTU, three from Tunghai and five from the University of the Ryukyus. They were guided by instructors from all three universities.

The course was taught in English, and while some students struggled sometimes to get their ideas across, the instructors showed their concern for the students and passion for knowledge, and managed to keep everybody's spirits high. In the end, the students and instructors interacted closely and the students worked in groups to prepare final presentations, whose subjects included tidal pool crabs and forest spiders.

Despite the limited time available to conduct their fieldwork, the students completed their tasks successfully and obtained satisfactory results for their presentations. The ten-day course not only allowed students to study the science and practice of fieldwork, but also created opportunities for the Japanese and Taiwanese students to learn about each other.

The University of the Ryukyus will host a similar course for NTU and Tunghai students this July. The course will take students to pristine Iriomote Island at the southern end of the Ryukyus Archipelago.



# PAPER ON RED IMPORTED FIRE ANT INVASION ROUTES PUBLISHED IN *SCIENCE*



The fire ant research team shared its results and experiences with guests at the publication ceremony for its *Science* article.

A paper on red imported fire ants coauthored by NTU entomologists was published in *Science* in February.



A paper revealing the global routes of invasion of the red imported fire ant that was co-authored by Prof. Chin-cheng Yang of the Department of Entomology was published in the February 24 issue of the prestigious journal *Science*. NTU held a publication ceremony on February 25 to mark this outstanding accomplishment.

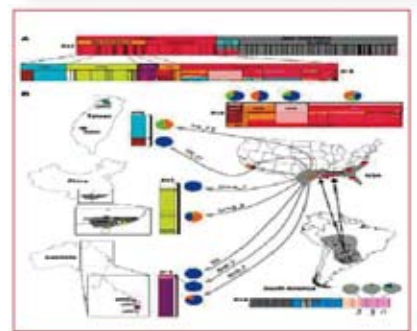
Prof. Yang's co-author on the paper is Marina Ascunce, a postdoctoral associate with the Florida Museum of Natural History on the University of Florida campus. Prof. Cheng-jen Shih and Prof. Wen-jer Wu of the Department of Entomology also contributed to the paper.

Speaking at the ceremony, NTU President Si-chen Lee noted that the red imported fire ant has severely impacted ecosystems, been listed among the top-100 invasive species and wreaked ecological catastrophes. Lee said that, though fire ants have been difficult to control because their routes of dispersion have long remained unexplained by scientists, we finally have the answer. He lauded the excellent research conducted by Prof. Yang in concert with a multinational

team of scientists from NTU, the United States, Australia and Switzerland, and declared that this successful explanation of the evolution and invasion routes of fire ants will rewrite the global effort for controlling the spread of fire ants.

Team member Prof. Wu, who had served as director of Taiwan's National Red Imported Fire Ant Control Center, addressed the audience on the history of the ant's dispersal. After first arriving in the US in the 1930s, it spread quickly to 17 states, infesting up to 200 million hectares by the end of the century. By the first years of this century, the fire ant had managed to cross the Pacific Ocean to reach Australia and New Zealand before eventually showing up in Taiwan, Hong Kong, Macao and China just a few years later.

Prof. Yang noted that the research team used a large volume of genetic markers, including 66 microsatellites, two mitochondrial gene sequences and nuclear genes with high variations, in combination with a full range of genetic analysis and modeling. The results show that



nearly all of the areas suffering fire ant infestations in recent years were invaded independently and that the invasions can all be traced back to US populations.

Prof. Shih said the research not only led to the establishment of a model for the dispersal of the red imported fire ant, it also allowed for the compilation of a comprehensive genetics database that can be provided to a newly invaded country for the rapid identification of the red ant source group. Calling the ant a source of heavy human and environmental damage, Shih said all infested areas had endured severe ecological damage, agricultural losses and human suffering.



⊗ NTU Hospital Superintendant Ming-feng Chen (left) and Dr. Moore exchange cooperation agreements.

