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交大資訊人

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Together, we are Greater.

個人很榮幸擔任交大資訊學院院長。從民國 49 年設立國內第一個計算機研究學程算起，交大投入資訊領域迄今已 60 年，在所有師生努立下，於國內外已有舉足輕重之地位。感謝所有教職員生過去的辛勞付出，也期勉我們新的行政團隊能在前人的基礎上，接棒開展未來。

本院不僅全台最大，放眼亞洲，規模也是數一數二之資訊學院。本院師資豐沛，擁有全國最充裕的研究能量，在國內外已獲得不少具體研究成果，本期報導包括陳添福副院長成立之「人工智慧系統檢測中心」，協助台灣產業未來在人工智慧領域能夠更加速的發展；與我個人所帶領的團隊，研發出之 5G 開源核心網路軟體「free5GC」。未來更多本院教授亮眼的研究表現皆將收錄在本刊物中。

除了學術研究外，大學最重要的是教育與啟發學生。我們不只是培養工程師或高級研發人員，更是培育具世界觀之專業領導人才。本期完整介紹院內推行創新資訊工程教育及跨領域專題之現況。本院課程經過數次翻新後，資訊專業課程之教育已相當具國際競爭力，並且朝向加強跨領域學習，培育獨立思考及執行能力之人才。

資工系友傑出表現亦是報導焦點之一。首先，恭喜創為精密材料股份有限公司董事長趙書華學姐與華威國際集團營運長蔡士傑學長榮獲交大出校友榮譽。他們在產業界努力耕耘及提攜後進的精神，他們的人生經歷與故事，都是學弟妹最佳學習典範。

台灣現階段正處於產業轉型及提升的關鍵點，交大與陽明自 110 年 2 月 1 日起將合併為「國立陽明交通大學」，兩校原各自發展的醫療與電子資訊兩大強項，合併後雙方學術互補，本院除了延續既有優良傳統外，我們將開展更多跨領域及國際合作。未來發展，期許我們成為世界一流、有影響力之資訊學院，成為台灣高教的新典範。

資訊學院院長

陳志成

2020.9.30

Together, we are Greater.

It is truly an honor to serve as dean of the College of Computer Science, National Chiao Tung University (NCTU). Since the first computer research program was founded, NCTU has been devoted to the field of computer science over the past 60 years. Thanks to all faculty members and students for outstanding performance, we brought College of Computer Science to this leading position both domestically and internationally. The hard work you have done deserves all my appreciation. May our new administrative team continue to work with such an approach and best wishes for the times ahead.

Being one of the largest colleges of computer science in Asia and the largest college in Taiwan, our college possesses a large number of faculty with outstanding research capability, and have many impressive achievements at home and abroad. The feature stories in this issue include “AI System Benchmarking and Tuning Lab”, founded by Dr. Tien-Fu Chen, Associate Dean, College of Computer Science. The goal of the lab is to accelerate the pervasive applications on Artificial Intelligence technology among industries in Taiwan. Moreover, “free5GC” developed by my team is the first open-source 5G core network in the world. There will be more brilliant research achievements published in this magazine in the future.

In addition to academic research, another primary goal of universities is to educate and inspire students. We not only train engineers or senior R&D developers, but also nurture professional leaders with a global vision. The current issue introduces the latest update of innovative computer engineering education and interdisciplinary programs in the College of Computer Science. With several iterations of curriculum revisions, our college offers a solid core of computer science courses to help students build up the global competitiveness. In the meantime, our curriculum also encourages students towards interdisciplinary study to cultivate independent thinking and nurture leadership potential.

The outstanding alumni is one of the feature stories in this issue. First of all, I would like to congratulate Mrs. Lillian Chao, President of Apex Material Technology Corp., and Mr. Jack Tsai, Chief Operating Officer of The CID Group, for winning the honor of Outstanding Alumni Award, NCTU. Their stories, especially the spirit of dedication towards work, and mentoring young employees, will be the best models for young students.

Taiwan is currently at the pivotal moment for Industrial transformation and improvement. National Chiao Tung University will be merged with National Yang Ming University to become “National Yang Ming Chiao Tung University”, Feb. 1st, 2021. Two major specializations, medical education programs and electronic / computer science programs, which are originally developed by the two universities, will create the most synergy by the academic integration and collaboration after the merger. In addition to continuing to build on our culture, we will extend more interdisciplinary and international collaboration. Within the foreseeable future, I expect our college will be a world-renowned college with significant impact and a new role model of higher education in Taiwan.

Dean of the College of Computer Science

2020.9.30

創新資訊工程教育在交大

文／林珮雯

身為全國規模最大、能量最充沛的資訊學院及資訊工程學系，我們肩負著培育未來所需及創造未來的資訊人才。交大資工向來注重精進教學，在資工系曹孝櫟教授帶領下，本系獲得教育部 108 學年度新工程教育方法實驗與建構計畫（以下簡稱「新工程教育計畫」），也是全國資訊工程科系中唯一的全面課程地圖與學習架構之調整 (A 類) 計畫。

資訊工程教育在過去 30 多年來的努力之下培養了實力堅強的電腦與資訊軟硬體的人才，也創造了近 10 多年來電腦與網路的榮景，為資訊環境打下了堅固的基石。展望未來 30 年，電腦與網路的發展與基礎建設或許趨於穩定，但可以想像的到，建立在這堅強的資訊基礎建設之上，將出現更多創新且跨領域的資訊應用與服務，創造更多價值與機會，資訊教育的改革及創新更是刻不容緩。

本系目前正在進行之資訊工程教育創新課程架構之設計與實踐工程，利用三至四年時間，以跨領域，國際化及創新的思維，全面檢討，設計，實踐並持續改善資訊工程教育。本系觀察近五年國際知名大學在資訊工程教育的調整，國內外學習環境的改變，也分析未來資訊工程人才的需求，是以綜合歸納本系最新課程改革總體目標如下：

1. 激發資訊工程學生主動學習興趣 (Active Learning) 。
2. 培養資訊工程學生自學能力 (Self Learning) 。
3. 培養資訊工程學生跨域 (Interdisciplinary) 的思維與利用資訊工程技術解決跨領域難題。
4. 建構個人化 (Personalized)，模組化 (Modularized) 的高度彈性課程地圖與學習環境。
5. 訓練學生以問題導向的學習 (Problem-based Learning)，加強解決問題 (Problem Solving)，實務動手的能力。
6. 培養資訊工程學生面向國際舞台的學習方式與態度。

並基於上述的總體目標，本系亦擬訂相對應的發展策略包括：

1. 降低必修學分，增加選修彈性：有助於激發資訊工程學生主動學習並增加學習自由度，以激勵自學。
2. 規劃實施資訊工程主題式課群：引導學生以主題式修課與學習，建構個人化，模組化的彈性課程地圖與學習環境。
3. 規劃實施各主題式課群之總整課程：以總整課程貫穿主題式課群各課程概念，並以實作與問題解決能力之培養為重點，協助學生掌握主題式課群課程內容與關聯，訓練學生以問題導向的學習，加強解決問題，工程實務的能力。
4. 規劃實施資訊工程跨領域主題式課群：提供選課彈性，培養資訊工程學生跨域的思維與利用資訊工程技術解決跨領域難題。
5. 增加深碗課程，海外實習，資訊工程基石課程 (Cornerstone) 等創新課程：仿效哈佛大學 CS50 課程，設計資訊工程基石課程，激發學生學習動力，引導學生了解資訊工程整體樣貌。設計海外實習課程，培養資訊工程學生面向國際舞台的學習方式與態度。增強各基礎與專業課程間之連結，強調兩課程之連貫性，提供學生彈性接續選修更深度課程。

目前針對 108 學年度入學的學生，已全面改採新制修業規定，其中除了調整必修學分課程與比例之外，也將原有專業選修課程，以七大主題課群來分類。同時，以主題學程規劃，將相同領域內的課程結合在一起，相較於傳統無特別規劃的修課方式，對於學生來說他們學習目標將更為一致，也因此更能夠專精在某些特別領域，並且更注重自我長期學習以及自學能力。

其次，本系建置了一個課程教育資源共享平台，提供給系內的老師們共享其製作的教學投影片或實驗教材。我們建議同一課程之各授課老師採用 70% 之共同教材，30% 則自由決定。透過平台互動功能，讓同門課的授課老師可互相交流教材設計，如此教學內容一致化，以利後續課程銜接。

本系除了自發性在課程改革上的規劃，我們也積極結合校院各項資源。例如，連結產業人才培訓計畫，帶入產學合作的業界夥伴協助授課與課程設計諮詢。配合高教深耕計畫，以院為核心進行國際化 (包含國際交換學生與海外實習課程) 與全英語授課之推動。本系教師亦積極參與本校推動之微學分，跨域學程，NCTU-ICT 工坊 (亦稱創創工坊)，藉由引進與整合更多相關資源，進一步推升本系創新資訊工程教育之動能。

Education Innovation in Computer Science & Engineering at NCTU

Standing as the largest and most competitive College of Computer Science and Department of Computer Science in Taiwan, our college is committed to cultivating influential graduates and future pioneers in the Computer Science field. The Department of Computer Science at National Chiao Tung University (NCTU) has always paid attention to education innovation. Under the leadership of Professor Shiao-Li Tsao of the Department of Computer Science, our department has received the grant of the 2019 New Engineering Education Method Experiment and Construction (NEEMEC program) by the Ministry of Education. The NEEMEC program (A-type project) is the only program which involved department-wide efforts to reorganize and renew the core undergraduate curriculum in the higher education of Computer Science in the country.

Over the past 30 years, Computer Science & Engineering Education has not only cultivated graduates equipped with contemporary knowledge and robust skills in software and hardware design, but also drove the bloom of computers and communication industry in the past 10 years, thereby establishing a solid foundation for the information environment. Looking forward to the next 30 years, we can be conceived that more innovative and interdisciplinary applications and services within information technology based on the solid infrastructure will emerge to create more value and opportunities, while keeping sustainable development and infrastructure of computers and networks. Therefore, it is even more crucial for program reform and education innovation of Computer Science.

Our department is undergoing the process of design and implementation for Curriculum Innovation Framework of computer science and engineering. With global view and interdisciplinary innovative thinking, we expect to spend 3 to 4 years comprehensively reviewing, designing, implementing, and constantly improving the curriculum of computer science. We observed the adjustments of the programs of computer science and engineering in globally renowned universities over the past five years, and the changes in the learning environment both at home and abroad; meanwhile, we also analyzed the demand for future computer science and engineering talents. Therefore, the overall objectives of the latest curriculum reform of the department are summarized as follows:

1. Inspiring CS Students to engage in active learning.
2. Motivating CS students towards self-learning.
3. Cultivating CS students with interdisciplinary thinking and being able to solve interdisciplinary problems.
4. Constructing a personalized, modularized, and highly flexible curriculum map as well as corresponding study environment.
5. Training students to establish problem-solving abilities and improve their hands-on skills by engaging with problem-based learning.
6. Preparing CS students' learning styles and attitudes for the global stage.

According to the above objectives, the department formulated corresponding development strategies, including:

1. Reducing required credits and increasing the flexibility of elective courses selection: it can help inspire students to engage in active learning and increase the learning flexibility, thereby encouraging students towards self-learning.
2. Planning and implementing the computer science and engineering subject-based courses: guide students to take subject-based courses, and construct a personalized, modularized, and flexible curriculum map as well as corresponding study environment.
3. Planning and implementing the overall curriculum of all subject-based course groups: Crucial to the overall curriculum is that the curriculum connects the concepts of different subject-based courses, and focuses on the establishment of problem-solving abilities and hands-on skills for students. It may help students engage in problem-oriented learning and strengthen their abilities in problem-solving and engineering applications.
4. Planning and implementing the interdisciplinary subject-based courses in computer science and engineering: with the flexibility in courses selection, students are able to develop interdisciplinary thinking, thereby solving interdisciplinary problems with computer science technologies.
5. Increasing the number of Deep Bowl courses, overseas internships, and innovative courses, such as Cornerstone: referring to Harvard University's CS50 course, the CS cornerstone courses are constructed to inspire students to engage in learning motivation, and guide students to understand computer science and engineering comprehensively. By the overseas internship courses, students' learning styles and attitudes would be prepared for the global stage. Moreover, we enhance the connection between basic and advanced courses and emphasize the relevance of both courses, so that students are able to select subsequent advanced courses with flexibility.

At present, for the students enrolled in the academic year 108, the regulations have been revised to the new version. In addition to adjusting the number and proportion of required courses, the original professional elective courses are also categorized into seven subject-based course groups. At the same time, the subject-based course planning integrates courses in the same field. Compared with the former way of taking courses without special planning, the learning objective for students would be more consistent, thereby helping students specialize in a particular field, motivating them towards long-term self-learning, and emphasizing self-learning ability.

In addition, the department has built up a teaching resource sharing platform for faculty in the department to exchange the teaching slides or experimental textbooks they made. We recommend that all faculty of the same course may use 70% of the common teaching materials, and freely decide what to use in the rest of materials (30%). Through the platform's interactive function, faculty of the same course may collaborate teaching material design with each other so that the teaching content would be consistent in order to facilitate subsequent courses.

