

Composer Shui-long Ma Receives Honorary Doctorate

NTU, Pfizer Clinical Trial Partners
Int'l Efforts to Develop Organic Solar Cells
Film Festival Features Taiwan Cinema

Special Report
Cross-Strait Academic Alliance



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NTU AT A GLANCE

History Gallery Holds Creative Exhibits and Acquires New Treasures



From the President's Office

In 1996, NTU supported an innovative Digital Library plan. That same year, a professor at Stanford was working on a similar plan. Two of the professor's PhD students went on to design a search engine, and two years later formed a company that changed the history of the Internet—Google.

Although NTU and Google had developed similar innovations, Taiwan's academic and societal resources were insufficient to help commercialize our innovation. Taiwan is much more mature now, boasting such fields as biomedicine, biotechnology and high technology, and we should not continue to miss opportunities to realize the potentials of our innovations.

In the knowledge economy of the 21st century, a university should contribute to the creation of new industries. Research achievements should not produce only journal articles and research plans, but be transformed into new businesses. For this purpose, NTU alumni from the business community established the Start-up Association this year. It aims to span the gap between academia and industry by taking advantage of the business community's resources in order to realize the potentials of NTU's ideas. The Office of Research and Development has also opened the Innovation Realization Center, which aims to help students and faculty members transform their patents and papers into product prototypes and attract industry investment.

As for students with a taste for entrepreneurship, I believe passion and courage remain most important. Still, budding entrepreneurs must remember they will require other skills, such as resource acquisition and organizational management; for they cannot realize their dreams in a single day. I look forward to students accumulating the powers of innovation and taking that first step with courage.

李嗣吟

President
Dr. Si-chen Lee

PRESIDENT LEE WANTS TO PRODUCE NOBEL LAUREATE BY NTU CENTENNIAL

NTU celebrated its 84th Anniversary with a special ceremony at the NTU Sports Center on November 15. With President Si-chen Lee presiding, the anniversary celebration welcomed former NTU presidents as well as alumni and honored guests from around the world. During the ceremony, President Lee bestowed an honorary doctorate on Prof. Shui-long Ma and commended eight outstanding alumni. President Lee shared his aspirations for NTU's centennial anniversary with the audience, declaring his desire to lead the university into the ranks of the 50 most elite universities in the world by its 90th anniversary and produce a Nobel Prize laureate by its centennial.

Prof. Shui-long Ma has dedicated over half a century of his life to music. Having first taught himself music and fine arts, Prof. Ma went on to become a distinguished composer. His compositions combine the traditional and modern, Eastern and Western, and feature a diverse range styles and forms. Prof. Ma is a pillar of the music community in Taiwan who always seeks to build on the old to create the new. He has also devoted his life to the promotion of music education in the schools and in the larger community, and has made outstanding contributions. In the community, Prof. Ma has inspired students with his arrangements of traditional folk songs for piano teaching material. He has led the public to appreciate modern music through his compositions of popular yet sophisticated works, such as his beloved Bamboo Flute Concerto. Prof. Ma's contributions to institutional music education are impressive. He played an important role in the establishment of the Taipei National University of the Arts. As the university's second president, he boldly tried new approaches and had far-reaching impact. He developed a comprehensive music curriculum based on Chinese and Western styles while fostering



the students' appreciation of traditional culture. It was for Prof. Ma's accomplishments and contributions that NTU presented him with an honorary doctorate.

This year's outstanding alumni are: in the arts and humanities, Yong-yih Tseng (Department of Chinese Literature) and David Der-wei Wang (Department of Foreign Languages and Literatures); in academics, Louise T. Chow (Department of Agricultural Chemistry) and De-maw Chuang (School of Pharmacy); in commerce, Chee-chun Leung (Department of Physics); in community service, (Department of Electrical Engineering); and for general contributions, Yueh-shen Weng (Department of Law) and Chintay Shih (Department of Electrical Engineering). In addition to being commended for their distinguished contributions, the eight alumni were invited to speak about their lives and careers as part of NTU's continuing education forums.

A broad range of events were arranged to celebrate the university's anniversary this year. These included museum exhibitions, musical performances, a lecture series and more. Further information may be accessed at <http://www.ntu.edu.tw/activities/festival2012/index.html>



President Si-chen Lee Presents Vision in NTU Anniversary Speech

The following is an excerpt from President Si-chen Lee's 84th NTU Anniversary speech.

Today, we have come to celebrate the 84th anniversary of the founding of National Taiwan University, and every member of the NTU family is filled with joy in welcoming this historically significant day. This year's anniversary is especially worth marking for me because I am near the end of my second term as NTU president, and this is the last time I will preside over the anniversary ceremony.

All of the elite universities of the world boast of possessing the following qualities: the finest faculties and students, abundant resources for the development of comprehensive academic disciplines, superlative educational and academic research reputations, and provision of scientific analysis and policy recommendations regarding pressing societal issues. NTU has taken three steps in its quest to join the ranks of the elite world universities: first, we have presented our vision and strategies to achieve it; second, we have reshaped the campus atmosphere; and third, we have infused plentiful resources to spur creativity.

In the first stage of the Aim for the Top University Project, we declared our vision of joining the ranks of the world's top 100 universities by NTU's 80th anniversary, and we achieved that goal within just a few years. Last



year, in the second stage of the project, we presented our vision of becoming one of the world's top 50 universities by NTU's 90th anniversary. I have yet another vision, that of NTU producing a Taiwanese Noble laureate by its 100th anniversary.

The 21st century is the era of the knowledge economy, and universities are the places with the highest concentrations of knowledge.

As such, they should contribute to the creation of new industries. I am hopeful that, by its 100th anniversary, NTU will, like Stanford and Harvard, foster an innovative global business, such as Google or Facebook.

Today, we honor the distinguished composer and educator Prof. Shui-long Ma for dedicating his life to music education and creation, and recognize these eight outstanding alumni for their exceptional achievements in the areas of academics, commerce and industry, community service and the development of the nation.

Today, as we celebrate the 84th anniversary of the university's establishment, I present my vision for NTU's 100th anniversary in hopes that my successor will endeavor to realize it. I wish NTU a happy birthday, and I wish each and every honored guest, faculty member and student good health and all the best. Thank you.