## NTU HOSPITAL AND SINGAPORE'S AGENCY FOR SCIENCE, TECHNOLOGY AND RESEARCH (A\*STAR) SIGN COOPERATIVE MOU ON CENTER TO COMBAT LIVER DISEASE



Liver cancer and cirrhosis of the liver rank among the top ten causes of death in Taiwan. Three years ago, NTU Hospital established the "Cirrhosis of the Liver Research Translation Center" to study applications of advanced medical techniques in diagnosing and treating both illnesses. The Center's outstanding results in this effort attracted the attention of Singapore's Agency for Science Technology and Research (A\*STAR), and this morning NTU Director Chen Ming-feng and A\*STAR deputy director Walter Lee signed an MOU to cooperatively set up and operate a "Center of Excellence for Clinical Trials and Research."

A\*STAR is an agency under the Ministry of Trade and Industry, with an annual scientific research budget of US\$430 million. In recent years, it researched diagnostic tools for

cirrhosis of the liver and fibrosis image diagnostics, and has been seeking for suitable partners.

NTU made a number of breakthroughs in liver cancer and cirrhosis of the liver in molecular virology, clinical treatment and genetic therapy. During the past three years, NTU worked with the Industrial Technology Research Institute and several top biotechnology companies in using translation medicine develop treatments for cirrhosis of the liver, liver cancer drugs and liver disease

diagnostic tools, which are all in clinical trial.

The two sides will soon cooperatively undertake clinical research in Taiwan and Singapore. The beginning stage work will be focused on diagnostic tools for cirrhosis of the liver. Hopefully, the fruits of this research will catalyze the development of the biotechnology industry in both countries by nurturing talent in the field and make breakthroughs in biotechnology research in Taiwan and Singapore.

## TSMC and NTU Successfully Develop the World's First 40 Nanometer 3DTV Chip

On February 16, NTU and Taiwan Semiconductor Manufacturing (TSMC) unveiled a jointly-developed 40 nanometer free viewpoint 3DTV set-top box chip, the first of its kind in the world. The chip provides a video image that is more refined and diverse than any current technology and is a major breakthrough in the fields of video processing and semiconductor manufacturing technology in the field of 3D. It will be officially unveiled at the International Solid State Circuits Conference (ISSCC).

Existing 3D image technology produces an image made up of the different angles from which the left and right eye see an image, and as such can only provide viewers with 3D images from a fixed point of view. The 3DTV set-top box chip produced by NTU's DSP/IC design laboratory allows viewers to see images of objects from different angles

## FERMILAB IN USA POSTS ARTICLE COMMENDING NTU PHYSICISTS ON WEBSITE

**F**ermi National Accelerator Laboratory in the United States posted an article by Don Lincoln on its website *Fermilab Today* on March 11 commending high-energy particle physics research conducted by NTU physicists together with a team of international partners. The article, "Searching for a Fourth Generation," is presented here in full.

There are many fascinating measurements that have been made at particle colliders over the years, but perhaps my favorite was done at the LEP accelerator at CERN. After varying the beam energy, physicists made a plot showing the production of Z bosons in comparison to theoretical curves for the existence of two, three and four neutrinos. The data essentially demonstrated that the number of different types of neutrinos into which the Z boson could decay is identically three.

Physicists already know at least three types of neutrinos exist and that each neutrino is associated with its own specific lepton and two quarks. Each grouping of these particles is called a generation,

with generation one consisting of the electron neutrino, the electron and the up and down quarks. Generation two includes the muon neutrino, muon and charm and strange quarks. Generation three consists of the tau neutrino, tau and top and bottom quarks. The precise value of three neutrino types suggested that there are exactly three different generations.

However, if we dig a little deeper, we find that the data actually only demonstrated that there were three light neutrinos into which the Z boson could decay. Additional heavy neutrinos were possible. Given that we see such a huge range of masses in the various quarks (for instance the top quark is about 100,000 times heavier than the up quark) it is at least conceivable that there could be a fourth generation with a heavy neutrino.