Beside the spontaneous planning of curriculum reform in the department, we also actively integrate various resources at NCTU. For example, we engage in industry talent training programs and invite partners of industry-academic cooperation to assist in teaching and offer consultation on curriculum design. Within the framework of the Higher Education SPROUT Project, internationalization (including international exchange students and overseas internship courses) and the promotion of all English teaching courses would be the core missions of our college. Motivated by the university, faculty of our department also actively participate in micro-credit courses, interdisciplinary programs, and NCTU-ICT workshops. By introducing and integrating more related resources, our department will further push forward innovative capabilities in computer science and engineering education.

人工智慧系統檢測中心
協助企業加速引進 AI

文／陳添福 資工系教授、連慶 資科工所碩士生

陳添福教授深耕台灣嵌入式系統產業多年，目前擔任台灣人工智慧晶片聯盟 AI 系統軟體召集人，因深刻了解到台灣 IC 設計與系統開發在這波 AI 浪潮中具有極大的優勢，台灣亟需 AI 系統化實現方案。為促進 AI 智慧系統產業發展，提升國內人工智慧系統產業的技術層次與產品品質，協助產業界能夠充分發揮其優勢並提高產品競爭力，陳教授成立「人工智慧系統檢測中心」(AI System Benchmarking and Tuning Lab)，推動具系統思維之人工智慧系統效能調校與安全檢測相關研究。

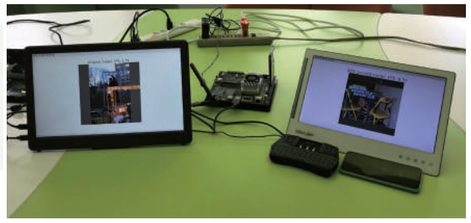
人工智慧系統檢測中心成立初衷在提供一個公正、專業、客觀的人工智慧效能檢測與調校服務及推動相關研究，希望能夠透過本中心的服務與研究能夠成為廠商在開發人工智慧系統產品時成為一大助力。國內擁有系統化且公正的評測服務組織對於產業加速與品質提昇是至關重要，唯有透過專業且嚴謹的測試流程才能準確且精準的找到產品弱項，也就能夠提供產業有效且有意義資訊，讓廠商有更明確的產品提昇計畫。中心為能與世界接軌亦積極參與人工智慧效能相關國際標準推行與制定，目前中心參與 MLPerf 中針對邊端設備評測的工作小組，透過了解現階段國際對於相關人工智慧效能評估方向與指標，我們能夠不斷修正我們的評測準則讓我們能夠提供具有國際認可的評測結果，強化測試評比報告的權威性。

中心另方面的服務項目亦包括：提供 AI 模型與應用系統開發、AI 效能優化、AI 系統規劃與效能調校服務。中心發展相關研究，過去已有些許成果，協助產業界在面對 AI 落地化問題時能夠有快速且系統化的解決方案，中心也積極培養人工智慧系統技術研發人才。目前中心更積極以 AI 系統核心技術耕耘智慧製造領域的技術與工具開發，協助產業克服數位轉型所面對的挑戰，支援企業相關部門 AI 開發，加速公司 AI 場域落地的實現。

目前中心應用我們相關技術在產業中進行實質合作，與產業界交流中獲得許多的回饋，從這些回饋當，依業界實際情形不斷的修正及研發我們的技術，使我們所提供的技術與服務都不只存在於理論層面，而是真正夠解決產業界問題。希望未來能夠協助台灣產業未來在人工智慧領域能夠更加速的發展。詳細資訊請參閱公開網站：

AI System Benchmarking and Tuning Lab (NeuralScope.org)

AI 手機量測：www.neuralscope.org/mobile
AI 開發板量測：www.neuralscope.org/devboard



AI System Benchmarking and Tuning Lab:
Accelerate the Pervasive Applications on Artificial Intelligence Technology among Industries

Professor Tien-Fu Chen, currently serving as a chairperson of AI system software in AI on Chip Taiwan Alliance, has been dedicated to Embedded System Industries in Taiwan for many years. It is foreseeable that Taiwan's IC design and system development will have great opportunities in the coming wave of AI, thus an AI systemization Implementation solution is needed desperately. In order to accelerate the growth of AI intelligent system Industries, improve technologies and product qualities of AI System Industries in Taiwan, as well as assist industries to maximize their technical advantages and enlarge the competitiveness of products, Professor Chen founded "AI System Benchmarking and Tuning Lab" to push up the researches of artificial intelligence system performance tuning and safety detection from architecture perspective.

The core value of AI System benchmarking and Tuning Lab is to provide a fair, professional, and objective AI System Benchmarking and Tuning service as well as to promote related research. We hoped that the services and researches of our lab would be a great help to manufacturers during the development of artificial intelligence system products. The existence of a systematic and fair Benchmarking service organization domestically is essential for industry acceleration and quality improvement. The professional and rigorous testing processes our lab provides can accurately recognize weak points of products, and thus provide industries effective and meaningful information, which will assist manufacturers to compile product improvement plans more precisely. In order to comply with the world, our lab proactively participates in the implementation and formulation of international standards for artificial intelligence performance. Lately, our lab joins in the working group of MLPerf for end-to-end device evaluation. Due to realizing the current international performance benchmark for artificial intelligence, we keep revising our benchmark criteria to provide worldwide recognized evaluation results and strengthen the credibility of the evaluation reports.

Other service items provided by our lab include AI model and application development, performance optimization, AI system planning and benchmark tuning services. With the related research, our lab has achieved some results in the past, helping industry get effective and systematic solutions regarding the issues of AI implementation, while actively cultivating AI system research and development talents. Our lab focuses lately on developing technologies and tools in smart manufacturing fields with AI system core technology, assisting industries in overcoming the challenges by digital transformation, supporting AI development of relevant departments of enterprises, and accelerating the adoption of AI solutions into different scenarios.

Our lab carries out substantial cooperation in the industry using our relevant technology, and receives many feedbacks from it at present. According to these feedbacks and the application scenarios of the industry, we constantly enhance and develop our technologies so that the technologies and services we offer do not only work at the theoretical level, but also solve problems in the industry. I hope our lab can help Taiwan's industries to speed up the development in the AI field. For more information, please refer to the public website:

AI System Benchmarking and Tuning Lab (NeuralScope.org)

AI mobile benchmark: www.neuralscope.org/mobile

AI development board benchmark: www.neuralscope.org/devboard

交大打造全球首套
5G 開源核心網路軟體

文／高儷玲

本校由陳志成教授所帶領的團隊研發出全球第一套符合國際標準的 5G 開源核心網路軟體——「free5GC」。並於 5 月 27 日由科技部召開記者會，不僅有機會未來應用在智慧工廠、智慧醫院、智慧車站、機場、港口等各方面，更有望打破目前 5G 由國際大廠壟斷及要價昂貴的狀況。

陳志成教授指出，5G 系統分為兩個層面，一是基地台，二為核心網路，其帶領的團隊便是著重於開發軟體層面的原始碼。他解釋「所有的基地台後面有一套很複雜很大的網路，那個就叫核心網路。若核心網路沒有布建起來，將導致所有的服務都不能使用。」

目前一般民眾使用的 5G 系統，核心技術多掌握在 Nokia、Ericsson、華為三大廠，屬於公網，不但價格昂貴，且不利客製化及在地化。而 free5GC 能為客戶量身打造「5G 專網」，提供一個非常好的 5G 核心網路方案。陳志成教授形容，這套開源軟體的概念，就像電腦的「微軟」或手機的「Android」，核心網路硬體設備平台只要載入 free5GC，便能進入 5G 的產業技術。

團隊從 2014 年開始研發，耗時六年，成功開發出符合國際標準的「free5GC」核心網路原始碼後，將其公佈於網路上，讓所有使用者免費讀取。陳志成說：「我們開放原始程式碼，看上的是整體產業的發展，這是全世界首創的 5G 開源核心網路軟體。」

儘管開源軟體免費提供各界使用，但團隊也已成立「通訊服務與軟體研究中心」，藉由制度的管理，與產業合作方式採會員制，提供 free5GC 的技術諮詢等服務，目前已與中華電信、啟碁與思銳科技簽約。中華電信研究院所長楊文豪表示，「很高興台灣能有這樣的技術，並期待能與中華電信自主研發的核心技術結合，發展出相關的解決方案。」

free5GC 推出後受到各界的高度關注，許多海內外學者爭相前來交大交流觀摩，並提出多項學術合作邀請。其中便以和美國萊斯大學（Rice University）進行大規模天線網路的協同實作最令人注目。此外，free5GC 更是榮獲頒科技部「未來科技突破獎」，成為台灣 11 項領先全球的技術之一。

NCTU: The First–open Source 5G Core Network Launches

Free5GC, the first open-source 5G core network in accordance with 3GPP release 15, was developed by Dr. Jyh-Cheng Chen and his team at National Chiao Tung University (NCTU). Ministry of Science and Technology (MOST) announced the launch of free5GC on 27 May 2020. Free5GC not only brings innovative 5G services in specific fields, such as smart factories, smart hospitals, smart transportation stations, airports, and seaports, but also offers a cost-effective alternative to fight against the monopoly of international telecom equipment vendors.

“5G network architecture comprises radio access networks and core network. My team focuses on implementing the critical functions of the core network,” Dr. Chen said. “A core network is a telecommunication network's key component, which provides various services to customers who are connected by the access network. This is to say, no core network, no services.”

The core network deployment of public 5G networks, currently dominated by Nokia, Ericsson, and Huawei, are expensive and unfavorable for customization and localization. On the other hand, free5GC is a very attractive solution for private 5G networks. According to Dr. Chen, the sharing idea of this open-source software suite is like “Microsoft operation system” to computers or “android” to mobile phones. Once deploying free5GC on the commodity hardware, you can effectively leverage the 5G technology.

Dr. Chen’s team is dedicated to mobile core network research since 2014. During the last six years, the free5GC source code has been built successfully and released as free and open-source software under an open-source license. “We have released our source code into the public domain in order to accelerate the growth of industrial development,” Dr. Chen said, “It is the world's first 5G open-source core network software.”

Based on the spirit of open source, Dr. Chen’s team established a “Communication Service/Software Laboratory” to provide professional consultations and other services in 5G core networks to the industry within customers’ membership plans. Meanwhile, the team has also expanded partnership with Chunghwa Telecom, Wistron NeWeb Corp., and EstiNet Technologies Inc. “We are truly excited by the advancement in 5G development in Taiwan,” Dr. Wen-Hao Yang, Director of Chunghwa Telecom Laboratories, said, “and looking forward to integrating it with the in-house core technology of Chunghwa Telecom to provide solutions for diverse application scenarios.”

Since the advent of free5GC, Dr. Chen’s team has received great attention from all over the world. Rice University in the U.S., for example, is developing massive MIMO base stations. Using free5GC as the core network, the research team at Rice University is actively collaborating with Dr. Chen’s team. Through the collaboration between Dr. Chen’s team and Rice University, free5GC has been promoted internationally. Moreover, Dr. Chen’s team also received the Award of Futuristic Breakthrough Technology from the Ministry of Science and Technology in 2019. Free5GC further won “Global Number 1” as one of the eleven leading technologies in the world developed in Taiwan.

黃敬群教授：學無止境，勇於創新

文／高儷玲

畢業於交大電子系的黃敬群教授，從大學到博士班，一路都是讀交大，現今又重返母校教書，一生中大把的青春時光都奉獻給交大。儘管在人生的道路上也曾幾度迷惘，但確立自己想回歸學術界並踏上教書之路後，繞了一圈，最終回到熟悉的交大。

兜轉一圈　發現自己志向所在

和許多畢業生一樣，黃敬群教授也曾對於未來感到迷惘。因為身邊同學都到科學園區上班，讓他即使心裡對於學術方面懷抱深切憧憬，仍隨波逐流到科技業闖蕩。然而，在工作六年後，儘管小有成就，發現自己始終心繫學術界，因此回到交大繼續深造，攻讀博士。「因為一開始就有一顆種子在心裡，終於萌芽成對學術的熱切追尋」黃敬群教授說道。

在業界被外派期間，讓他看到外面的世界高手雲集，也確立心中的志願，決定重返學術界走出自己的一派天地。「我覺得自己是喜歡學術界的自由和它可以做許多新的嘗試，畢竟在業界要面臨現實層面的壓力，導致做的東西不能太過冒險，而且一定要在短期內可以看到成果。」

多年的運動習慣　成為優勢

大學時期開始，黃敬群教授就有打網球的愛好，過去身為交大網球校隊的他，也有多次代表學校出征梅竹的經歷。談及運動，他表示：「運動過程中其實有太多好處，能讓思緒更清楚。如果能把運動當嗜好，在精進球技的過程中，會有很多體悟，這對學業和事業都有極正面幫助。」

他以網球比賽為例，遇到不同的選手，要適當地調整策略，還要具備專注力、意志力、抗壓力及判斷力，而這些都是人生中不可或缺的能力。除此之外，運動有助於情緒穩定，也結交許多好友，對於生理和心理上皆有幫助，因此他非常鼓勵學生讀書之餘多運動。

因材施教　鼓勵學生勇於創新

黃敬群教授先後到了高科大和中正大學教書，他選擇因材施教去面對不同性質的學生。在科大教書時，他透過實作讓學生瞭解理論，而面對交大同學，他則是用比較抽象的模式，讓學生思考如何將理論與實作連接。黃敬群教授說：「最終的原則沒有改變，只是教學的技巧還有呈現的方法上有所不用而已。」

過去當學生時，他也常問自己「如何學以致用，學術如何與產業結合。」因此他特別重視實作，希望藉此讓學生從中思考並發掘真實有用的創意。無論是教學理論，或是做研究，他都會先確立其中的目標、目的，避免盲目地為了嘗試而做實驗。

對他而言，科學精神是一種冒險精神。科學和知識的開創是永無止盡的，同時，也代表對未知的持續探尋，而面對未知的事情，人難免因為害怕而裹足不前，此時，冒險精神變得特別重要。儘管會害怕，創新者，更要勇於冒險或嘗試，方能超越。尤其現今資訊取得方便，往往使人忽略對未知的探尋的重要性，也間接導致缺乏深度思考的過程，因此他期許現在的學生能勇於創新，莫忘科學精神即冒險精神。

「stay humble, stay hungry ,stay foolish」是黃敬群教授的人生座右銘，他認為學無止境，但也提出自己最近的體悟，他提醒「持續學習乃持續成長的基石，但在知識的洪流中，學得多反而不如聚焦，懂得聰明選擇，培養正確判斷力或許更為重要。」

Dr. Ching–Chun Huang: There Is No End to Learning and Be Bold in Making Innovations

Dr. Ching-Chun Huang has now returned to campus as a faculty member in the Department of Computer Science (CS) at National Chiao Tung University (NCTU). Graduated from the Department of Electronics Engineering, Dr. Huang completed his study at NCTU from undergraduate to doctoral degree. Although there were times when Dr. Huang was not sure about his career path, eventually he determined to dedicate himself to tertiary education at NCTU, the school he is most familiar with.