DUAL-DEGREE AGREEMENT SIGNED WITH PEKING UNIVERSITY



NTU and Peking University signed a memorandum on dual-degree programs at the Grand Hotel in Taipei on November 3. NTU President Si-chen Lee and Peking University President Zhou Qifeng both presented speeches at the signing ceremony. Finding it difficult to conceal their excitement over the dual-degree agreement, both parties looked forward to promoting substantial exchanges and taking higher education in Taiwan and China into a new era.

While in Taiwan for the signing ceremony, President Zhou's delegation accepted the invitation of the Department of Athletics to attend a banquet for the Sixth Friendship Games between NTU, Chinese University of Hong Kong, and Peking University.

NTU HOSPITAL AND PFIZER BUILD ON CLINICAL TRIAL PARTNERSHIP



Senior officials and honored guests come together for a group photo.

NTU Hospital and Pfizer Inc. inked an agreement to cooperate on clinical research for new pharmaceuticals under Pfizer's INSPIRE (Investigator Networks, Site Partnerships and Infrastructure for Research Excellence) Site Program during a signing ceremony held at the hospital's National Center of Excellence for Clinical Trial and Research in November. Pfizer is the world's largest drug research and manufacturing firm, and its decision to team up with NTU Hospital shines a bright light on the hospital's world-class research capabilities. Pfizer Taiwan invests over NT\$100 million in new drug research annually and has brought numerous early-stage clinical trials as well as large-scale clinical trials to Taiwan.

The hospital and drug maker have enjoyed an excellent research cooperation relationship. Since 2009, the NTUH-Pfizer Clinical Research and Development Center has carried out 43 clinical trials on new drugs, demonstrating the high quality of research conducted at NTU Hospital. Now, by deepening the ties between the university and Pfizer through the INSPIRE Site Program, the hospital looks forward to achieving the double benefits of raising research standards for new drugs in Taiwan as well as creating a healthier world for the people of Taiwan.

NTU Hospital Superintendent Ming-fong Chen and Dean of the College of Medicine Pan-chyr Yang joined Pfizer Taiwan Country Manager David Lin and Pfizer Global Leader for Investigator Development and Networks Bridgitte Attwood in signing the agreement at the ceremony, which was also attended by a number of high-level government officials. By combining the strengths of NTU Hospital and Pfizer, the cooperation program is expected to promote the global development of medical treatment and biotechnology and enhance the health of the Taiwanese people.

NTU Hospital boasts the finest talent and research environment in the Asia-Pacific region, and its

new medicine clinical trial research capabilities have garnered the affirmation of international pharmaceutical companies. As a result, the hospital has been contracted to carry out a wide range of clinical trials for new drugs and lead numerous international clinical trial research projects. Signing this agreement with the world's leading new drug research and development company puts Taiwan's new pharmaceutical research and development efforts more closely on track with the international drug development community and strengthens the nation's new drug clinical trial research capabilities.



NTU Hospital Superintendent Ming-fong Chen and Pfizer Taiwan Country Manager David Lin ink the INSPIRE agreement for clinical research on new drugs.

Pfizer leads the world in advancing prevention, treatment and new drug development for the diseases affecting people around the world. It is presently running 87 new drug research projects; among these projects, eleven have already entered the review stage, 19 are conducting clinical trials in Phase III, 30 are in Phase II and 27 are in Phase I. These projects are developing medicines for such diseases as cardiovascular and metabolic diseases, inflammation and immunological diseases and central nervous system diseases as well as pain and cancer, and are working to prevent diseases through vaccinations.

NTU DELEGATIONS VISIT STRATEGIC UNIVERSITIES IN US AND VIETNAM



NTU continues to demonstrate its commitment to internationalization by aggressively expanding and strengthening exchange and cooperation agreements with its partner universities. In pursuit of these goals, Vice President for Academic Affairs Ching-hua Lo led delegations of NTU officials to visit several strategically important universities in the United States and Vietnam this fall.

In late September, Vice President Lo led a delegation to the University of Illinois at Urbana-Champaign (UIUC), Purdue University and the University of Chicago to observe their campuses and discuss student exchange and special course programs. The delegation included Dean for International Affairs Hsiao-wei Yuan, Associate Dean for International Affairs Shang-hsien Hsieh and Prof. Chun-yen Chang of the Department of Horticulture and Landscape Architecture.

NTU's colleges of bioagriculture, electrical engineering and computer sciences, engineering, management and social sciences have closely cooperated and interacted with UIUC for a long time. During the delegation's visit to the UIUC campus, the two sides worked out the details of

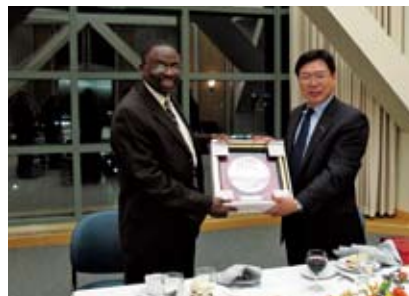


Members of the NTU Alumni Association of Greater Chicago celebrate the Mid-Autumn Festival.

Chancellor Phyllis Wise's upcoming trip to Taiwan at the invitation of the Ministry of Education, discussed the arrangement of joint symposia, and invited students and faculty to participate so as to come up with more opportunities for



deep affections for their alma mater; around 40 joined the party. Vice President Lo and Dean Yuan briefed the alumni on the current situation at NTU; the alumni were pleased to hear that NTU is making such great progress.



cooperation between the two institutions. Additionally, NTU is preparing to sign a student exchange agreement with UIUC and to organize a special landscape and health program to provide further opportunities for NTU students to study abroad.

The delegation arrived in Chicago on the day of the Mid-Autumn Festival, so the NTU delegation met with the NTU Alumni Association of Greater Chicago to celebrate. The Chicago area is home to over 200 alumni, most of whom are older and hold

Shortly after returning from the United States, Vice President Lo again set off in late October to head a delegation of eleven professors to Ho Chi Minh City University of Technology (HCMUT) to recruit outstanding Vietnamese students. NTU and HCMUT officials met on numerous occasions before this trip. HCMUT is Vietnam's leading technology university and all of its courses are taught in English. NTU President Si-chen Lee has created two scholarships especially for HCMUT students because he sees them as excellent candidates for study at NTU.