Naturally, the only way to be sure is to look for heavier particles of the fourth generation. These hypothetical particles don't (yet) have the quirky names of the known quarks and are simply called  $t'$  and  $b'$  as analogs of the top and bottom

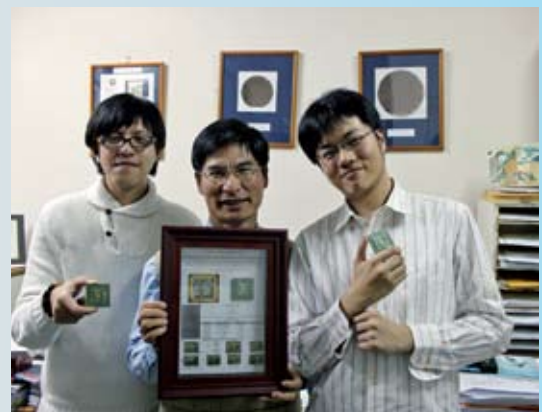


quarks. CMS physicists looked for a  $b'$  quark. Following the patterns observed in the lighter generations, we think that the  $b'$  quark will decay into a top quark and a W boson. The top quark decays in the ordinary way into a bottom quark and another W boson. Because  $b'$  quarks and antimatter quarks are produced at the same time, this doubles the particle count. Physicists then looked for events containing two bottom quarks and four W bosons.

Using the 2010 dataset (which is only a tiny fraction of the data expected to be collected in 2011) the analysis showed no evidence for the existence of a fourth generation, but it demonstrated CMS' ability to quickly search for very complicated experimental signatures.

whatever their position, giving the image a more lifelike quality. In addition, the chip also has traditional HDTV and 3DTV functions, enhancing the image definition of Full-HD by a factor of four.

NTU DSP/IC design laboratory and TSMC first began working together in 2008, with TSMC providing advanced semiconductor manufacturing processes to work on. In recent years, the results of this work have been accepted by the ISSCC. Beginning in February 2010, NTU began to receive 40 nanometer multi-wafer services from TSMC, the first academic institution to receive such services in the world. TSMC's 40 nanometer manufacturing processes and design IP were then utilized to develop an even more advanced 3D chip.

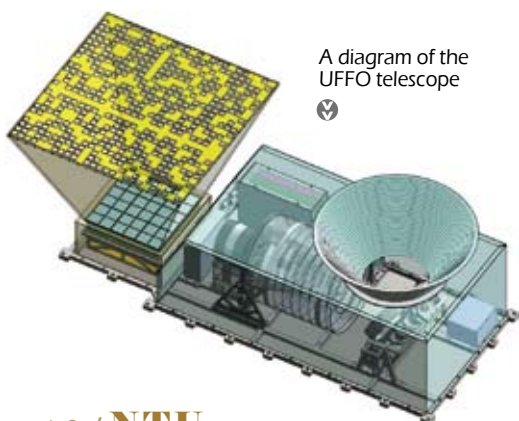


# LECOSPA JOINS INTERNATIONAL SATELLITE TELESCOPE PROJECT MONITORING GAMMA RAY BURSTS



Participants pose for a group photo at a UFFO collaboration meeting.

The Leung Center for Cosmology and Particle Astrophysics (LeCosPA) has joined the Ultra-Fast Flash Observatory (UFFO) project, a new satellite telescope that will observe the instantaneous signals of gamma-ray bursts. The UFFO team was formed by the Korean Ewha Women's University, University of California at Berkeley, Moscow State University and NTU. LeCosPA is not only assembling the telescope's X-ray trigger system, but is also simulating the effects of radiation backgrounds. All project components will be completed by May, in time for final verification testing that commences in June at Taiwan's National Space Organization (NSPO).

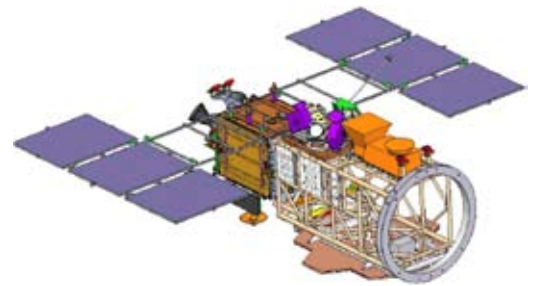


A diagram of the UFFO telescope

For the last two decades, scientific research has seen dramatic breakthroughs in astrophysics and cosmology that have revolutionized our worldview. These discoveries have given rise to further questions for science in the new century, and the search for answers often requires exploring the deepest regions of the universe for signals emanating from the most energetic particles. Gamma-ray bursts are caused by the collapse of massive stars or by the merging of two stars (manifested as neutron stars or black holes). Gamma-ray bursts are the second-most powerful explosions in the universe, emitting most of their energy in the first few seconds from energetic particles. To circumvent confounding effects from Earth's environment and to monitor instantaneous signals from gamma-ray bursts, a satellite telescope, such as that of the UFFO project, is indispensable.