Discovering his career path

Just like many graduates, there were times when Dr. Huang felt confused about his future. After graduating from graduate school, Dr. Ching-Chun Huang worked at one of the companies in Hsinchu Science Park, as many of his classmates did. Although he had a passion to pursue an academic career, Dr. Huang also did well on the job in the company. After working for 6 years, he found that he still had the passion for academia, thus Dr. Huang decided to go back to work to school to continue his doctoral degree. “My pursuit for the academic career was like a sprout coming from a seed,” he said.

He benefited from playing sports

Dr. Huang has been playing tennis since he was in university. Representing the NCTU tennis school team, he had participated many times in the Mei-Chu Tournament, an annual sports competition between National Tsing Hua University (NTHU) and National Chiao Tung University (NCTU). “Playing sports can help to improve many skills. For example, it can help you to see things more clearly by thinking about different aspects of life,” Dr. Huang continued, “also it has a positive influence on your academic studies and career.” He further explained by giving an example. “When competing with an opponent in a tennis field, it is necessary to adjust your strategies. You will also learn how to stay concentrated, make right judgments, be persistent, and cope with stress.” These are all important abilities in a lifetime. Therefore, Dr. Huang would encourage all students to keep a habit of doing sports in their spare time. “It’s good for you physically and mentally. While learning how to stay in a stable mood, it can help to create friendships.”

With different teaching strategies, he encourages students to be innovative

Dr. Ching-Chun Huang had taught at National Kaohsiung University of Science and Technology (NKUST) and National Chung Cheng University (CCU). He applies different teaching strategies for different student groups. During the time teaching in NKUST, he would introduce theory to students by doing experiments. In contrast, his students in NCTU are pushed to think in a more abstract way. He prefers those students to brainstorm ideas of combining theory and experiments by themselves. “Basically my principle is the same, it is just that I present it differently through my teaching techniques.” When Dr. Huang was still a student, he often questioned himself about “how to apply knowledge into practical practices, and how to integrate academic studies and industry?” Thus, he practically sees the values for doing experiments. Through conducting the actual experiments, students are able to think more critically and innovatively. Also, Dr. Huang always sets up clear goals before teaching and doing research to avoid meaningless trials

For Dr. Huang, having a scientific spirit is like taking an adventure. There is always more to explore in science and knowledge. At the same time, it means we need to keep exploring the unknown. However, people might feel afraid to step forward in many cases. Dr. Huang suggests the only way we can move on is to be curious and adventurous about acquiring knowledge. In his opinion, we are living in a generation that is very convenient to find information online. As a result, people become demotivated to take time to explore new things, which is a very important process to learn critical thinking. Therefore, he encourages students to be innovative and adventurous.

“Stay humble, stay hungry, and stay foolish” is Dr. Huang’s motto. He thinks learning is an endless road. Finally, he also said to all students in the Computer Science Department, “it is important to select your choices wisely. Remember to focus on the field you want to learn and to make the right judgments in the world of knowledge.”

趙書華學姐：互相成為別人的貴人

文／高儷玲

現任創為精密材料公司的董事長的趙書華女士，是交通大學計算機工程學系 69 級的學姐。「我覺得交大是一個不僅專業，也是培育社會英才的非常好的地方。」談到交大，趙書華學姐如此說道。回憶起在交大的四年，不僅學到許多專業知識，更獲得人生道路上非常寶貴且實用的技能——做人處事之道。

大一時，由於她對寫作有極高的興趣，因此參加文苑社並擔主筆，當時做了一個專題，卻因觸碰到比較敏感的議題而被約談，雖然終止了專題，但並沒有澆熄她對文學的熱情。隨後趙書華姐因為外向的個性，便轉而投入舉辦各種文學相關活動，不僅結合自己的興趣及個性，也幸運地認識到許多校外人士。

當身邊的同學都開始準備研究所的考試時，趙書華學姐並沒有一昧的隨波逐流，反而停下思考自己的志向所在，確立了自己的興趣與目標後，她做了不同於身邊大部分同學的決定，放棄繼續攻讀研究所。畢業後非常幸運地，人生第一份工作到宏碁上班，也在那裡遇到許多交大校友，而這一做便是十多年。

熱愛文學的趙書華學姐，在公司大力推廣讀書風氣，二十多年來，每位員工一年都要讀四本書，她表示：「讀書是一輩子的事，我一直認為每一個人就是要讀書，不是看報紙，也不是看商業週刊，而是真正的讀一本書。從書上你會學到很多，不管是專業的知識或做人道理，甚至思想觀念，都能得到一些啟發。」

除了鼓勵同仁閱讀外，趙書華學姐也率領公司投身於慈善服務，並致力於提供台灣中小學、弱勢團體的餐食，「我覺得人最基本的先吃飽，才有辦法做更多的事，因為餓著肚子是沒辦法再上進，所以我們在這方面呢是做得比較著墨。」同時她也建議學弟妹可以從自己做起，幫助身邊有需要的同學，「交大有一句話，我們要互相成為別人的貴人。而貴人不一定是給錢，有時候是一句話或是一條方向，或許都能幫助到別人。」

身為交大的傑出校友，趙書華學姐也不忘給學弟妹一些叮嚀。第一點：要清楚自己想要做什麼，找到目標後就全力以赴的努力。而第二點：面試時要注意自身的服裝儀容，也要注意態度上要一定要莊重、誠懇。「我面試過一些人，講話方式蠻剛愎的，會給主考官有種不好的感覺。」她同時強調，成績的好壞和專長都不是最首要的，因為一間公司在選擇人才時，注重的不是面試者的過去，而是未來能對公司有什麼幫助，因此個人的強處要多強調一些，因為面試是個雙向的交流。

Lillian Chao:
Be Each Other's Benefactor

As the director at Apex Material Technology Corp. (AMT), Lillian Chao graduated from the Department of Computer Engineering at National Chiao Tung University (NCTU, class year, 69). "In my opinion, NCTU has cultivated many elite students by providing professional knowledge," she said, "and the most valuable lesson I learnt from the 4 years in NCTU was how to get along with people, aside from learning the professional knowledge in my field." When Lillian Chao was a freshman student in university, she was particularly interested in literature writing. She joined a writing club, Wen Yuan Club, and became the editor of the club. During that time, she was working on a project and she accidentally brought up a sensitive issue. Soon, there were some troubles and she was summoned for a meeting. However, her love for literature was unwavering. As an outgoing person, she joined a lot of literature relevant activities and met many friends outside of school.

Lillian Chao made a different decision in comparison to her classmates. She started to consider her future goal and interests while most of her classmates were preparing for the graduate school examinations. After thoughtful considerations, she decided to give up graduate school. Later, Lillian Chao got her first job in ACER and worked there for several years. During her time working in ACER, she also met many NCTU alumni. As a literature lover, Lillian Chao has been promoting the importance of reading in her company at AMT. For the past 20 years, every employee of the company was required to finish at least four books every year. Lillian Chao said "reading is something that you can enjoy in your entire lifetime. People should have the habit of reading books, not newspapers or business magazines. You will be inspired by professional knowledge and a lot of different concepts from reading books."

Besides promoting reading, Lillian Chao also has devoted charity work to provide meals to underprivileged groups such as some elementary and middle school students in Taiwan. "Staying away from hunger is fundamental to all human life", she claimed, "this is why we put more efforts in this area." Lillian Chao also encouraged NCTU students to be helpful to people around them. As an outstanding NCTU alumnus, Lillian Chao would like to provide some suggestions to all NCTU computer science students": first, be clear about your goals and work hard to achieve them. Second, pay attention to the dress code and attitude during job interviews. "I've interviewed some people who were quite stubborn about his or her ideas, which would give a bad impression to interviewers. When choosing a suitable candidate for a company, it is crucial to talk about the plan you have for the company, for example, how will you help the company. Therefore, your personal strengths should be emphasized rather than your past academic performances. Overall, participating in a job interview is a two-way communication process.

蔡祈岩學長：
正面的態度讓你哪裡都是舒適圈

文／高儷玲

與眾不同的職涯發展

自認個性有點反骨的蔡祈岩學長，大學畢業時，身邊的同學大部分都選擇到科學園區，他卻不想和其他人一樣，「幾乎每一個工作機會來的時候，原則上若覺得有趣，我就做了，倒沒有事先有個完整的規劃，比較像隨遇而安。」這份有點叛逆的性格，也造就他與眾不同的職業生涯。

職場實用的溝通技巧：做好被說服的準備

擁有交大資工背景的蔡祈岩學長，在職場上遇到了許多理工學生都會面臨的問題，卻也因此有了體悟。他表示：「職場上的最佳的解，不見得是我們用程式設計角度所想的客觀最佳解，有時候大家都認同的那一個，並且能一起把他做出來的那個解，才是最佳解。」因為在職場上需要與人合作，需要考慮團隊合作，因此最後實行的不一定永遠都是最客觀的答案。

他以一個程式設計師的角度看到自己的盲點，「如果都把自己跟對方所有的想法事先都想完了，那麼其實我們自己是很難被說服的。」為此他的解決方法是，每次開會時心裡都會默默地告訴自己：「我來是要被說服的。」若是看到對方的方案有缺陷，便會以對方的為主，再以自身的能力彌補不足的部分，同時還要顧慮他人的感受，盡量在溝通時多稱讚對方的方案。「我是來幫對方把他的方案變得更完美，而不是來推銷我的方案。」這是他經過職場歷練後所深刻體悟到的想法。

擁有積極正面的態度　哪裡都是舒適圈

對於舒適圈，蔡祈岩學長有不一樣的見解，不同於鼓勵大家跳脫舒適圈，他的看法是，「是不是舒適，看我們自己，如果我自己帶著氧氣瓶，就算離開了原本的舒適圈，我其實是去了另外一個舒適圈，也就是我走到哪裡都是舒適圈。」而比喻中的「氧氣瓶」是指，保持著樂觀和正面的心態看待每一個困境或挑戰。如此，無論外在環境如何改變或是何等嚴峻，只要有積極正面的態度，任何地方都能成為舒適圈。

取之於社會　回饋於社會

最後，蔡祈岩學長給學弟妹的一些建議，他認為能夠進來交大資工的同學都是天之驕子，擁有良好的學習環境、優秀的老師，得到這麼多社會資源的同時，也該努力回饋於社會。蔡祈岩學長說道「因為我們身上揹負的是父母、社會大眾的期待和資源，因此我們就要加倍努力，不能辜負這些，這樣的想法是我期望學弟學妹能夠有的。」

Jack Tsai：
Having a Positive Attitude Can Create Comfort Zone on Your Own

A different career path

Seeing himself as a disobedient student, after graduating from university, Jack Tsai wanted to be different from others while most of his classmates chose to work in Hsinchu Science Park. “I don’t usually plan things. When there are some interesting job opportunities, I would take them.” This rebellious personality made him enter a different career path. With a Computer Science Bachelor degree, Jack Tsai has encountered many problems just like many other science and engineering graduated students would encounter in the workplace. He said, “sometimes the best solution is not from scientific perspectives. The best solution is usually the ones which everyone agrees and can work on together.” It requires collaboration in the workplace, so teamwork is extremely important.