MANAGEMENT PROFESSOR NAMED EDITOR OF PRESTIGIOUS TRANSPORTATION JOURNAL

Prof. Jiuh-biing Sheu, a distinguished professor of the College of Management's Department of Business Administration, has accepted the editor-in-chief position at the prestigious international journal *Transportation Research Part E: Logistics and Transportation Review*. Prof. Sheu's three-year term will commence in 2013.

Transportation Research Part E (TRE) is an international academic journal with a long history that was established in the United States and is part of the six-journal series *Transportation Research Parts A, B, C, D, E, F*. Publishing cutting-edge academic papers on primarily distribution, supply chain management and freight transport, the journal is recognized internationally as one of the top five journals in the field of logistics and transportation. It is covered by both the Science Citation Index and Social Sciences Citation Index; with a five-year impact factor of 2.126, its latest impact factor is 1.648.

TRE has published six issues per year for the past 48 years. It has one editor-in-chief, eight associate editors, a 17-member editorial advisory board and a team of paper reviewers.

Prof. Sheu has served as a *TRE* associate editor since 2004. At the time Editor-in-Chief Wayne Talley invited Prof. Sheu to be an associate editor, the other associate editors were all major international scholars mostly from Europe and the Americas, while Prof. Sheu was still an associate professor and the only associate editor

from Asia. Since taking up that position, a day has not passed that he hasn't striven to make the journal better.

TRE's publisher Elsevier introduced a new policy this year that limits the editor-in-chief's term to three years with the possibility of serving a second term. Consequently, Dr. Talley, who has already served as editor-in-chief for 13 years, stepped down and joined Elsevier in calling on Prof. Sheu to take up the position starting in 2013. In fact, as of November, Prof. Sheu has already officially taken over the journal's operations and begun organizing a new team of associate editors.

Prof. Sheu says that when he accepted the position he felt a profound sense of respect and humility because by accepting the responsibility of the success or failure of a journal he would be instantly involved in the research, as well as the effectiveness of its publication, of contributors from around the world. Moreover, it was no longer a question of his personal honor, but one of taking up a higher responsibility to international academia.

The self-effacing Prof. Sheu says that his abilities are limited and that it is only due to his determination and foolhardiness as a scholar that he has been able to maintain to courage to make it to where he is today. He adds that he has now come to fully appreciate that the triad of the scholar's life—research, publication and editing—is a lonely road indeed.



Postgraduate Receives Asian Young Researcher Award in Magnetics



The Asian Union of Magnetics Societies presented two major annual awards at the AUMS International Conference in Nara, Japan in October. Son-hsien Chen, a postgraduate research student in the Department of Physics, was among four young scientists who were presented the AUMS Young Researcher Award. Chen received his award in recognition of his significant contributions to the gauge field theory of the spin-orbit interaction and the theory of spin injection. The Young Researcher Award was also presented to two researchers from Japan and one from China.

The 2012 AUMS Award was presented to two scientists: Dr. Kazuhiro Ouchi, professor emeritus at the Akita Industrial Technology Center in Japan, for his significant contributions to granular magnetic recording films for high-density perpendicular magnetic recording media, and Dr. Chia-ling Chien, Jacob L. Hain Professor of Physics at The Johns Hopkins University Department of Physics and Astronomy, for his seminal contributions to magnetic materials, nanostructures, and magnetoelectronic phenomena and devices.

Hydrotech Engineer Honored with Trefftz Methods Award

Prof. Frank Der-liang Young of the Department of Civil Engineering and the Hydrotech Research Institute has been honored with the ICCES Special Award in Trefftz Methods for his “long-lasting and seminal contributions to the development of Trefftz methods to solve a broad class of problems in engineering and the sciences.” The award was presented by the International Conference on Computational Experimental Engineering and Sciences at the ICCES Special Symposium on Meshless Methods (ICCES MM’12) in Montenegro on September 4.



After accepting his award, Prof. Young delivered an acceptance speech on “Applications of Methods of Fundamental and Particular Solutions to Some Hydrodynamics Problems.” Besides receiving the award, Prof. Young was named chair of the Permanent Executive Organizing Committee for ICCES MM.

ICCES was founded in 1986 by Satya N. Atluri, a distinguished professor in the Department of Mechanical and Aerospace Engineering at the University of California, Irvine. The ICCES Special Award in Trefftz Methods was established to commemorate German applied mathematician and mechanical engineer Erich Trefftz (1888-1937) for his pioneering work on meshless and other novel computational methods. Prof. Young was the first Taiwanese scholar to receive this international honor.

Prof. Young has spent the last decade developing novel meshless methods for scientific computation to make up for weaknesses in the commonly used mesh-dependent methods, including finite difference methods, finite element methods, finite volume methods and boundary element methods. Meshless methods are semi-analytical methods based on strong formulation. They are used only for radial basis functions related to distance and do not require the establishment of numerical integration. Meshless methods thus easily can be extended to complex computational problems in engineering and science, such as multiple dimensions, time-variant systems, non-linearity and coupling. They currently rank among the scientific computation methods that show the greatest potential.

Prof. Frank Der-liang Young (right) of the Department of Civil Engineering poses with Satya N. Atluri (left), who is the founder of the International Conference on Computational Experimental Engineering and Sciences a distinguished professor at the University of California, Irvine.



YOUNG INTERNATIONAL SCHOLARS TEAM UP TO DEVELOP ORGANIC SOLAR CELLS

NTU hosted a session of the Global School for Advanced Studies, September 17-21. This "Session on Organic Solar Cells" offered a platform for young scholars to enhance their knowledge of organic solar cells and to build their collaboration and communication skills in an international setting. The mission of GSAS is to foster the next generation of global leaders who will be tasked with solving pressing global challenges in energy, health, and the environment. GSAS Director Dr. Robert Chang of Northwestern University (United States) joined Prof. Wei-fang Su of the NTU Department of Materials Science and Engineering to chair the event.

The session included 17 PhD and postdoctoral students from NTU,

NWU, MIT, the University of Chicago, UC Santa Barbara, University of Delaware, University of Newcastle and National Chiao Tung University. Seven world experts on organic solar cells served as GSAS fellows who presented lectures and mentored the young scholars together with the session chairs.

The lectures offered insights into how to develop an idea and take it from the raw materials stage to a final product. After attending the lectures, the students were grouped into four teams that were balanced across disciplines and asked to formulate a competition research proposal.