The UFFO telescope is based on microelectronic mechanical systems (MEMS) technology, which can react to transient signals, such as gamma-ray bursts, within one millisecond. The telescope can trace instantaneous gamma-ray burst signals much more effectively than any other existing gamma-ray burst satellite telescope. The UFFO project, therefore, has created a unique scientific opportunity that is at the very forefront of astrophysics.

On the technical side, the Korean collaborators have amassed extensive experience in the development the MEMS-based space telescopes. Their first MEMS-



The Ultra-Fast Flash Observatory telescope

based micro-satellite telescope, MTEL (MEMS Telescope for Extreme Lightning), was delivered to Russia and launched with the Tatyana-2 micro-satellite in February 2009.

Taiwan's UFFO team, by contrast, has a solid background in particle and high-energy astrophysics, cosmology, gamma ray detection, radiation simulations and data analysis. NTU will complete the assembly and calibration of the UFFO X-ray trigger system by May. Besides building the trigger system, LeCosPA has also teamed up with NSPO here in Taiwan to conduct space environment verification testing, control for vibration during launch and monitor the thermal-vacuum variation in the space environment.

The UFFO telescope is scheduled to be launched at the Baikonur Cosmodrome in November. The research and development conducted for the UFFO's MEMS micromirror array is expected to prompt technical and commercial applications in Taiwan. The UFFO project represents a unique opportunity for astrophysics and cosmology. LeCosPA and NTU are excited to be participating in such a significant project.

# NTU INTERNATIONAL STUDENTS ENCOUR- AGE CONTINUED INTERNATIONALIZATION



Strolling about the NTU campus, one often encounters groups of local and international students engaged happily in conversation. The proliferating international students—over one thousand at present—enrolled at NTU each year are transforming the campus into a Little United Nations and introducing new cultures and traditions to local students and faculty in the process. Here, we share some of the experiences and views of three NTU international students.

Chang Han, an exchange student from Jilin University in China, deeply appreciates NTU’s humanistic traditions which span eight decades. Moved by the warmth and friendliness of Taiwan students, Ms. Han regards their congeniality as “the epitome of the friendly people of Taiwan.” As an exchange student here, Han has roomed with local students with whom she studies, and together they take trips to the mountains and seaside, sings karaoke and exchanged life experiences and thoughts about the differences between Taiwan and China. She finds the atmosphere of open dialogue in NTU’s classrooms highly stimulating and believes the university’s professors are good at leading student discussions. Ms. Han also says professors

and students at NTU share a relationship of equality and partnership and that students are free to raise questions at any time.

Ban-chuan Lim, a Malaysian student majoring in Computer Science and Information Engineering, says that NTU’s resources are abundant and its facilities convenient. Lim says that NTU’s instructors are highly qualified and that all of the professors in his department graduated from the world’s finest universities. Also, as a member of the NTU Cake Club, he says the university offers many opportunities to develop interests outside of one’s specialization. Still, Lim says he’s come to realize that the “internationalization” of NTU students is far from complete, noting for example that his schoolmates know very little about the cultures of neighboring Southeast Asian countries and that Taiwan lacks adequate international news reporting.



## Famed Taiwan Author Kenneth Pai Returns to Deliver Kun Opera Lecture



▲ Kenneth Pai, who is playing a major role in a Kun opera renaissance, hopes his Kun opera course becomes a regular aesthetics course at NTU.

NTU is most delighted that the renowned writer Kenneth Pai returned here to his alma mater to present a lecture as part of the seminar “Kenneth Pai’s Talks on Literature” this semester. Dr. Pai graduated from NTU’s Department of Foreign Languages and Literatures a half century ago, and is considered among Taiwan’s greatest living novelists. He taught literature at the University of California, Santa Barbara, for 29 years and has also offered courses at Peking University and Soochow University in China. The seminar was made possible by a generous donation from Trend Education Foundation founder Jenny Chang.

To mark this momentous occasion, NTU President Lee made a point of welcoming Dr. Pai at the opening of his lecture on February 25. Due to the great enthusiasm surrounding Pai’s lecture, which covered “The New Aesthetics of Kun Opera,” Trend Education Foundation set up a live internet broadcast, making it available to students unable to enroll in the course as well as to the general public.