Effective communication skill at workplace: ready to be convinced by others

Jack Tsai sees his blind spots from a programmer’s point of view. “If we think we have already thought through everything, it is difficult to be convinced by others.” During a meeting, if he sees some flaws in other people’s plans, he will respect others’ opinions first and then try to make up for the shortage. At the same time, he sees the importance of caring for other people’s feelings. In addition, Jack Tsai thinks knowing how to make compliments on other people’s plans and projects is considered very crucial in the workplace. “I am here to help other’s plans to become better instead of selling own my plan.”, he said. This is what he learned from his experience at work.

Having a positive attitude can help you to build comfort zone anywhere

People usually are encouraged to leave their comfort zone for good. However, holding a different opinion about it, Jack Tsai thinks students can actually decide whether this place is a comfort zone for them. He thinks that If we carry “oxygen bottles” around us, every place can be a comfort zone. In other words, if we have a positive attitude toward every challenge, we can adjust and survive well in different environments.

Giving Back to Society

Finally, Jack Tsai would like to give some words to all the computer science students at National Chiao Tung University (NCTU). He thinks NCTU students are considered privileged students who are instructed by the world’s leading professors and are studying with sufficient learning resources. Upon that point, students in the future should try to give back to society as much as possible. Jack Tsai said, “society and parents have high expectations for us because we have so many resources. Therefore, we should work hard for them. I hope NCTU students should have this kind of attitude.”

從水流星到洲際飛彈 導航科技發展史

文／林一平 交大講座教授

第六代行動通信 (6G) 發展低軌道衛星，最重要的應用是精準定位。在《黑暗騎士》(Dark Knight) 這部電影，蝙蝠俠為了追蹤「小丑」，將高登市所有手機的麥克風統通打開，監聽每一支手機附近的說話聲音，比對小丑的聲紋，並以手機定位，找到小丑的位置。這種做法顯然大闖紅燈，嚴重侵犯隱私權。在現實生活上，這種全面監聽已能實現。定位服務是科技演進的必然結果，無法抵擋的。

誰發明提供定位的 GPS ？主要的想法據說是來自於葛提 (Ivan Alexander Getting)，而由美國國防部花了 1,200 億美元建置。最初用來導航，而今日更顯著的用途是用來校正時間以及精準定位。例如過去的行動通訊基地台全都靠 GPS 來做時間的同步。第一套 GPS 系統包括了 18 顆衛星。這是當時擔任雷神公司 (Raytheon) 副總裁的葛提於 1951 年給美國空軍的建議，用以導航洲際飛彈 (ICBM)，使之能沿著火車鐵路路線移動。葛提亦活躍於學術界，於 1978 年擔任 IEEE 總裁。

另有一說，Roger L. Easton 才是「正港」的 GPS 之父。這種「誰是爸爸」的爭議，在科技界常常發生，我們也無法細究，只能在此平衡報導，以昭公信。

行動定位能精準神奇，是需要軟體配合的。前幾年有一則新聞，報導過年期間到苗栗大湖採草莓的人，大都飽嘗塞車之苦。警方懷疑是衛星導航惹的禍，因為衛星導航把駕駛人導引到距離最短、卻狹窄多彎的縣道一三〇線。苗栗警察分局雖在中山高三義交流道附近派了廿多名警員及義交指揮交通，但車潮還是一波接著一波，根本無力疏散。原本只需半個小時的車程，開了三、四個小時。

很顯然，衛星導航的程式智慧不足。抱怨的民眾最後下結論：「早知道就不要太相信衛星導航！」因此，導航軟體要寫好，才能充分發揮 GPS 的功能，否則仍然會「迷路」。關鍵在於人工智慧的預測要準。

早年沒有 GPS，只有靠大自然來定位。我的父親小時候住在雲林麥寮海邊，生活貧困。因為年紀太小，無法出海捕魚，冬天得跌跌撞撞跟著祖母到海邊，撿凍僵的死魚佐餐。冬天夜色來的早，潮水迅速上漲，如不及時上岸，就會淪為波臣。當黑幕快速籠罩大地後，無法分辨方向，只感覺黑暗、濕冷，及惶恐。此時祖母會依靠天狼星 (Sirus) 指引，將父親平安的帶回岸上。

台灣位於北迴歸線附近，冬季的傍晚，往東南方地平線的方向看去，最亮的那顆星，就是天狼星。天狼星是大犬座的第一亮星 (大犬座 α 星)。祖母沒有受過教育，不知道甚麼大犬座、天狼星，而是稱天狼星為很詩意的「水流星」(台語發音)。祖母說，由遠離岸邊的海中望去，低垂的天狼星如同在水面載浮載沉的漂流。

父親後來念書，才知道祖母口中的水流星，就是天狼星。湊巧的是，埃及人也稱呼天狼星為「水上星」。對父親而言，不管叫甚麼名字，天狼星不只是單純的方位導航，更是安撫惶恐，提供安全感的藉慰。今日我們有衛星定位，比起埃及人的天狼星，幸福多了。第六代行動通信的雙向定位加上人工智慧的預測，會冒出甚麼火花？令人期待。

From Water Meteor to Intercontinental Missiles, the History of Navigation Technology

As important complements to the sixth-generation mobile communications (6G) system, low-orbit satellites have provided initial navigation and precise positioning services. In the movie The Dark Knight, in order to track the villain Joker, Batman transformed the smartphones in Gotham City into a massive audio surveillance network, quietly enabling all citizens' microphones, scanning for the Joker's voice, and then finding the location of the Joker. This fictional approach represents a serious invasion of privacy, but it also alludes to the wealth of possibilities in our real world. From a technical perspective, tracking a person's every move has only become more achievable over the years. Afterall, positioning services are the inevitable product of technological evolution.

Who invented the GPS (Global Positioning System)? The idea was said to originate from Ivan Alexander Getting, an American physicist and electrical engineer, and the US Department of Defense spent $12 billion on its construction. Although the GPS was designed predominantly for navigation, it is gaining ground as a timing and precise positioning tool today. For example, all the mobile communication base stations relied on GPS for time synchronization in the past. The first GPS with 18 satellites was suggested by Getting in response to an Air Force requirement for a guidance system of a proposed intercontinental ballistic missile (ICBM) that would travel along a railroad system. Getting was also active in academia, serving as the president of IEEE in 1978.

On the other hand, some people consider Roger L. Easton as the "real" father of GPS. Arguments for "who is the father" often occur in the fields of science and technology. In most cases, it is impossible to say for sure, and we can only report the claims in a fair and balanced manner.

Mobile positioning calculates a person's precise position depending on software. A few years ago, a local news reported that most people who went to Miaoli Dahu for strawberry picking during Chinese New Year suffered through traffic jams. The police suspected that satellite navigation was the main cause of the traffic jam, because each car's satellite navigation guided its driver to the shortest, curved and narrow route—County Road 130. Although the Miaoli Police Station sent more than 20 police officers and voluntary traffic wardens to direct traffic near the congested Sanyi Interchange of Sun Yat-sen Freeway, with the continuous influx of vehicles in the area, drivers were unable to evacuate. As a result, a stretch of road that would have taken half an hour to drive through instead took three or four hours.

It is clear, then, that the satellite navigation software was not "smart" enough yet. People who complained at the situation finally concluded, "I would not have trusted satellite navigation if I had known that!" Therefore, the navigation software must be well written to fully utilize the functions of the GPS, otherwise it will still be "lost" in the routes. The key to effective use of the GPS lies in the accuracy of artificial intelligence predictions.

In the early days with no GPS navigation, pilots had to navigate by celestial signs. When my father was a child, he lived in poverty at the seaside of Mailiao in Yunlin county. He was too young to go fishing, but in the winters, he would follow my grandmother and stagger to the beach to collect frozen, dead fish for dinner. It gets dark earlier in the winter, and the tide rises rapidly. If you don't get ashore in time, you can easily drown to death. When darkness quickly enveloped the earth, my father was unable to find the direction to shore, and felt dark, clammy, and panicked. Yet each time, without fail, my grandmother would bring him safely back to shore with the guidance of Sirius.

The Tropic of Cancer crosses through Taiwan. On winter evenings, looking towards the southeast horizon, you will see Sirius as a vivid point in the sky. Sirius is the brightest star in Canis Major (CMa). My grandmother was uneducated and didn't know what "Sirius" meant, much less "Canis Major". Instead, she called Sirius by a very poetic name, "water meteor" (pronounced in Taiwanese). My grandmother said, when you looked at the sea far from the shore, the drooping Sirius seemed to float on the surface of the water.

After my father went to school, he learned that the "water meteor" named by my grandmother was more commonly known as Sirius. Coincidentally, the ancient Egyptians also called Sirius the Nile star, the forerunner of the inundation of the Nile. No matter what the name is, Sirius is not only a simple means of celestial navigation to my father, but also a comfort, a release from fear and a restoration of emotional safety. Today the satellite positioning system, which is more wonderful than the Egyptian's Sirius, provides much convenience to us. We look forward to seeing what sparks will emerge between the two-way positioning of the sixth-generation mobile communication system and artificial intelligence predictions.

模擬人生的方法

文／林一平 交大講座教授

最近大家都在高喊雲端運算，談虛擬化(Vitualization)、負載平衡(Load Balancing)等等。其實這些技術的基本原理，在2、30年前就已存在。例如我的博士論文題目是平行模擬(Parallel Simulation)，係以多部計算機來模擬離散的事件(Discrete Event)，在負載平衡上就下了極大的工夫。

平行模擬最大的問題是，許多部計算機要共同模擬一個現象，彼此必須協調，相當困難。例如用10部計算機模擬一個系統在100分鐘內的變化，這些計算機必須依時間的次序來模擬事件(Event)，因此要協調，避免後發生的事，被先模擬到。我們的研究顯示，協調的成本甚高。

1980年代的有一天我突發奇想，做了另類思考，如果將前述100分鐘的模擬，切成十份，第一個10分鐘由第一部計算機模擬；第二個10分鐘由第二部計算機模擬，以下類推。所有計算機平行模擬時，彼此之間不需要做任何協調。當它們全部完成運算後，再將所有10分鐘的結果依序串接回來，就完成整個模擬程序。我將這個方法叫作Time-Division Algorithm，發表於ACM Transactions on Modeling and Computer Simulation這個雜誌的創號刊，頗受矚目。

有不少學者持續我的研究，但將這個方法改名為Time-Partitioning Algorithm。這個方法其實並不容易使用。你必須先預測系統在第10分鐘時，處於何種狀態，如此第二部計算機才能正確的模擬第二個10分鐘。這當中有一些數學理論，不在此說明。

在電話公司工作時，我曾用Time-Division Algorithm來模擬電信交換機的效能。後來我有點走火入魔的想，是否可以用這種方法快速模擬人的一生。例如針對一個20歲的人，我們先假設他在30歲時的狀況(由關西摸骨算命師提供)，再同時模擬他20~30歲及30~40歲發生的事，豈不有趣？其實狄更斯(Charles John Huffam Dickens；1812~1870)在《小氣財神》(A Christmas Carol)這部小說，就用Time-Division Algorithm對主角Scoorge的一生快速模擬，然後讓聖誕精靈分段放給Scoorge看。

做模擬研究的人，都會忍不住去偷嚐「模擬生命」這個禁果。我20年前的一位好友傑佛森(David Jefferson)就是如此。傑佛森超級有個性，喜歡開跑車飆速，也很會「國罵」。我大部分的「美國俚語」，是向他學來的。他在UCLA升等為常聘副教授(Tenured Associate Professor)沒多久，打電話告訴我：「Jason, I fxxking left UCLA.」原來他一升等就決定換工作，跑去一家公司玩耍子去啦。

傑佛森發明了一種很特殊的平行模擬方法，叫做Time Warp，時間可以倒捲回來的意思(不過Len Klenirock好像也獨立想出類似的方法)。Time Warp的計算機不互相協調，各自亂跑(這和傑佛森的個性很像)。當一部計算機發現跑過頭時，就將時間倒退，並取消(undo)超前模擬的事件。傑佛森這怪咖後來想到要模擬生命。他闖入了生物領域，進行人工生命(Artificial Life)的模擬，我一點都不驚訝。

林一平 交大講座教授

現為交通大學資工系終身講座教授暨華邦電子講座，曾任科技部次長，為ACM Fellow、IEEE Fellow、AAAS Fellow及IET Fellow。研究興趣為物聯網、行動計算及系統模擬，發展出一套物聯網系統IoTtalk，廣泛應用於智慧農業、智慧教育、智慧校園等領域/場域。興趣多元，喜好藝術、繪畫、寫作，遨遊於科技與人文間自得其樂，著有<閃文集>、<大橋驟雨>。

A Method for Life Simulation

Recently, everyone has been making a lot of noise about cloud computing, virtualization, load balancing and so on. In fact, the basic principles of these technologies have been in development for the past two or three decades. For example, the topic of my doctoral dissertation was Parallel Simulation, using multiple computers to simulate discrete events; as a result of that, I put great efforts into load balancing.

The most critical issue in parallel simulation was the extreme difficulty to simulate a phenomenon by massively coordinating computers together. For example, if 10 computers are used to simulate the changes of a system within 100 minutes, these computers must simulate events in the order of occurrence. Therefore, they must coordinate to avoid simulating the later event in advance. Our research showed that the cost of coordination was very high.