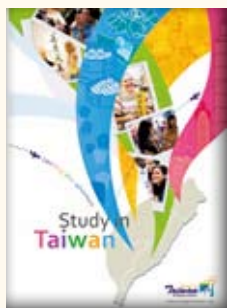
The two winning proposals were: "Donor-acceptor-acceptor block



copolymers for high-efficiency solar cells" from UC Santa Barbara-NTU, and "Vertically-aligned semiconducting oxide nanorod arrays for high-performance solar cells" from Delaware-MIT-NTU.

ICLP INVITES OIA TO INTRODUCE INTERNATIONAL DEGREE STUDENT PROGRAMS

At the invitation of the International Chinese Language Program at NTU, Office of International Affairs staff visited the ICLP on November 9 to introduce NTU's international degree student graduate programs to ICLP students interested in enrolling at NTU.



OIA staff briefed the ICLP students on a wide range of information about NTU, including its history, various campuses, internationalization data, and ratio of international students. They also explained NTU's application procedures and informed the students about degree student life, including the student club activities, for-credit Mandarin courses for graduate students and the services of the NTU International Student Emergency Support Team. The OIA hoped that, by presenting a multifaceted array of information, the students could be broadly familiarized with NTU and have a sense of what their lives would be like as international degree students.

As a final note on this event, an international student from the ICLP wrote a news article in Chinese about the OIA briefing for the ICLP's electronic bulletin. It appeared in Issue 78 of the bulletin under the title, "Being an International Student at NTU: An Opportunity Worth Taking."

ICLP, the world's premier institution for the instruction of both modern and classical Chinese, was established in 1963 as the Inter-University Program for Chinese Language Studies. Since then, it has offered intensive language training to over 2,000 students from more than 20 countries.

The OIA is looking forward to more opportunities to join ICLP in promoting NTU's international student programs.



Ⓐ Chief Judge Randall Rader of the US Court of Appeals Federal Circuit shares his experiences regarding the review and practice of patent litigation.

JUDGES AND EXPERTS ADDRESS PATENT LITIGATION AT INTERNATIONAL CONFERENCE



Ⓐ Participants assemble for a photo at the opening of the International Conference on Patent Litigation and Non-Practicing Entity Trends.

The College of Law and Industrial Technology Research Institute hosted the International Conference on Patent Litigation and Non-Practicing Entity Trends here at NTU on October 30 and 31. The conference invited judges and intellectual property rights scholars and experts from the United States, Germany, Japan, South Korea and France to share their insights on recent trends in patent litigation and the rise of non-practicing entities around the world. The event drew over 400 participants.

The motivation for organizing the conference was the tempest that hit Apple after their tablet computers appeared on the market; the storm led to heated debate around the world. Patent litigation is not only highly technical, but also occurs under intense time pressure, and it is frequently used as a means to block competitors from entering a market. Given the fierce patent wars over tablet computers and smart phones that have erupted among such parties as Apple, Samsung, Motorola, HTC and Google in the United States and Europe in recent years, it is not difficult to observe the trends in the implementation of patent litigation strategies.

The views and opinions of the legal communities in countries around the world on high technology patent litigation are sufficient to influence the litigation strategies adopted by high technology industries. In order to enable Taiwan's high technology industry and legal community to better understand recent changes in international patent litigation, especially the viewpoints of the legal community in the United States on such issues as the patent litigation battles involving Apple, the conference organizers invited three highly-experienced judges from the US Federal Circuit, US District Courts and the US International Trade Commission as well as practicing American attorneys to share their experiences in the review and practice of patent litigation.

Among the keynote speakers were: Chief Judge Randall Rader from the US Court of Appeals Federal Circuit, who enjoys an international reputation

for his expertise in intellectual property rights litigation; Judge Theodore Essex from the USITC, who presided over the patent case between Motorola and Microsoft concerning Android; and Magistrate Judge Paul Grewal from the US District Court for the Northern District of California, who heard the patent case between Samsung and Apple.

Non-practicing entities, which do not commercialize their patents, but use them to initiate litigation against other companies for patent infringement, have drawn much attention in recent years. The impact of NPEs on businesses is growing gradually, and Taiwanese enterprises presently face hundreds of patents cases initiated by NPEs. The conference held an open forum to address the most pressing issues involving NPEs for enterprises, including the America Invents Act, standard/essential patents, availability of injunctive relief and FRAND (fair, reasonable, and non-discriminatory terms).

OVER 1,200 STUDENTS AND PARENTS ATTEND STUDY ABROAD FAIR

The Office of International Affairs held the 2013/2014 NTU Study Abroad Fair in coordination with the university's 84th Anniversary activities on November 10.

More than 1,200 students and parents attended the fair to check out booths set up by universities from around the world and listen to explanations of NTU's outgoing summer program and outgoing exchange student program. The attendees expressed great interest in NTU's abundant study abroad resources.

Along with the growth in the importance of overseas study experience, the Office of International Affairs has spared no effort in introducing a variety of study abroad programs. The annual Study Abroad Fair invites students and representatives from NTU partner universities to set up booths promoting the strengths of their institutions as well as the special cultural features of their countries or regions. Universities that are unable to participate in the fair also provided promotional materials



welcoming NTU's students to study at their schools as exchange students.

Each year the outgoing summer program section of the fair presents students with a wide range of options not provided through NTU's exchange student program. Among the international universities promoting their exciting exchange programs this year were such prestigious institutions as the University of Heidelberg, University of California, Berkeley, and Stanford University. Oxford University's Hertford College sent a special representative to provide interested students with first-hand information and advice and present a briefing on the college's summer programs for 2013.

Registration for the selection process for participation in NTU's highly-anticipated outgoing exchange student program has already kicked off. The OIA held a special explanation meeting about the program during the fair in order to allow students to better understand the selection process, rules and other information regarding the 2013/2014 academic year. During the meeting, Dean for International Affairs Hsiao-wei Yuan joined Associate Dean for International Affairs Shang-hsien Hsieh in telling the students what preparations were necessary for taking part in the exchange program's selection process and providing detailed explanations about application deadlines, online registration, scholarships and the features of the campus areas at NTU's partner universities. The European Union Center in Taiwan and Language Training and Testing Center also took part in the fair, informing students about the range of exchange program resources at their disposal.