The Graduate Institute of Taiwan Literature reports that 2,386 students, local and foreign, registered for the course; but, since the lecture hall was too small, 400 students were selected at random to take the class in person. Dr. Pai was delighted by the deep interest in the course shown

by students and the public, and hopes it will become a regular aesthetics studies course in the program.

The course takes as its starting point the legacy and reemergence of a rich Chinese culture in Taiwan, and then explores Kun Opera and its diverse artistic expressions. The broad range of topics covered include a diachronistic analysis of Kun Opera’s historical development, the “four skills” and “five methods,” the division of roles, and concepts behind new Kun Opera scripts. The course also addresses the enhancement of people’s listening and viewing experiences during performances through the use of costumes and stage and lighting design, the interweaving of music and movement, and the integration of calligraphy, painting and the guqin zither. The plots and characters of well-known works such as *The Peony Pavilion* and *The Jade Hairpin* are also analyzed, all in an effort to present the beauty of this Chinese operatic art.

Other events were arranged in coordination with the teaching of this course. One was the month-long exhibition, “The Birth of the New Aesthetics of Kun Opera—a Photographic Record by Hsu Pei-Hung,” which opened in the NTU Main Library on March 4. In addition, the Suzhou Kunqu Opera Theater of Jiangsu Province in China was invited to present three performances in April. These performances give the students the opportunity to appreciate Kun opera in all of its depth and texture as it is performed on stage rather than as simply a subject for study.

Kun opera is a sophisticated form of Chinese opera, and although UNESCO has listed it among the Masterpieces of the Oral and Intangible Heritage of Humanity, its survival as a living art is uncertain. Dr. Pai is one of the concerned people working to ensure that Kun opera will continue to be enjoyed live by audiences for years to come.

▲ Four hundred lucky students, just one-sixth of those that registered for the course, were able to enroll in “Kenneth Pai’s Talks on Literature.”





## Memorial Lecture Marks 103rd Anniversary of Former NTU President Chien's Birth

NTU held a memorial lecture on February 11 to mark the 103rd anniversary of the birth of former NTU President Szu-liang Chien, a noted chemist who gave selflessly as NTU president from 1951 to 1970. Chien held many important posts in education and government throughout his career, including president of Academia Sinica.

Current NTU President Si-chen Lee served as moderator while Dean Chun-chien Huang of the Institute for Advanced Studies in Humanities and Social Sciences was the speaker. The topic of the lecture was "New Challenges to University Education in the 21st Century: Discussing the NTU Spirit and Szu-liang Chien."

In his lecture, Dean Huang compiled a vast range of materials to present his astute and incisive discussion of educational concepts in China and other parts of the world from classical to modern times, as well as the impact of history and politics on education. Huang commended former President Chien's diligence and sense of responsibility, even quoting Confucius to express Chien's greatness. He pointed out that the former president had stood up to political power just as Confucius had done.

As moderator, President Lee emphasized that education should remain the principal mission of university education, and that academic research necessarily follows closely in importance. Lee said education improves life by instilling cultural values, and that it continues to allow those receiving an education to achieve their goals while laying a solid groundwork for the spirit of community service (life education). He declared that every one of the world's renowned institutions of higher learning throughout history has focused on education above all, and that this has never changed.

President Lee noted further that a few universities in some Asian countries have adopted Western-oriented educational policies but he believes this approach will achieve only limited results. He said that, with the G20 gradually becoming the G2, all of the finest universities in Europe and North America are striving to strengthen their Chinese education programs. Lee added that, with Chinese already being used for information and computer technology, the potential for it to become a global language is growing and it is therefore important to maintain this advantage.