One day in 1980s, I got a fanciful idea that led to an alternative thought. If I cut the aforementioned 100-minute simulation into ten pieces, the first 10 minutes will be simulated by the first computer, the second 10 minutes will be simulated by the second computer, and so on. If all computers are simulated in parallel, there would be no need to coordinate with each other. After all of them have completed the calculation, all the 10-minute results are serially connected in order to complete the entire simulation program. I called this method Time-Division Algorithm, which was published in the first issue of ACM Transactions on Modeling and Computer Simulation and attracted much attention.

A number of scholars have continued my research, renaming the method to Time-Partitioning Algorithm. This method is actually not easy to use. You must first predict the state of the system at the 10th minute, so that the second computer can correctly simulate the second 10 minutes. There are several mathematical theories involved, which are not explained here.

When I was working for a telephone company, I used the Time-Division Algorithm to simulate the performance of telecommunication switches. Later, I got a little carried away and wondered if I could leverage the same method to quickly simulate a person's life. For example, for a 20-year-old adult, let's first assume his condition by the age of 30 (provided by a fortune teller in Kansai), and then simultaneously simulate what happens to him between 20 and 30 years old as well as between 30 and 40 years old. Isn't it amusing? In Christmas Carol, Charles John Huffam Dickens (1812~1870) used the Time-Division Algorithm concept to quickly simulate the life of the protagonist Scrooge, and later the Ghosts of Christmas showed Scrooge the moments in his past, present, and future.

Those who do simulation research can't help but taste the forbidden fruit of "life simulation". It was just the case with David Jefferson, a good friend of mine who I first met 30 years ago. Jefferson has a strong personality. He likes to drive sports car at high speed and is good at using swear words. I learned most of "American slang" from him. Not long after he was promoted to tenured associate professor at UCLA, he called me and said, "Jason, I fxxking left UCLA." It turned out that he decided to change his career once he was promoted, and went to a company to play around with his ideas.

Jefferson invented a special parallel simulation mechanism called Time Warp, which means virtual time can be rolled back (but Len Klenirock seemed to have come up with a similar method independently). The computers in Time Warp simulation don't coordinate with each other and run in an un-preconfigured manner (which is very similar to Jefferson's personality). When a computer detects that it has gone too far, it rewinds time and cancels (undo) the events that were simulated ahead of time. Jefferson-the-geek later thought of life simulation and broke into the biological field by simulating Artificial Life, which didn't surprise me at all.

Dr. Jason Yi-Bing Lin / Lifetime Chair Professor

Dr. Lin is currently a lifetime chair professor of the Department of Computer Science at National Chiao Tung University and Winbond chair professor. He is an ACM Fellow, IEEE Fellow, AAAS Fellow and IET Fellow. His research interests include Internet of Things, mobile computing, and system simulation. He has developed an Internet of Things system called IoTtalk, which is widely used in smart agriculture, smart education, smart campus, and other fields. He has a variety of interests, such as art, painting, and writing, as well as voyaging through science, technology, and humanities.

林盈達教授、曾新穆教授
榮獲科技部傑出研究獎

文／林珮雯

科技部為獎勵研究成果傑出之科學技術人才，長期從事學術或產學研究，提升台灣學術、產學研究水準，增強國家科技實力，特別設立「傑出研究獎」。本院林盈達教授與曾新穆教授雙雙榮獲科技部 108 年度傑出研究獎。林盈達教授鑽研網路相關題材，團隊研發出自動測試平台 ACTS 和 5G 測試工具 ORANge，目前已從交大技轉智慧財產權，由執行團隊共同創立交大首間衍生研究服務公司「詮隼科技」，為國內的次世代電信樹立自動化測試的典範。曾新穆教授專攻巨量資料，他與科技部的 iDeepCare 計畫，結合機器學習研發智慧型深層健康照護系統，與三軍總醫院建立大腸息肉 AI 辨識模型，輔助醫師病辨別息肉性質，也和臺北榮民醫院合作心律不整預警系統，預測布魯蓋達氏症候群心電圖表現。兩位教授都是再度榮獲傑出研究獎，其研究成果皆對台灣產業及社會有莫大貢獻，以下是得兩位傑出研究獎得獎感言：

林盈達教授：學術研究是終身志業

距離上次獲頒傑出研究獎又過了三年，最大產出應該是由網路測試中心衍生出一家新創公司，初期產品為自動化測試平台 ACTS 與 5G 測試工具 ORANge。從提供網通廠商測試服務到測試工具，我深知台灣高科技產業也需要升級，只有透過測試才能把產品從消費性市場提升至企業級與電信級市場，經過多年研發累積終於把技術能量移轉至產業界。

論文發表是終身志業，只是模式可以從基本師徒二人制進化到二師一徒或二師二徒交叉共同指導，甚至二師想一系列題目找其他師徒合作，也就是可以從自備學生的種田模式擴充到找別人學生的打獵模式。因為擔任編輯、議程委員與 IEEE Distinguished Lecturer，及平均每年在國外演講 10 場，所以認識許多同領域的各國學者，得以透過合作擴大了研究的產出與視野。

得獎後要忘掉，還要假裝自己只是助理教授，以有動力但沒壓力的態度繼續努力，看自己還能學到與做到什麼。

曾新穆教授：做研究是一件長遠又迷人的事

再次獲得科技部傑出研究獎之殊榮個人深感榮耀，要感謝許多師長前輩的提攜支持以及學校與系上提供最好的研究環境；當然，也要謝謝所有傑出的合作夥伴以及聰明又勤奮的學生們，一起投注心血創造出精彩的成果！

有人問我說如何做研究才能得獎？ 做研究是一件長遠又迷人的事，過程雖然艱辛，但充滿了柳暗花明的驚喜：每個創新火花的激盪、每個困難點的突破、從最初的抽象意念到實際的具像化，點滴的累積可以帶我們窺見無限的可能性，引領至意想不到的精彩境地！

所以，我想得獎不是目的，如何找到自己的興趣，激發出熱情並鍥而不捨的沉潛於中，至終能破繭而出，驀然回首原已滴水穿石、積沙成塔，會心一笑自己與世界已有所不同，又至另一新境，這才是最大的意義與價值。與大家共勉之！

Professor Ying-Dar Lin and Professor Vincent S. Tseng
Were Awarded the Outstanding

The “Outstanding Research Award”, instituted by the Ministry of Science and Technology (MOST), honors scientific and technological talents having outstanding research performance, thereby encouraging them to devote themselves to academic and industry-academic research to improve the quality of Taiwan’s research in the international community, and ultimately boost the country’s technological capacity. Dr. Ying-Dar Lin and Dr. Vincent S. Tseng, professors of the College of Computer Science, both received 2019 Outstanding Research Award from Ministry of Science and Technology. Dr. Ying-Dar Lin delved into networking topics and his team developed automatic test platform ACTS and 5G test tool ORANge. The intellectual property rights have been transferred from National Chiao Tung University to O’Prueba technologies Inc at present. O'Prueba Technology Inc., co-founded by Dr. Lin and his team, is not only the first spin-off research service company of National Chiao Tung University but also a role model of automatic test for next-generation mobile communication in Taiwan. In addition, Dr. Vincent S. Tseng is a well-recognized expert in big data analytics. Dr. Tseng and his team at NCTU executed the iDeepCare project sponsored by MOST to develop intelligent disease risk prediction system by machine learning, establish an AI identification model for assisting physicians to detect colorectal polyps with the Tri-Service General Hospital, and cooperate with Taipei Veterans General Hospital to develop an early Warning System for Cardiac Arrhythmias and estimate the EGG pattern of Brugada syndrome. The acceptance speeches by both professors are as follows:

Professor Ying-Dar Lin: Academic research is a lifetime mission

Ever since the latest Outstanding Research Award I have received 3 years ago, the biggest accomplishment is O’Prueba, a spinoff from NCTU Network Benchmarking Lab. The early products are automatic test platform ACTS and 5G test tool ORANge. By providing network communication equipment vendors testing tools and services, I am deeply aware that Taiwan’s high-tech industry also needs an upgrade. Through product testing, manufacturers are able to improve product quality, thereby upgrading consumer-grade products to enterprise-grade and telecom-grade products. After many years of research and design, we finally transfer our technology capacity to the industry.
Academic publishing is a lifetime mission. However, the collaboration model could evolve from the basic two-person style, one mentor and one apprentice, to two mentors and one apprentice, or two mentors and two apprentices for joint advising. Furthermore, two mentors could collaborate with other mentor-apprentice groups, which means that mentors could expand from the farming model of having their own students to the hunting model of looking for other students. Since I, as an editor, agenda committee member, and IEEE distinguished lecturer, give 10 speeches abroad a year on average, I know many scholars around the world in the same field so as to expand the vision and outcomes of research through collaboration.
After receiving the award, you have to forget it and pretend that you were still an assistant professor, keep working hard with a motivated but pressure-free attitude, and see what else you can learn and do.

Professor Vincent S. Tseng: Conducting research is a long-lasting and fascinating thing

It is truly an honor to receive the outstanding research award of MOST again. I would like to thank many faculty and seniors for their support as well as the department and the university for providing the best research environment. Of course, I also want to express my gratitude to all incredible co-workers as well as smart and hardworking students for the remarkable performance we fueled together.
Someone asked me the strategy to win awards? Conducting research is a long-lasting and fascinating thing. Although the process may be full of struggles, you will be excited to see there is always a way out, such as the excitement of each innovation spark, the breakthrough of each difficult point, as well as the flow from initial abstract idea to actual visualization. The assortment of bits and pieces illustrates the unlimited possibilities, thereby leading us to a wonderful place beyond the imagination!
Therefore, I think winning the prize is not the goal. I would like to use the following words as our mutual encouragement: the greatest significance and value would be how to find my interest as well as fuel enthusiasm and perseverance, and eventually the butterfly would break out of the cocoon. Looking back after all passed, you will realize the true meaning of “constant dropping wears away the stone” and “every great thing is nothing but a lot of little ones” so that you can smile at yourself knowing that the world and yourself might have advanced to a new realm.

KKday 創辦人 陳明明：
機會是留給會爭取的人

文／高儷玲

給畢業生：好好思考未來要做什麼

陳明明學長是電機 84 級的，畢業後分別創立了易遊網、燦星和易飛，並於 2014 年創立目前台灣知名的旅遊平台——KKday。雖然是讀電機出生，但他卻選擇與電機截然不同的道路，投身於旅遊產業。也因為不同於身邊多數同學的選擇，當時的他受到家人強烈的質疑及反對。僅管最初做旅遊產業時不被看好，但他依然努力堅持，因而擁有今日的成就。

他以自身的經歷提點即將畢業的學生們，「必須要找到自己的方向，而不是由他人來告訴你。」不然過了不惑之年後會發現，自己是為別人而活。同時他也點出現今年輕人的通病，常常問身邊的同學「未來要做什麼？」想從中參考，藉此決定自己的未來。陳明明學長說：「大學畢業是個里程碑，也就是你再也不能說自己是小孩了，你不能說你什麼都不懂，需要人家來指導，你沒有這樣的特權。」必須要學會對自己負責，關於未來是個人課題，無須參考別人，而是需要靠自己去找尋答案。

工作應優先考量產業　不要過於在乎起薪

談及許多畢業生避之唯恐不及的就業問題，陳明明學長表示「很多人都說想找興趣相投的，實際上都找薪資高的，這是最常見的現實狀況。」而他則認為以長遠的角度，應該優先選擇產業。因為身處一個興盛的產業，無論到哪都能有棲身之處，而找到對的產業、對的公司，又符合自己興趣的工作時，還能因為熱愛而發揮的很好。

另外，他也強調「在找第一份工作的時候不要太在乎起薪，無論現在起薪多少，將時間拉長至 10 年後來看，這一點意義都沒有。」提醒學弟妹應該注重未來 10 年或 20 年後的薪資，而非最初的起薪。

職場學校大不同　要具備找答案的能力

身為縱橫職場多年的前輩，陳明明學長說：「學校與社會最大的不同就是，學校能有很多人告訴你答案，但到社會上卻有很多事沒有標準答案的。」必須透過自身的探索尋找屬於自己的答案，同時也要學會包容別人的答案與自己的不同，「找答案的能力遠比知道答案的要來得重要。」他語重心長地說道。

陳明明學長以第一次世界大戰著名的壕溝戰為例，儘管兩方人馬都很想放棄，但最終的贏家必然是堅持到最後的那方，藉此鼓勵學弟妹做事情要有決心和毅力。「在學校時常常會聽到一句機會留給準備好的人，但在社會上機會是留給會去爭取的人。」他提醒學弟妹，未來在社會上，準備充足的同時，也要勇於把握機會。

Founder of KKday, Mr. Ming-Ming Chen:
Opportunities Are for Those Who Strive

For graduates: please plan your future wisely

Graduated from the Department of Electrical and Computer Engineering (class year, 84) at National Chiao Tung University, Ming-Ming Chen started up companies such as ezTravel, Star Travel, and Ezfly. Furthermore, he also established the renowned travel online platform KKday in 2014. Ming-Ming Chen chose a different career path to enter into the travel industry with his Electrical and Computer Engineering background. Although he was opposed and questioned by his family, he was still persistent with his goal, which contributed to his success today. Ming-Ming Chen would like to encourage graduates that "they should try to find their goals other than being told by others." Otherwise, people would live without any purpose once they reach their midlife years. He found that it is common for young people to determine their further goals by only surveying people's opinions around them. Ming-Ming Chen also pointed out that "graduating from university is a milestone. That is to say at this stage, students do not have any excuses for their own immature behaviors anymore." Instead, students should be responsible for their future, and they need to find answers on their own.