Online registration for the selection process for the 2013/2014 academic year's outgoing exchange student program began on November 19. More information about NTU's study abroad programs is available on the OIA website (www.oia.ntu.edu.tw).

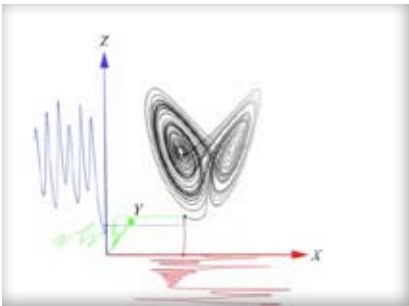




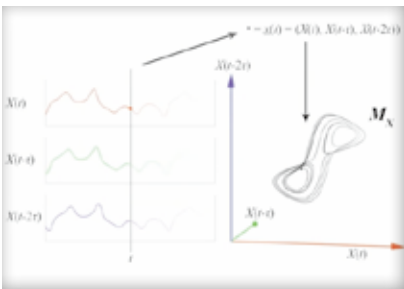
SCIENCE ARTICLE SHEDS LIGHT ON CAUSALITY IN COMPLEX ECOSYSTEMS

An international team of researchers, including Prof. Chih-hao Hsieh of the Institute of Oceanography and Institute of Ecology and Evolutionary Biology, published the results of its cutting-edge research aimed at identifying causal networks in the October 26 issue of the prestigious journal *Science*. The team's article, "Detecting causality in complex ecosystems," introduces a new method for analyzing the causal relations between biological and non-biological elements within ecological systems.

A causal relationship does not necessarily exist between two



(a) Time Series and Dynamic Systems. <http://youtu.be/7ucgQE3SO0o>



(b) Takens' Theorem and Shadow Manifolds. <http://youtu.be/rs3gYeZeJcw>

things just because they appear to be correlated. This can be illustrated through a simple example from life: During the summer, people



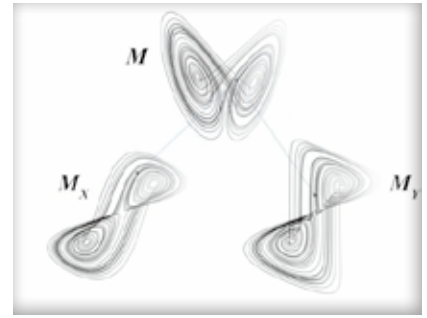
Prof. Chih-hao Hsieh's website

become easily impatient and irritable, while sales of ice cream go up as well, so there is a strong statistical relationship between impatience and irritability and ice cream sales volumes. Nonetheless, there is in fact no causal connection between the two; they are both simply influenced by the weather.

When we conduct research on ecological systems, for instance, and we observe a significant correlation between the population dynamics of two species in nature, it is possible there are inter-species interactions between the two species, yet it is also possible that the two species are being affected by a similar environment at the same time.

This issue came to light only through the work of Clive Granger and Robert Engle. They abandoned traditional correlation in favor of prediction as the basis in their effort to analyze causal relationships, and they verified this approach through their analysis of financial and economic data. The pair ultimately shared the 2003 Nobel Prize in Economics for making this breakthrough.

Prof. Hsieh and his collaborators developed convergent cross mapping to detect causality in



(c) Convergent Cross Mapping. <http://youtu.be/NrFdlz-D2yM>

complex systems. Simply speaking, this method is designed based on the principle that anything will leave a trace where it has passed. The researchers used time series data sets to test whether A ever left a trace in B's history; if so, then A is the cause that caused B.

In the *Science* article, the team applied this approach in analyzing historical data on two vital fisheries—anchovies and sardines—in the ecological system of the ocean current near California to shed light on the causal factors behind the variations in the populations of these fisheries. Over the last century, the populations of anchovies and sardines experienced anti-synchronistic fluctuations on repeated occasions. There was an obvious negative correlation, with one population expanding when the other shrank.

It has long been debated whether these variations were due to inter-species competition or environmental factors (e.g., changes in ocean temperature). The team's method showed that the anti-synchronistic fluctuations in these populations were caused by the different reactions of the two species to changes in ocean temperature and not inter-species competition.

METHOD FOR FORECASTING CANCER THERAPY OUTCOMES RECEIVES US PATENT



Researchers at the Center of Genomic Medicine's Bioinformatics and Biostatistics Core Laboratory recently published their research findings on a novel method that involves using blood samples from esophageal cancer patients to forecast their outcome following a combination of chemotherapy and radiation therapy. Their findings were published in the *International Journal of Radiation Oncology, Biology and Physics*, the most authoritative journal in the field of radiation oncology.

The NTU Office of Research and Development was impressed with this research achievement, and assisted the researchers in applying for patents in Taiwan and overseas. The researchers received a patent in the United States in June while their patent application in Taiwan remains under review.

Scientists have discovered that esophageal cancer, which is more common in men, has been on the rise in both Eastern and Western societies in recent years. Since

the symptoms of esophageal cancer are not obvious in the early stages, most patients learn they have cancer only when they seek treatment after experiencing problems with swallowing. By this time, the cancer has already developed to the middle or late stage and the time for the initiation of treatment has been delayed for too long.

Since most esophageal cancer patients receive their diagnoses in the middle or late stage, they tend to opt for a combination of chemotherapy and radiation therapy followed by surgery. The chemotherapy and radiation therapy are administered first in order to reduce the size of the tumor prior to surgery so as to increase the chances for success and lower the risk of infection. For approximately 10-40% of patients that undergo either chemotherapy or radiation therapy, the course of treatment eradicates tumors completely. However, the therapies do not cause tumors to disappear

or even shrink in every patient, and tumors remain the same size or even enlarge for around 30-50% of patients. The patients who have no positive reaction to chemotherapy or radiation therapy must not only endure the side effects of these treatments, but possibly see their chances of survival lessen by the postponement of surgery.

The novel method developed by the researchers at the Bioinformatics and Biostatistics Core Laboratory does not require the collection of tumor cells through surgery, but relies simply on blood samples from the patients. Since the DNA in the blood does not change as a result of time or treatment, the biomarkers obtained allow doctors to predict patients' treatment outcomes beforehand. These forecasts allow patients and their doctors to make more informed decisions as to whether to choose chemotherapy and radiation therapy or to move directly to surgery. Moreover, this approach is easy for patients to accept because the collection of blood samples is convenient and has a low level of invasiveness.