## Leading Alumnus in Nonlinear Optics, Dr. Shen, Honors NTU German Physicist Kroll

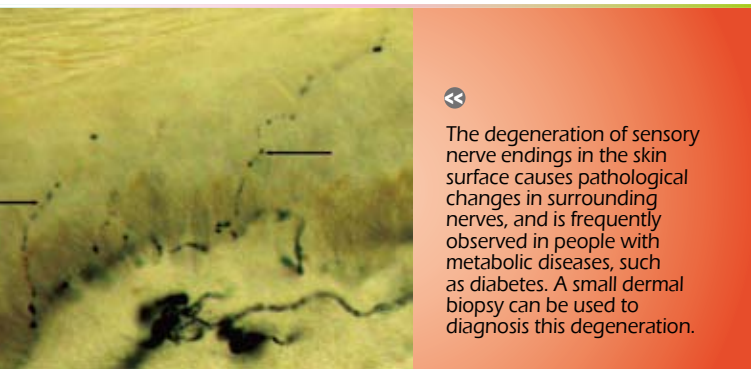


Leading nonlinear optics physicist Dr. Yuen-ron Shen, an NTU alumnus who is currently professor emeritus of physics at UC Berkeley, visited NTU March 8-9 to engage in academic exchanges with NTU faculty and administrators as well as share his reflections in a talk on the startling advances made in nonlinear optics during the past 50 years. Shen delivered his speech at a symposium dedicated to Dr. Wolfgang Kroll, the German physicist who was responsible for building the physics program at NTU after arriving in Taiwan some sixty years ago in 1941.

Dr. Kroll conducted research with the great German quantum physicist Heisenberg for seven years during the 1930s. He is revered in Taiwan for educating generations of Taiwan physicists. Kroll's students, in turn, have gone on to raise the quality of physics education and research in Taiwan to world-class levels and even, as in the case of Dr. Shen, become leaders in their fields.



## Advanced Testing Benefits Diagnosis and Study of Neuropathic Pain



The NTU College of Medicine and NTU Hospital have established a complete assessment system to better help patients who suffer neuropathic pain. Encompassing advanced pathology, physiology and imaging testing, this system not only yields more accurate diagnoses than traditional approaches, it benefits studies into the causes of neuropathic pain and the devising of effective remedies.

The most commonly observed cause of chronic neuropathic pain is the degeneration of nerve endings

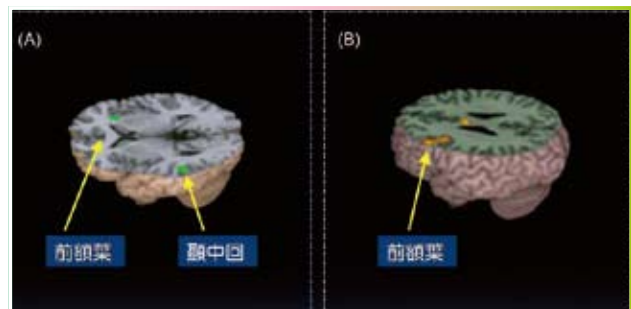
that reside in the most outer layer of skin. Therefore, the college and hospital have instituted small dermal biopsy testing for sensory nerve damage to obtain empirical data for diagnosing the pathological states of nerves. The first of its kind in Asia, the system is superior to traditional nerve biopsies. Like minimally invasive procedures, it causes only a light abrasion of the skin yet enables the physician to easily “observe” damage to nerve endings rather than rely solely on the patient’s subjective descriptions. For this reason, the international neuroscience community has recognized this testing as a new standard diagnostic tool.

As the nerves of the skin surface convey heat as well as pain, NTU neurologists have also measured heat evoked potentials to establish an atlas of heat evoked potentials for neuropathic pain, thus providing independent physiological evidence for the diagnosis of pain. Besides serving as an effective diagnostic and evaluation tool for patients, this system opens up new directions and opportunities for the neurobiological study of pain by allowing deeper explorations of the relationships between brain structure and function.

## Psychologist Explores Influences of Cultural Differences on Language Processing

Prof. Tai-li Chou of the Department of Psychology performed experiments using functional magnetic resonance imaging that shed light on how cultural differences shape the neurological mechanisms behind language processing. Chou seeks ultimately to identify the physiological foundations for language deficiencies in children. The experiments took advantage of differences between Chinese speakers and speakers of alphabetical languages, such as English, in the neural processing of word form, word sound and word meaning.

Prof. Chou and his research team found that, on the one hand, for children who are native speakers of English, neurological activity in the prefrontal lobe of the right hemisphere and the middle temporal gyrus of the left hemisphere increases with age when they are processing the meaning of a word. When the team tested children who are native speakers of Chinese when they are processing word meaning, on the other hand, they discovered both similarities and dissimilarities in the location of brain activity compared to English speaking children.