Industry should be considered first before salary

When talking about employment, Ming-Ming Chen said that students often say interest is the most important factor when looking for a job. However, the truth is they usually choose jobs by salary. From a long term perspective, he suggested it is more important to choose which industry students want to work for other than the salary. Ming-Ming Chen suggested, "do not focus too much on salary when looking for the first job, it is meaningless if you see it in the long term. If you have a profession for a popular industry, it is easier to find a job. Besides, you will be able to perform better with the job you are interested in."

Students should have the ability to find answers

After working many years, Ming-Ming Chen said, "the difference between school and workplace is that many people would tell you answers directly at school. However, sometimes there are no standard answers after you graduate from school." It is necessary to search for answers by ourselves. Meanwhile, it is important to tolerate the differences with others. "The ability of searching answers is more important than knowing the answers", Ming-Ming Chen said. He further gave an example of trench warfare in world war 1 to encourage Computer Science students to be persistent with their goals, "winners do not give up. It is often said that opportunities are for those who are well-prepared. However, the reality is opportunities are for those who strive hard."He hopes Computer Science students will be able to seize the opportunities after they graduate from school.

資工系
畢業生與在校生代表致詞

王柏盛　資工系學生

主任，各位提攜我們的師長，學長姐學弟妹，以及在座所有畢業生，大家好，我是畢業致詞代表，王柏盛。

說實話，我並不覺得我能夠代表交大資工09級上台說話，我不是最優秀的，也不確定這個角色應該要表達感謝之意還是離別之情。也許我唯一能做的，是用我的區區拙見，說一說在畢業之際的一些想法。

四年過去了，你的大學目標完成了多少，有成為一名合格的交大資工人嗎？有學會做人處事嗎？有做到入學申請寫的讀書企劃嗎？在交大資工的四年，不論設定的目標完成了多少，我相信對各位來說都是一段很充足的時光，像是大一「早八運動」的好習慣，大二一起考很多次的CPE（程式檢定），大三開始瘋狂做專題meeting，然後大四出國、實習、推甄、考研究所等等，相信各位在經歷這些豐富且紮實的訓練之後，即使沒有成為資訊領域的佼佼者，也應該都是時間管理大師了，而這些都能成為未來讓我們立足社會的養分。

交大資工的官網有寫著預約成功的三個要素，除了剛剛說的紮實的專業訓練外，還有結交一輩子的朋友跟貴人多相助，關於同儕之間我一直覺得身在資工系是很幸運的。在這個交大資工一樣米養百樣人，除了課業上的好表現外，也有在各個領域的強人，有體育校隊，代表學校去比賽抗爭；有饒舌歌手，寫歌對隔壁學校狂噴；甚至有人出了Line貼圖，讓我們能在群組洗頻。在人才濟濟的環境中，受到各路高手的啟迪，也洗去資工系都是宅男宅女的刻板記憶，所以等等記得跟幫助過你的同學說聲謝謝。雖然他可能還有錢沒還你，雖然他可能有攤沒有鳩你，但別忘記，你們曾經一起在操場上跳過大會操，你們曾經互相幫忙簽過導師時間，你們曾經一起做過或沒做過服務學習。未來，希望我們互為貴人，繼續互相幫助。

我覺得畢業這件事就像是GTA5一樣，同樣一張畢業證書，有人為此付出了許多，有人什麼都沒付出就領到了限時免費，但一樣都佔了你人生記憶體的幾十G。大家都有畢業證書，大家都有GTA5，那要怎麼區分出我們的差別？沒錯，就是努力地用這張畢業證書，就像衝遊戲的時數。在自己所選擇的領域不斷地進步，不斷地解成就，然後時不時拉朋友一起學習，達到真正的together we go far。

最近有許多人事物在這個畢業季畢業了，提醒我們要更加珍惜身邊的所有。或許未來我們不會有交集，但希望在這個典禮後，你會時常想起，想起一起打code的朋友，想起Stack over flow，想起幫你簽退選單的教授，想起一路走到這裡你值得為自己驕傲，為自己來自交大資工而驕傲。

吳柏憲　資工系學生

主任，各位敬愛的師長，學長姐學弟妹，以及在座所有的畢業生，大家好，我是在校致詞代表，吳柏憲。

很榮幸能夠在各位人生中重要的畢業典禮中，擔任在校生代表，為各位送行。

去年這個時候，我一樣參加了大學部的畢業典禮，那時各位大三，而我還只是大二。

那時候對於畢業這件事，是完全沒有任何的實感，畢竟還距離得很遠，但是今天站在這個台上的我，卻深刻地感受到，明年我也將坐在台下，接受師長與學長姐學弟妹的祝福，為我的大學生涯畫下一個句點。

我想在這次的畢業典禮之前，我充其量就是個變老的大二，但在今天的這個場合，我想我也終於能體會作為大三生是甚麼感覺。

即使下定決心要好好的珍惜所剩不多的日子，但珍惜回憶這件事，說起來簡單，但卻很難做到。 曾經有人跟我說過：過去心不可得、現在心不可得、未來心不可得，我想就是這個意思吧，想要珍惜的每一個瞬間，都會在瞬間消逝而去。

我們無法珍藏當下，但我們能夠享受當下，那怕各位的大學生活只剩下這個畢業典禮，希望各位能夠好好享受在這邊的每一刻，和好朋友相處的每一刻，身為交通大學資工系學生的每一刻。

在座的畢業生當中，有好幾位與我有著許多共同的回憶，一起參加過的活動，一起寫過的作業，一起熬過的夜，都為我的大學生活增添了許許多多的色彩，也是我有困難時會最先想到，最可靠的對象，謝謝你們對學弟妹們提攜，謝謝你們作為可靠的靠山，也謝謝柏盛學長在大一的第一個學期教我怎麼簽期中退選單。

在各位畢業之後，我們就將要成為大學部年紀最大的一群人，期許自己能夠成為學弟妹們眼中，可靠的靠山，能夠依賴的對象，種種的種種，都希望能夠成為和各位學長姐一樣優秀的學長姐。

或許在未來，在我們畢業之後，會在世界的某一個角落，以不同的身分相見，但同為交大資工人這件事是不會因為畢業而消逝，希望在未來這份學長姐與學弟妹之間的聯繫，會成為讓交大資工更強大的基石，讓交大資工的名聲更加享譽。

最後我想說的是，畢業是一段旅程的結束，也是下一段旅程的開始，無論上一段旅程是否順遂，接下來都會是一個全新的開始，祝福各位的下一段旅程鵬程萬里，展翅高飛，成為東亞資工強人！

Valedictorian Speech Given by a CS Graduate Representative and a Student Representative

Bo-Sheng Wang

Dear chairperson, every professor, and every CS graduate and undergraduate, my name is Bo-Sheng, Wang, the valedictorian. To be honest, I don't think I am good enough to be the valedictorian for all CS graduates of NCTU this year because I am not the most excellent student. In addition, I am not sure whether I should show my appreciation or sentimentality in this valedictorian speech. However, one thing I could do is to deliver my thoughts about graduation. First, I always think about how many objectives for my university life have been finished in the past four years. For example, I need to think about the following questions: Do I become a qualified CS student of NCTU? Do I know how to maintain good interpersonal relations? Nevertheless, over the past four years in NCTU, no matter how many objectives I have finished, I believe I still have a fruitful period in my life, and so do you. For instance, we should get up early for the class at 8 a.m. when we were freshmen. Besides, we should take many CPEs in the second year and spend much time making graduation projects in the third year. And now, each of us needs to prepare for the next step for our future. Thus, after these hard training, I believe all of us have become masters of time management although we might not be outstanding enough in our field. I believe all these past training could lay the foundation for our future.

Second, I want to talk about three factors for success listed on our official website. In addition to the hard training I mention above, the other two factors are friendship and life changer. For friendship, I think I am so lucky in this department because I meet many excellent people. For instance, some of you show your remarkable talents in other areas, such as music, art, and sport. Your versatility removes the stereotype of CS students and inspires me a lot. For a life changer, I think we should not forget every moment we get help from others in the past years. For example, we helped each other when we took the student service course. We should deliver our appreciation to someone giving his/her support after this commencement. Furthermore, we should still be the life-changer for others and continue helping each other in the future.

Third, I want to talk about the process of graduating. Although all graduates can get diplomas, the processing for graduating is different for each person. Some of you put much effort into your works, but some of you may slack off over the past four years. Hence, while we all have the same diploma, there are still differences among us. For me, like playing a game called GTA5, different results of our achievement depend on how much effort we pay. If we want to achieve great achievement, the only thing we can do is to make a lot of improvement in the field we choose. During this progress, we can also invite our friends to go far together. Finally, I think we should cherish what we have. Although we might not meet each other after graduating, we should remember every corner in this department of NCTU, such as your partners for coding. Just cherish everything you have and be proud of being one of the members here.

Po-Hsien Wu

Dear chairperson, every professor, and every CS graduate and undergraduate, my name is Po-Hsien Wu. It is my honor to be the student representative in this congratulatory speech. Last year, when I was a sophomore, I didn't have any thoughts about graduation at that time because it seemed far away for me. Before attending today's commencement, I still just kept the same mindset. However, at this moment, I am deeply feeling what graduation is since I will become a graduate next year. Knowing to cherish what we have is not really easy. It's easier said than done for us. Every moment always disappears in the blink of an eye although we want to treasure all of them. It corresponds to an old slang: Time is, time was, and time is past. Thus, we should enjoy every moment of being a student in the department of CS of NCTU no matter how good we could cherish them. Although there is limited time left for our university life, I hope we can enjoy every moment here, such as the moment we have with our friends.

For me, many graduates and I have owned a lot of memories that we share during the past years. The interaction among us colors my university life. For instance, we joined some activities and stayed up late together. In addition, I really appreciate your guidance when I meet difficulties, and you are the most reliable guys for me. Your excellence also reminds me to be a good model for others when I become a senior next semester. I believe the connection among us will not disappear after your graduation. Although we will have different identities to meet each other somewhere in this world, the truth is that we all come from the department of CS of NCTU. Hope this kind of connection can make the reputation of this department more and more powerful. Finally, I would like to say that the graduation from NCTU is not only the end of a journey of this stage but also a new start for the future. Wish every graduate has a bright future and becomes an excellent engineer in Asia.

參與國際頂尖會議 開拓國際視野

文稿整理／林珮雯

交大資訊鼓勵師生在頂尖國際會議論文發表，近期本院碩博士生在頂尖國際會議論文表現極為亮眼，特別在 AAAI、 CVPR 等重要的人工智慧頂級會議都有學術發表。本院十分重視學生做研究的能力，透過鼓勵參與國際頂尖會議等學術活動，讓學生們有機會與全球一流人才互相切磋，達到增進國際視野與跨文化溝通能力，我們邀請幾位參與其中同學分享心得：

發表論文：Accelerating and Improving AlphaZero Using Population Based Training
作者：Ti-Rong Wu, Ting-Han Wei, I-Chen Wu
指導教授：吳毅成老師
國 際 會 議：Thirty-Fourth AAAI Conference on Artificial Intelligence (AAAI-20)
該會議重要性：The Thirty-Fourth AAAI Conference on Artificial Intelligence，簡稱 AAAI-20，是目前國際最頂尖的人工智慧學術會議之一。由於深度學習技術發展迅速並能有效地應用到各領域項目，近年來 AI 研究蔚為風潮，今年 AAAI-20 會議投稿數量共計 7737 篇，其中僅 1591 篇被接受發表，接受率為 20.6%。接受的論文分成 oral、spotlight 兩種類型，並且每篇論文皆有海報展示。

吳廸融同學心得分享：這次會議前兩天參加了數場 tutorial，透過半天至一天的時間聆聽不同領域、主題的演講，往往能得到看待研究問題不同角度的觀點，收穫良多。會議第三到六天則是各論文的報告。這次發表的論文獲選為 oral（僅 453 篇接受為 oral; 比率：453/7737 ~= 5.85%），需要進行約莫 20 分鐘的口頭報告，向與會者介紹本篇論文技術重點及回復提問。另外也於當天晚上在海報展覽區向有興趣的與會者介紹並討論詳細的技術內容。而且會議的每天晚上，大會也安排好幾位不同研究領域的專家針對人工智慧的各領域演講。藉由參與這類型的會議以及與其他研究者的交流，不僅可以快速了解各領域的最新知識，更可以得知目前的人工智慧領域的趨勢與潮流發展，對於未來的研究方向會更有方向。