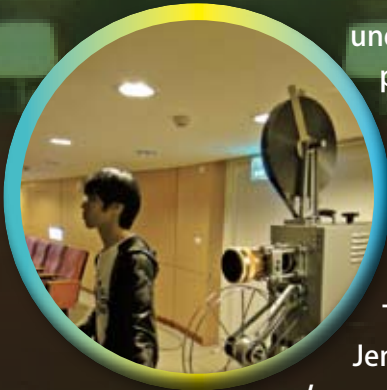
The research team made its amazing breakthrough under the leadership of Director of the Graduate Institute of Biomedical Electronics and Bioinformatics Prof. Eric Y. Chuang and Director of the NTU Hospital Department of Thoracic Surgery Dr. Chang-ming Lee.

Film Festival Shines Spotlight on Taiwan Cinema History

The NTU Student Association's Culture Division has been organizing the NTU Film Festival for nearly two decades. The annual event has served as a window into the world of films from around the globe for countless students over the years, and has become one of the most popular arts and culture events on the NTU campus. This year's festival took place from November 30 to December 24.

Compared to the simpler film festivals of the past, this year's NTU Film Festival offered a more plentiful selection of activities. Taiwan Cinema was chosen as the theme of this year's festival because Taiwan's film industry has been flourishing in recent years, and the organizers hoped to turn people's attention to the industry's historical development as well as its future prospects. Besides the screening of 20 movies, the festival featured post-screening symposia with well-known film critics and the festival's first film forum, which brought influential film industry figures to campus to engage in discussions with students and scholars.

The festival's director, Albert Yao, pointed out that Taiwan cinema has drawn the attention of international society and markets in recent years. He says the festival this year was focused on the three topics of film and the public sector, the impact of digitization on cinema, and film marketing to allow students not only to appreciate great films but to gain a deeper

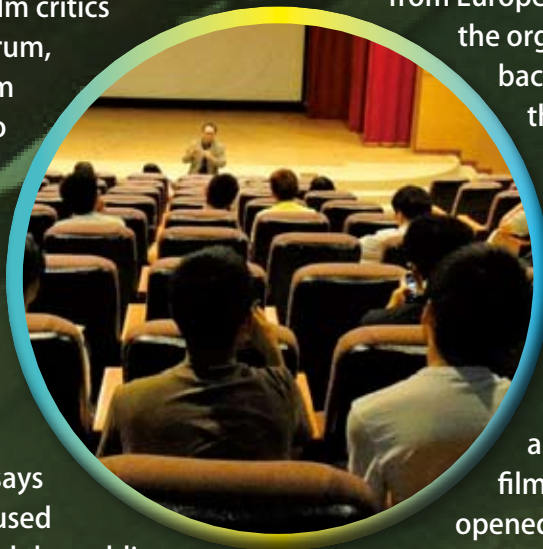


understanding of the challenges and possibilities facing Taiwan's film industry. Professionals working on the front lines of the industry were also invited to share their views on film in Taiwan. These included famous director Tsai Yueh-Hsun, Taipei Film Commission Director Jennifer Jao and *When a Wolf Falls in Love with a Sheep* producer Aileen Lee.



In order to convey a sense of the historical development of film in Taiwan, the festival showed representative works from the different eras of Taiwan cinema, including the post-World War II period, New Wave Cinema and Second New Wave Cinema. Such important films as *Beautiful Duckling*, *That Day on the Beach*, and *Yang Yang* gave the students a vivid overview of the history of Taiwan cinema.

Silvia Luo, director of the Student Association's Culture Division, noted that while past NTU Film Festivals tended to showcase films from Europe and North America, this year the organizers shifted the spotlight back to Taiwan, hoping to stir the students' interest in the development of homegrown Taiwan cinema.



World-renowned Taiwanese director Ang Lee was chosen as the festival's Person in Focus because 2012 marks the 20th anniversary of the start of his filmmaking career. The festival opened with a screening of Lee's critically-acclaimed film *Life of Pi* and a number of the film's crew members shared their experiences of making the film with students at a post-screening symposium.

Students Win New Data Mining Competition



◀ A scene from an explanation meeting before the start of the 1st SAS Campus Data Mining Competition



A team of four NTU students from four disciplines outperformed over one hundred other teams to take first place in the 1st SAS Campus Data Mining Competition. The competition was organized by the Taiwan affiliate of the business analytics software and services company SAS Institute Inc. The students received their award at an awards ceremony on October 25.

Data mining, also known as data discovery, is a technology that emerged in just the last 20 to 30 years. However, this new field is developing rapidly because it has applications in a wide range of areas, especially the business world, where it is of high commercial value. Data mining refers primarily to obtaining information for decision making from large and unorganized datasets by using such methods as selection, analysis and modeling. For instance, a business can use data mining to find appropriate candidates when it is seeking to recruit new employees or identify potential customers for new products. Data mining has emerged as a very popular occupation in recent years.

SAS-Taiwan decided to establish the SAS Campus Data Mining Competition because it saw a lack of data mining

professionals in Taiwan, and it hoped to show students the depth of industry demand and encourage outstanding students to enter the field. It teamed up with E. Sun Bank to organize the competition. For the competition, the bank provided a set of customer data, information from previous marketing campaigns and forecasted customer management operations targets, and the competitors were asked to market a new financial product. The teams were challenged to use SAS data mining tools to organize and filter data and create a market forecasting model to generate a list of 10,000 potential customers for the financial product. While teams were evaluated based mainly on content analysis in the first stage of the competition, speaking skills, stage presence and responses to questions from the judges became important factors in the finals.

NTU team leader Ping-yu Wu, a fifth year student in the Department of Industrial Management, said that when he heard about the competition he pulled together three people he had met in various situations. Though the three did not know each other, they

were strong in their respective fields, and the team benefited from the combined breadth of their knowledge. For example, the subject of the competition was closely related to the studies of fourth-year Department of Finance student Kai-ti Chen. Jao-Hong Cheng, who is a master's student in the Department of Information Management, studies data mining and the team relied mostly on him to operate the software. Ping-hsun Wu, a graduate of the Department of Industrial Management, rounded out the team.