(A) Activity in the right prefrontal lobe and left middle temporal gyrus of American 9-15 years olds. (B) Weak activity in the left prefrontal lobe of American 8-14 years olds with reading difficulties.

The tests show neurological activity increases with age in both the prefrontal lobe and middle temporal gyrus of the left hemisphere of young Chinese speakers. Chou attributes this to the existence of a more direct correspondence between the form of a word and the meaning of a word in Chinese than in English.

Also, due to the higher occurrence of homophones in Chinese than in English, the experiments reveal Chinese speaking children experience greater neurological activity in the prefrontal lobe of the left hemisphere when they are processing the sound of a word than do English speaking children.

## President Lee Declares NTU Right Choice at Azalea Festival Opening

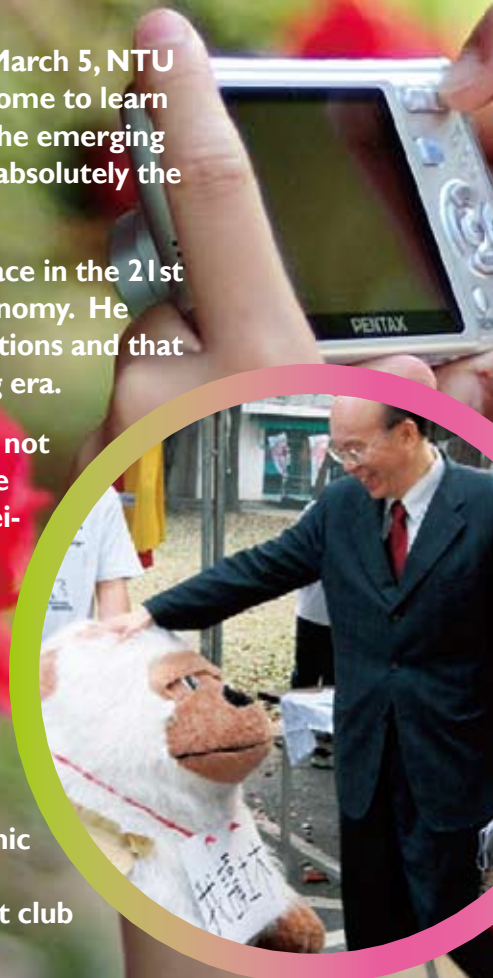
As the warm weather of spring arrives each March, the campus' countless azaleas burst forth in a magnificent display of white dancers adorned with every shade of red and pink and purple. Inspired by this perennial spring flower show, the university holds its annual month-long NTU Azalea Festival, enlivening the campus with a fantastic explosion of colorful events and activities.

Speaking at the opening ceremony of this year's festival on March 5, NTU President Si-chen Lee told the high school students who had come to learn about NTU that the university has prepared well to confront the emerging trends of the 21st century and declared that selecting NTU is absolutely the right choice.

President Lee stated that the first major trend NTU must face in the 21st century is globalization while the second is the knowledge economy. He proclaimed that the university has made all necessary preparations and that all of its courses are designed to meet the needs of the coming era.

Lee noted that, although NTU drew criticism in the past for not making an effort to recruit students because of its status as the first choice of most students, it was former NTU President Wei-jao Chen who decided to hold recruitment activities after high school students have taken their university major proficiency tests yet before the test results are announced. He added that the Azalea Festival offers the ideal opportunity to hold such an activity.

That day, the prospective undergraduates freely followed their interests in exploring NTU's academic and extracurricular activities at the fascinating department and student club exhibitions.





# ***Improving Economy Draws Record Number of Employee Seekers to Career Fair***

**On March 13, a record number of companies seeking to hire employees from the talent pool of NTU's graduating class manned booths at the NTU Campus Career Fair. In all, 205 enterprises set up 287 booths to plug their businesses at the fair, which is an annual event held by the NTU Career Center.**

**The success of this year's fair is a reflection of the improving economic climate, and a record number of job openings were on offer. Openings were available in a broad spectrum of employment sectors, including high technology, finance, traditional industry, creative industries and medicine, as well as the military and government.**

**The career fair also attracted for the first time Taiwanese businesses based in China and a delegation of businesses from Singapore.**



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