發表論文：Ghost Calls from Operational 4G Call Systems: IMS Vulnerability, Call DoS Attack, and Countermeasure
作者：Yu-Han Lu, Chi-Yu Li, Yao-Yu Li, Sandy Hsin-Yu Hsiao, Tian Xie, Guan-Hua Tu, Wei-Xun Chen
指導教授：李奇育老師
國際會議：ACM International Conference on Mobile Computing and Networking (MobiCom) 2020（接受率：17%)
該會議重要性：ACM MobiCom 為無線和移動網路 (wireless and mobile networking) 領域的頂尖國際會議，近五年平均接收率為 18%。
呂昱翰同學心得分享：本篇的論文是對 4G 網路與 IMS 系統設計上的缺失，設計攻擊手法與提供解決方案，同時結合機器學習來進行進一步的分析。我認為通往完成一篇論文的路上有許多問題，包含一開始確立研究目標、過程中尋找與解決問題、還有最後論文的呈現手法，這些我都受到同學及老師許多幫助，實驗室大家有各領域的知識能提供解答，或是給予不同觀點的看法，老師也會與我們討論研究方向，提供建議，集結眾人之力才能順利完成這篇論文。

發表論文：WBF-PS: WiGig Beam Fingerprinting for UAV Positioning System in GPS-denied Environments
作者：Pei-Yuan Hong, Chi-Yu Li, Hong-Rong Chang, YuanHao Hsueh, Kuochen Wang
指導教授：李奇育老師
國際會議：IEEE International Conference on Computer Communications (INFOCOM) 2020 (接受率 : 20%)
該會議重要性：IEEE INFOCOM 為網路領域的頂尖國際會議，近五年平均接收率為 20%。

洪培元同學心得分享： 很高興在李奇育教授的指導下，論文能上頂尖會議。這份榮譽是和老師學長學弟一起努力得來的。加入實驗室會從動手做和研讀一流論文開始。一段時間下來，便可知到領域的潮流，能找出別人不足的地方，還有確立研究方向。題目選定後，會不斷和老師做攻防演練來找出缺失並改進，最後投稿便被接受了。

在我的學術生涯中，發論文倒是其次，最重要的是有個表率可以觀摩。讓我學習到老師良好的時間管理、做研究的方法，以及被他的熱情所影響。

發表論文：Time Flies: Animating a Still Image with Time-Lapse Video as Reference
作者：Chia-Chi Cheng, Hung-Yu Chen, Wei-Chen Chiu
指導教授：邱維辰老師
國際會議名稱：IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2020)
該會議重要性：CVPR 為電腦視覺領域中最頂尖的會議。今年一共有 6656 篇有效投稿，其中有 1470 篇被接受，接受率為 22% 左右。

近年來深度學習與人工智慧越來越熱門，而電腦視覺也被認為是該領域中很重要的發展方向。因此 CVPR 也被公認為是 AI 領域中的頂尖會議之一。

鄭家期同學心得分享：這是我第一次參加頂尖會議，當初知道論文被接受時非常開心，以為能順利去美國發表，但後來因為疫情的關係改為線上會議。

雖然覺得有點可惜，但換個角度想可能也是因此而參加到最特別的一次 CVPR。因為時差的關係，我的報告時間為台灣的半夜一點，也是個特別的經驗。

會議過程中跟來自世界各地的學者討論我的研究方法、概念及結果，一開始非常緊張，但到後來越來越放鬆，也從中得到很多不錯的建議與想法。

這次會議中也讓我學到要對自己的研究跟想法有信心，與他人討論時也要盡量的表達自己，其實與會者們都是很互相欣賞的，也都希望可以互相學習，所以清楚闡述自己的想法及勇於發問一定會有意想不到的收穫！

發表論文：IF-Net: an Iilumination-invariant Feature Network
作者：陳柏亨，駱昭旭，黃祖寬，楊浚，陳冠文
國際會議名稱：ICRA 2020, International Conference on Robotics and Automation
該會議重要性：於世界頂級 A 級會議，會議內論文主軸 focus 在機器人與人工智慧之研究議題與應用。

陳柏亨同學心得分享：很高興論文能夠被世界頂級的會議接受，尤其是在現在人工智慧領域這麼火熱的情況下，能夠讓自己的研究內容受到會議的肯定，是非常令人振奮的。在這次的虛擬會議中，遇到很多能力很強的研究學者，而且大家在線上會議的討論也非常熱烈，都在互相腦力激盪，也學到了很多其他領域的新知。而這次我們投稿的內容屬於 AI 領域的深度學習，所以在虛擬會議中也遇到不少對我們研究感興趣的學者，我也非常喜歡這種互相答辯來回的過程。經過這次參與國際會議的過程，整體而言是可以學到很多專業知識，感覺獲益良多。

發表論文：Spatiotemporal Super-Resolution with Cross-Task Consistency and its Semi-supervised Extension
作者：Han-Yi Lin, Pi-Cheng Hsiu, Tei-Wei Kuo, Yen-Yu Lin
指導教授：林彥宇老師
國際會議：International Joint Conference on Artificial Intelligence 2020 (IJCAI 2020)
該會議重要性：IJCAI 是人工智慧領域中的頂尖學術會議之一，首屆舉辦在 1969 年，原為每兩年一次，但隨著近年來深度學習技術的迅速發展與廣泛應用，自 2016 年起每年招開。今年的接受率更創下近年來新低 12.6%，今年投稿數為 4717 篇，有 592 篇被接受。

林翰毅同學心得分享：這是我在 AI 領域的第一個研究成果，對這個領域從不熟悉到有一篇研究成果，前後花了約一年半的時間。一開始我先了解 AI 的核心技術以及此技術如何應用在電腦視覺領域，接著一邊大量閱讀論文也邊尋找可能的研究題目，然後與老師討論出這個研究主題，最後設計方法與反覆實驗，並寫成文章投稿。很開心這個領域正蓬勃發展的同時能夠參與其中，也感謝共同作者群的指導教授們，每周一起討論研究，不斷修正，最後才能產出這篇頂尖會議論文。

Participation in Top International Conferences Would Broaden a Global Vision

The college of Computer Science, NCTU, encourages faculty and students to submit papers at top international conferences. Recently, our master and PhD students have performed extremely well at top international conferences, especially in AAAI, CVPR and other important artificial intelligence top conferences. Our college holds students' research abilities in great regard. By encouraging participation in top international conferences, students would have opportunities to interact with world-class talents to broaden their global vision and develope effective cross-cultural communication skills. Here are some students' experiences.

Title of Article: Accelerating and Improving AlphaZero Using Population Based Training
Author: Ti-Rong Wu, Ting-Han Wei, I-Chen Wu
Advisor: Dr. I-Chen Wu
International Conference: Thirty-Fourth AAAI Conference on Artificial Intelligence (AAAI-20)
The Significance of the conference: The Thirty-Fourth AAAI Conference on Artificial Intelligence (AAAI-20), is one of the top international conferences. Due to the recent advances and applications of deep learning technology in various fields, AI has become a growing area of research and development in the past few years. In this year's AAAI-20 conference, 7,737 papers were reviewed, and 1,591 papers were accepted, with an acceptance rate of 20.6%. Accepted papers will be divided into two categories: oral presentation and poster presentation. Each paper has a poster display.

The experience of Ti-Rong Wu: I participated in several tutorial sessions in the first two days of the conference. I listened to speeches in various topics and field and gained a lot of knowledge from a wide variety of perspectives on research through quite a few sessions. Papers were presented during the last 4 days of the conference. Our paper was accepted as oral presentation (only 453 papers were accepted as oral; ratio: 453/7737 ~= 5.85%). An oral presentation would take about 20 minutes to introduce the technical highlights of the paper and answer questions. In addition, we will introduce and discuss our technology in more detail in the poster exhibition area in the evening.

Title of Article: Ghost Calls from Operational 4G Call Systems: IMS Vulnerability, Call DoS Attack, and Countermeasure
Author: Yu-Han Lu, Chi-Yu Li, Yao-Yu Li, Sandy Hsin-Yu Hsiao, Tian Xie, Guan-Hua Tu, Wei-Xun Chen
Advisor: Dr. CHI-YU LI
International Conference: ACM International Conference on Mobile Computing and Networking (MobiCom) 2020 (acceptance rate: 17%)
The Significance of the conference: ACM MobiCom is a top international conference on wireless and mobile networking. The acceptance rate is 18% over the past 5 years.
The experience of Yu-Han Lu: Our paper is about the discussion of design deficiencies and attack techniques of 4G network and IMS system, thereby providing effective solutions and integrating machine learning for further analysis. There are many challenges regarding the completion of a paper, including setting up a research goal in the beginning, finding and solving problems during the research process, and compiling the final paper. I have received a lot of help from classmates and my advisor. Everyone in the laboratory may provide answers in various fields, or give different perspectives. My advisor would also discuss research directions with us and provide suggestions. The completion of this paper would be a team work to me.

Title of Article: WBF-PS: WiGig Beam Fingerprinting for UAV Positioning System in GPS-denied Environments
Author: Pei-Yuan Hong, Chi-Yu Li, Hong-Rong Chang, YuanHao Hsueh, Kuochen Wang
Advisor: Dr. CHI-YU LI
International Conference: IEEE International Conference on Computer Communications (INFOCOM) 2020 (acceptance rate: 20%)
The Significance of the conference: IEEE INFOCOM is a top international conference on Networks. The acceptance rate is 20% over the past 5 years.
The experience of Pei-Yuan Hong: It is a pressure to me that my paper was accepted in the international conference under the guidance of Dr. Chi-Yu Li. The honor should be shared by my advisor, my colleagues, and me due to the joint effort. Being a member of the lab, we begin with hands-on works and survey excellent papers. After studying for some time, you will realize the trends in the field, recognize other's weaknesses, and choose research directions. After the topic is defined, we will continue to conduct offensive and defensive drills with our advisor to find out the weak points and make improvements. Finally, the paper is accepted. In my academic career, paper publishing is the second priority. The most important thing to me is to find a role model who possesses merits I can learn from. My adviser is exactly the one: his good time management, the research methods he teaches, and his enthusiasm for the research.

Title of Article: Time Flies: Animating a Still Image with Time-Lapse Video as Reference
Author: Chia-Chi Cheng, Hung-Yu Chen, Wei-Chen Chiu
Advisor: Dr. Wei-Chen Chiu
International Conference: IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2020)
The Significance of the conference: CVPR is one of the top international conferences on computer vision. In this year's CVPR conference, 6,656 papers were reviewed, and 1,470 papers were accepted, with an acceptance rate of 22%.
In recent years, deep learning and artificial intelligence have become more and more popular. Computer vision is also considered to be one of the very important development directions in the field. Therefore, CVPR is recognized as one of the top conferences in the AI field.
The experience of Chia-Chi Cheng: It is my first time attending a top international conference. I was very happy when I was informed that my paper was accepted. I thought I would go to the United States for a presentation; however, it was changed to an online conference due to the COVID-19 pandemic.
Although I felt sorry for not going abroad, I thought this CVPR might be the most special one from a different perspective. Because of the time difference, my presentation time was 1:00am, right in the middle of the night in Taiwan, which was also a special experience to me.
During the presentation, I discussed my research methods, concepts, and results with scholars all over the world. At first, I was very nervous, but later on I was getting relaxed. I received many good suggestions and ideas from them.
I have learned so much at this conference: building my confidence in my own research and ideas and expressing my ideas in great detail while discussing with others. I realized that all participants appreciated each other and hoped to learn from each other. Therefore, you would gain beyond all expectations if you express yourself clearly and ask questions bravely!

Title of Article: IF-Net: an Iilumination-invariant Feature Network
Author: Po-Heng Chen, Zhao-Xu Luo, Zu-Kuan Huang, Chun Yang
Advisor: Dr. Kuan-Wen Chen
International Conference: ICRA 2020, International Conference on Robotics and Automation
The Significance of the conference: ICRA 2020 is the world's largest and most comprehensive technical conference focused on the topics and applications of robotics and automation.
The experience of Po-Heng Chen: I am very happy that my paper was accepted in the top international conference. Among the booming of AI research, it is very exciting that my research was affirmed by the conference committee. In this virtual conference, I met many capable scholars. The discussions in the online conference were very enthusiastic. We tried to bounce ideas off each other, and also learned a lot of new ideas in other fields. The paper we presented in this conference was categorized to deep learning in the AI field, so that I met many scholars who are interested in our research online. I especially enjoyed the Q&A session. In general, I have learned a lot of professional knowledge and gained a lot at the conference.

Title of Article: Spatiotemporal Super-Resolution with Cross-Task Consistency and its Semi-supervised Extension
Author: Han-Yi Lin, Pi-Cheng Hsiu, Tei-Wei Kuo, Yen-Yu Lin
Advisor: Dr. Yen-Yu Lin
International Conference: International Joint Conference on Artificial Intelligence 2020 (IJCAI 2020)
The Significance of the conference: IJCAI, one of the top international conferences in the AI field, was founded in 1969, and held biennially in odd-numbered years since 1969. Due to the recent advances and applications of deep learning, IJCAI has been held every year since 2016. The 12.6 percent acceptance rate based on valid submissions marked a historic low for the prestigious and discerning conference. In this year's IJCAI conference, 4,717 papers were reviewed, and 592 papers were accepted.
The experience of Han-Yi Lin: This is my first paper in the AI field. It took me one and a half year from knowing nothing in the field to conducting a research paper.
In the beginning, I first studied the core technology of AI and how to apply this technology to computer vision. Next, I surveyed a lot of papers while looking for possible research topics. I discussed my research directions with my advisor, designed my research methods and repeated experiments, and finally submitted my paper to the conference. I enjoyed the participation among the booming AI field. I would like to thank the advisors of the joint research group for discussing together every week and constantly refining my paper, which molded this top conference paper at the end.