📌 SAS-Taiwan client E. Sun Bank helped organize the 1st SAS Campus Data Mining Competition.



Students Win Again at Prestigious IC Design Automation Conference

Two graduate students, advised by Prof. Yao-wen Chang, director of the Graduate Institute of Electrical Engineering, each won first prizes at the 49th Association for Computing Machinery/Institute of Electrical and Electronics Engineers Design Automation Conference (ACM/IEEE DAC) in San Francisco this year. PhD student Meng-kai Hsu was champion of the 2012 ACM/IEEE DAC Routability-Driven Placement Contest while PhD student Shao-yun Fang came in first in the 2012 ACM/SIGDA Student Research Competition. Hsu's first-place award is the sixth major DAC award to be claimed by a student of Prof. Chang in the last six years. Prof. Chang's students lead the world in the number of first-place DAC awards, having collected three in the last three years.

This was the first time that the ACM and IEEE jointly held the Routability-Driven Placement Contest at DAC. IBM formulated the software design contest's challenge and provided judges. The goal of this year's contest was to develop a routability-driven placement system for integrated circuits that would place millions of electrical circuit components in the most optimal positions on a silicon chip. Contestants were judged for shortness of total wire length, circuit speed, power conservation and ease of routability. These issues are among the most crucial challenges confronting the field of integrated circuit design automation at present.

Meng-kai Hsu and Prof. Chang's winning entry was called NTUplace4. They enjoyed a strong 10% lead over the second-place team from the Chinese University of Hong Kong.

The ACM/SIGDA Student Research Competition is among the most important student competitions that ACM holds. It is organized by the ACM Special Interest Group on Design Automation (SIGDA) with support from Microsoft. The contest provides an opportunity for students from around the world in the field of electrical engineering and computer science to demonstrate their electronic design automation research achievements. Outstanding students from some of the world's leading universities come together to share their research, engage in academic exchanges and compete for honor and affirmation.

Shao-yun Fang's first-place finish this year marks the first time a graduate student from outside of the United States has claimed first place in the Student Research Competition. Fang's research topic was "Lithography Optimization for Sub-22 Nanometer Technologies." Multiple patterning lithography, e-beam lithography and EUV lithography are universally accepted as offering the greatest potential for breakthroughing future lithography bottlenecks, yet there remain problems with each technology in terms of practical design. Fang's research presented solutions and design algorithms that addressed the most crucial problems for each of these advanced lithography technologies, allowing them to achieve their greatest potentials.

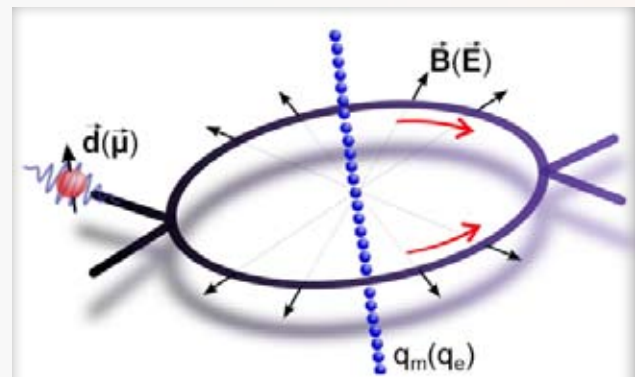
Also, DAC accepted ten papers by NTU students for presentation despite a low 22% overall acceptance rate. This number was a record for the conference. UCLA came in second with five student papers accepted.



First Evidence Presented for Quantum Phase Named for NTU Professor

An article in *Physical Review Letters* presents the first evidence for the existence of a quantum topological phase named in part after Prof. Xiao-gang He of the Department of Physics: the He-McKellar-Wilkens phase. Prof. He and Bruce McKellar predicted the existence of the HMW phase in 1993, and M. Wilkens followed with his prediction a year later. The HMW phase is a basic test for quantum mechanics, which has far reaching implications. Authored by French physicist Jacques Vigue and his colleagues, the article is entitled "He-McKellar-Wilkens topological phase in atom interferometry."

The HMW phase is topological because the phase developed in the wave function does not depend on the particular path the particle follows if the path forms a closed loop. The first quantum topological phase, the AB phase, involves electromagnetic interaction, and was discovered by Aharonov and Bohm in 1959. This phase can be generated by an electric charge moving along a closed path in a magnetic field-free region but also requires enclosing areas which contain non-zero magnetic flux. Classically, in such a configuration the particle's motion is not influenced by any forces, and should not display a physical deviation from the closed loop motion. But, in quantum mechanics a completely unexpected effect arises, which leads to the wave function developing a topological phase.

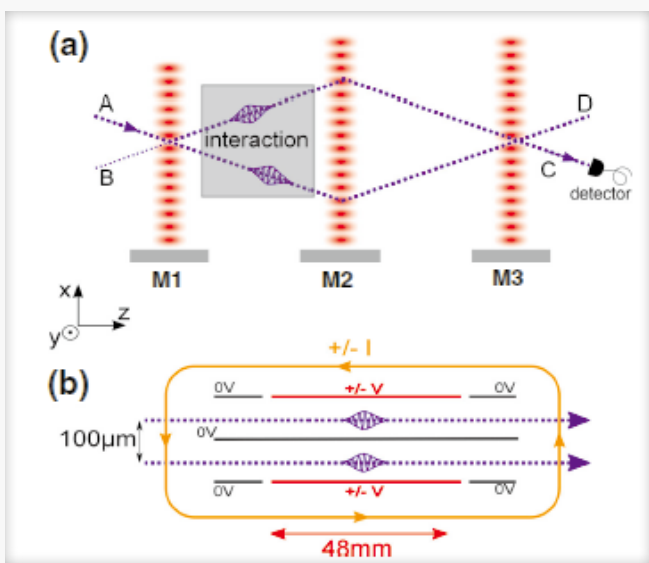


A. Cimmino et. al., Phys. Rev. Lett. 63, 380(1989).

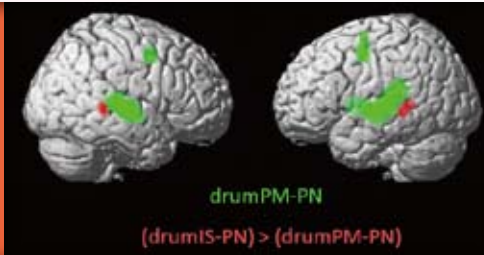
In 1984, Aharonov and Casher discovered another topological phase, the AC phase. This phase is generated by a particle with a magnetic dipolar polarization moving in the wire direction on a plane with an electric field produced by an infinitely long wire with uniform electric charge distribution. This particle's motion is also not impacted by any forces classically, but in quantum mechanics a net topological phase develops in the particle wave function after the particle moves in a loop enclosing the wire.

The HMW phase arises from a particle with an electric dipolar moment polarized in the wire direction moving on the plane under the influence of a magnetic field produced by an infinitely long wire with uniform magnetic monopole charge distribution. Classically, this particle's motion is not impacted by any forces and should not display any physical deviations once the particle moves in a closed loop. Again, in quantum mechanics, a topological phase is developed in the particle wave function. This is a new type of quantum effect.

Vigue's group was the first to construct an equivalent system, which would produce the HMW phase. They injected, along x-direction, a beam of polarized Li moving along z-direction, and let the beam split into two beams, and pass through the interaction region with a magnetic field in y-direction and an electric field produced in x and -x directions. They observed in their atomic interferometry a phase shift that was in agreement with the theoretical prediction for the HMW phase within a 31% margin of error.



Scientists Use Brain Imaging Technology to Study Meaning of Musical Sounds



(left) Brain activity of drummers listening to familiar drum sounds

(right) Stimulation material for a musical modulation experiment

Prof. Chen-Gia Tsai at Graduate Institute of Musicology, Prof. Chien-chung Chen and Prof. Tai-li Chou of the Department of Psychology, and Prof. Jyh-horng Chen of the Department of Electrical Engineering, who use brain imaging technology to investigate the relationships between music and language, have published two papers that are among the few to explore the use of onomatopoeia to reproduce percussion music.

One paper details the results of a functional magnetic resonance imaging study that found increased activity in the posterior parts of the middle temporal gyrus in

both brain hemispheres when subjects matched the movements of their limbs to different sounds respectively while listening to random drum sounds as compared to when they did so as they listened to a section of drum music. In the left hemisphere this brain region is associated with the semantic processing of verbs. This study therefore shows there is a possibility that each type of drum sound for drummers is similar to the concept of linking verbs to the movements of one's limbs.

The researchers also used magnetoencephalography to investigate pitch-naming systems

in order to better understand the meanings of musical sounds. This study discovered that the posterior parts of the temporal cortices in both hemispheres also play a crucial role in the processing of pitch names. Interestingly, it is generally the left temporal cortex that activates during the processing of linguistic semantics and concepts, while it is both the left and right hemispheres that activate, though there is greater activation in the right hemisphere, during the processing musical semantics and concepts.

Neurology Lab Studies Nerve Injury Pain with Advanced Techniques

Dr. Sung-tsang Hsieh serves as the chairman of NTU's Department of Anatomy and Cell Biology and is an attending neurologist at NTU Hospital's Department of Neurology. Dr. Hsieh's laboratory is dedicated to the exploration of the pathology, physiology and imaging of pain due to nerve injury with advanced techniques.

Pain is the most disturbing symptom of patients with different types of nerve injuries, particularly in diabetes mellitus, cancer and chemotherapy. Injured nerves behave as cables with leaking currents. Furthermore, pain is considered an emotion, a

psychophysical process that cannot be documented objectively.

We target these issues through (1) punch skin biopsies to examine the pathology of skin nerve degeneration, (2) contact heat evoked potential (CHEP) stimulation to investigate physiological characteristics of pain and (3) functional magnetic resonance imaging (fMRI) to detect global imaging signatures of pain in the brain.

In patients with peripheral nerve disorders due to diabetes, skin nerves become degenerated, which explains many symptoms of diabetic

patients, such as reduced sensations with frequent injuries and burns.

Dr. Hsieh's lab has discovered that, despite the severe degeneration of skin nerves, the amplitudes of CHEP are usually higher than expected, indicating that brain activations become exaggerated when peripheral nerves degenerate. Dr. Hsieh has used fMRI to document these changes in the brain globally. Many areas in the brain, including the motor-control areas and emotion-processing areas become much more activated when patients encounter stimuli that were not considered as painful in normal subjects. These observations strongly indicate that the brain becomes excessively excitable in diabetic nerve disorders.

NTU at a Glance



The Gallery of NTU History has kept busy in 2012, devising innovative ways to record and preserve the university's history, old and new.



The gallery recruited 365 students from various backgrounds to take part in a yearlong chain diary project. As in a relay race, each student was responsible to record the minutiae of his or her life during one day of the year. The project commenced on June 1.



Also on June 1, the gallery opened the "Life Maps of NTU Campus, Episode 2, Alumni" exhibition, which was based on a survey of NTU alumni about their favorite locations on campus for studying, dating and extracurricular activities. Comparing these survey results to an exhibition based on a survey of current student preferences, the spots most favored by the alumni have dropped out of the top ten. The places that have remained popular are the First Student Activity Center, NTU Library, dorms, and shops near campus.

The gallery also acquired three new treasures. Two were donated by Prof. Pisin Chen: the Double Centennial National Flag he made and unfurled at the South Pole and a sketch he made while studying in the NTU Library as a Physics undergrad. Also, noted Potter Jen-yao Lee donated a vase he made here on campus just after presenting a lecture.

NTU 134th in Latest THE World University Rankings

NTU took a great leap forward in The Times Higher Education for 2012–2013 compared to the previous rankings, moving up 20 spots from 154th to 134th.

Compared to the rankings for 2011–2012, NTU's overall score jumped from 46.2 to 43.2. The university climbed from 58.5 to 65.7 in the research category and from 47.8 to 56.4 in the teaching category, the two categories with the largest increases for NTU. There were also significant gains for NTU in the other categories of international outlook (up from 20.7 to 24.6), industry income (up from 40.0 to 44.0), and citations (up from 39.2 to 45.5).

NTU has made great strides in education, research and internationalization due to the financial support of the Ministry of Education's Aim for the Top University Program as well as the injection of National Science Council research programs. With this support, NTU is setting its sights on entering the ranks of the world's top 50 universities.



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