善用科技：
不畏懼疫情，資工英語圓桌推出遠距教學課

文／劉美君

受新冠肺炎疫情影響，本學期的資工英語圓桌課程調整為遠端學習的方式，順利完成為期十週的英語溝通能力表達課程。因為是第一次採用線上教學的方式，也顧慮到資安的問題，一開始課堂在選擇教學軟體上，師生一起嘗試不同的遠距教學軟體並選擇最適合小班、互動性較高的軟體。

本學期的主題內容豐富，包含科技產品、運動、人生目標、國際新聞、心理學等等。英語助教在設計課程前採用問卷方式調查資工學生較有興趣的主題，提高學生的學習動機和學習成效。學生在課後問卷裡面表示：「我覺得課程的內容很棒」、「謝謝助教每堂課都那麼用心的準備課程內容，每次看到投影片都覺得也太用心，辛苦了。」

學生也不諱言地說有時候需要習慣遠距教學的缺點，例如使用線上教學軟體使用時有時候會有雜音影響，但大致上還是可以克服，而採用線上教學的方式也讓學習不受時間、空間的限制，可以隨時隨地進行，在非常時期的時候依舊能提升資工學生的英語能力。大部分的學生都一致認為參與此課程之後能增加英語口語能力、增加單字量及更能流暢的用英文分享自身的經驗。

< 資工專屬英語諮詢服務 >

資工系自從 108 下學期起提供專屬一對一英語諮詢服務，由本系的英語助教劉美君老師提供客製化的英語諮詢課程。諮詢內容包含英語研討會口頭報告演練、英語簡報演說、英語海報展演練、工作面試英文演練、語言檢定及商業英文相關諮詢。若你需要提升自身英文能力，歡迎報名此項資工系專有的免費英語諮詢服務。

可預約的對象

資工系大學生、碩士生、博士生、教職人員及行政人員。

了解更多

系網：https://www.cs.nctu.edu.tw/education/english-counseling-service

CS Offered Online English Speaking Course during Covid-19 Pandemic

The Computer Science (CS) Department at National Chiao Tung University (NCTU) offered Online English Communication and Delivery course due to the impact of Covid-19 pandemic. The course is originally designed for graduate students at the department to practice English speaking abilities, and it usually involves face-to-face interaction between instructors and students. However, the 10-week course went online for the very first time in spring semester in 2020 for safety concerns.

In the beginning of this 10-week course, instructors and students joining this course worked together to try out different suitable online learning platforms for group discussions and interactive class activities. Meanwhile, the importance of online information security was concerned. After several attempts and practices, the classes were finally ready to be switched to long distance learning mode.

Although the course was conducted online for the first time, it was still able to help students to practice speaking English. Students were asked to turn on their web cameras in front of computers and laptops to discuss a variety of different topics such as technology, sports, life goals, international news, and psychology in English. These topics were selected from a pre-class questionnaire conducted by students to investigate their personal interests for better learning outcomes of the course. “I think is the content of different topics is really awesome and I feel appreciated to the instructors who put a lot of efforts into it.”, a student said after participating in the course.

Overall, the first English for Speaking Delivery and Communication online course was completed successfully. Because of its flexibility for learning, improving English oral communication for Computer Science students can happen anytime and anywhere. Despite there are some limitations in remote learning such as connection problems or noises in the background, they can be overcome in general. Furthermore, most of the students increased vocabulary size and became more confident to express their opinions in English after attending this course.

One-on-one English Counseling Service

One-on-one English Counseling Service is available in the Computer Science Department at National Chiao Tung university starting from fall semester in 2019. The service is offered by Selina (Mei-Chun) Liu, who is currently an English teaching assistant in the department. It includes helping Computer Science students to prepare for conference presentations, poster presentations, job interviews, and English proficiency tests.

Qualified candidates who can use this service:

students, faculty staffs, and assistants of the Computer Science Department at NCTU

Please visit the website: https://www.cs.nctu.edu.tw/education/english-counseling-service

XR 跨域專題 創造無限幻境

文稿整理／林珮雯

XR 熱潮正方興未艾，亦是未來的重點科技。由資工系莊榮宏教授、傳科系張宏宇教授、應藝所謝啟民教授及墨匠科技王銓彰執行長四位老師共同開設「XR 跨域專題」。XR 跨域專題是交通大學創創工坊 VRA 小組的核心實作課程，透過不同領域學生組成團隊，擔任程式設計師、2D/3D 視覺設計師及聲音設計師 (sound designer)，藉由動手操作過程中學習跨領域合作，此學期共執行三個專題。

為展現專題成果，於 109 年 7 月 1 日辦理期末 XR Showcase，共有八組參賽作品，是由二十多個專題成果中由同學票選出。Showcase 前半段時間開放給師生體驗，後半段時間邀請學界與業界專家評審及開放同學票選。本次專題作品成熟度令人驚豔，顯見學生們成長頗多。以下是

作品介紹：

最佳 XR 獎：Boundary

成員：林克帆、林詠詩、張晉城、鄭適其

這是一款間諜遊戲。三名玩家分別扮演遭到陷害的社會運動領導人、領導人助手，以及陷害領導人的間諜。助手和間諜分別使用 AR 在外圍幫助 / 阻礙領導人。領導人使用 VR 在監獄迷宮內找資源逃生。領導人在迷宮內會收到兩人的指示。但有一方是敵人，因此要判斷哪一方是助手，哪一方是間諜。最後要在時間內逃出去。遊戲特點是結合 VR 和 AR，三方的行為會相互影響。助手和間諜都會被變聲，要讓領導人自己判斷。XR 技術反而強化遊戲中的緊張懸疑的部分。

最佳創意獎：七彩霓虹棋

成員：王丰怡、李家揚、楊秉澄、戴志達、賴奕善

本專題嘗試將五子棋透過 VR 連線以雙人對戰的模式呈現，但考量到五子連線容易有先手優勢因此改為四子連線，而評斷機制是將所有棋子都將投影到六個面，若有連線便獲勝，因此，增設一個小棋盤讓玩家都能縱觀整場棋局！

遊戲最有趣的地方在於，棋盤是 3D 的並且棋子的六面會有不同顏色，因此，每下一個棋都有可能對其他面棋局產生影響，所以非常考驗玩家的空間邏輯能力！另外，遊戲中還加入了互動選單，讓玩家在過程中能和對手交流互嗆，增加遊戲中的互動趣味性！

勇於挑戰獎：山有木兮

成員：黃筱涓、潘怡汝、李東穎、曾維浩、廖志唯

山有木兮是一款 VR 角色扮演戀愛遊戲，主角 (玩家) 原本是一棵樹，愛慕著一位每日經過他樹下的女子。終於，他強烈的執念打動上天，開啟了不斷轉生到其他身體 (比如：貓咪、鸚鵡等等) 中並追求心上人的旅程。只要玩家完成特定的任務，就能進入下一個身體，而在不同身體當中必須扮演好進入的角色，並以角色能做出的行為和女主進行互動，增進好感度。如果最後好感度達到標準、且成功轉生為人，就能和心上人終成眷屬。

除了能在遊戲當中體驗成為人類以外的生物非常有新鮮感之外，在劇情上我們也花了許多心思來呈現。每個角色都有各自的故事，隨著任務的完成，會逐漸了解角色的背景和女主的個性，讓玩家能更有帶入感。

製作這款遊戲花了非常多的時間，甚至到展示的前半夜組員們都還在系館通宵趕工，過程中付出了心血也是難以估量的，但最後的成品大家都非常喜歡，也成為了難忘的回憶。感謝指導老師，莊榮宏、謝啟民、張宏宇、王銓彰。

最佳呈現獎：監獄逃脫

成員：黃筱涓、潘怡汝、李東穎、曾維浩

這是一款雙人的協力賽車遊戲，PC 玩家駕駛賽車，VR 玩家蒐集、操作道具，以逃出監獄孤島為目標共同合作。遊戲的最大特點在於兩位玩家的操作互相影響並且缺一不可，因此遊戲中需要大量的溝通與討論來應付各種突發狀況與對付敵人。遊戲中本來是兩位好友要一起逃獄，但是其中一位卻在中途中槍身亡。PC 玩家就是倖存下來的駕駛者，而他死去的友人則是化作了靈體幫助好友向自由邁進。

此外，由於 PC 玩家是車子駕駛者的一般視角，而 VR 玩家卻是一種近似於巨人的上帝視角，雙方的遊戲體驗是完全不同的，非常推薦兩個角色都要體驗看看。感謝指導老師，莊榮宏、謝啟民、張宏宇、王銓彰。

最佳人氣獎：NCTU-RUN

成員：劉安齊、林冠宇、王淞正、陳雅致、黃韜云

在這個熱愛運動的校園中，我們調查了許多在校有運動習慣的學生與教職員，發現了不少人對於單純的跑步感到平凡無聊，所以我們結合了音樂節奏遊戲與最新的穿戴式裝備 Hololens，藉由交替跑道、撞擊拍點、躲避虛擬障礙物等等，讓枯燥乏味的跑步運動添增趣味，也藉由遊戲前的暖身，提醒著使用者千萬不能忽略需要適當的拉筋，造以免造成後續的運動傷害，以及遊玩後會給予各項數據監控，讓使用者更加清楚自己的跑步情形與改善方向，讓你更清楚自己身體機能。

在未來希望能夠裝置在更輕便的裝置下，並結合手機與智慧型手錶等等，更方便記錄位置、里程數、心跳，手機甚至可以記錄歷史跑步紀錄，甚至可以將喜歡的歌曲直接由手機上傳至遊戲當中，使得此裝置可以吸引更多人，增加遊玩的彈性化。

Showcase 展入圍：

Fire

成員：林克帆、林詠詩、張晉城、魏旭濤、羅右喬

Fire 是一款結合防火宣導、災難逃生的遊戲。遊戲的構想來自當時的火災議題。我們想做出一款寓教於樂的遊戲，讓玩家體驗遊戲後能更了解防災觀念和火場逃生的必要知識。遊戲分為兩部分，第一部分是發生在火災前，檢修人員要檢查防火設施、清空逃生口等。另一部分是逃生人員，要在時間內運用逃生知識離開火場。檢修人員的行為可以影響逃生人員的遊戲難度。如果未來繼續改進遊戲，開發人員會加強畫面與特效功能，期待能造出更擬真的場景。

樂音夢王國

成員：戴靜雯、黃元欣、鄭適其、陳以諾、林坊羽

這是一款音樂療癒型遊戲。樂音夢王國的公主陷入了沉睡，需要世界上最美妙的樂曲才能喚醒她。玩家扮演被皇室召集的音樂家，需要在王國內的音樂魔法迷宮創造樂曲。遊戲場景共有三種地形：上下階梯、平路以及斜坡，藉由地形創造音樂的多樣性。場景以春夏、冬天為主體，並加入霧氣以及不同的障礙物增加遊戲變化度及難度。玩家在地形起伏的迷宮上移動，而音樂就如同鋼琴按鍵般的彈出，途中會遇上魔法棒、障礙物以及霧氣的阻礙和驚奇讓音樂產生更多樣的變化。

NEMO

成員：戴靜雯、黃元欣、李啟安

這是一款解謎遊戲，故事改編自 Scribbly G 的漫畫：Nemo 死了，焦急的父母決定在 Timmy 發現前換一隻新的。然而，計畫並未成功，且 Nemo 逐漸發現身邊的異狀。玩家須扮演新的 Nemo，與 Timmy 一同發掘身分真相。玩家可和周遭所見物品互動，若是感到疑惑，則可依靠 Timmy 給予提示。未來希望 2D 與 3D 美術風格可更協調，並再添加提示、伏筆和與關鍵角色互動性。並加強關卡銜接順暢度與劇情完整度，讓玩家得知結局時更加驚訝。

更多資訊連結：

https://www.facebook.com/groups/1023220511094576

XR Interdisciplinary Project Can Make Your Imagination Come True

XR is very popular in recent years, it is also the key technology for future technology. Prof. Jung-Hong Chuang at the Computer Science Department, Prof. Hong-Yu Chang at the Department of Communication and Technology, Prof. Chi-Min Hsieh at the Institute of Applied Arts, and Chuan-Chang Wang, the executive director of Blacksmith Technology Ltd. collaborated and taught in the course, XR interdisciplinary project. The course was one of the core hands-on courses in the NCTU-ICT, in which students from different fields became the programmer, 2D/3D visual designer, and sound designer to conduct 3 projects together. To present the outcome of the course, XR Showcase was held on the 1st of July, 2020. 8 groups were selected and presented with an award from 20 and more groups. In the first half of the showcase, professors and students were invited to experience the games. At the second half of the showcase, it was the voting time for students and judges in different fields. Overall, all the works were very impressive, which showed students' learning journey through this course.

The best XR: Boundary
Members: Ke-Fan Lin, Yung-Shih Lin, Chin-Cheng Chang, Shih-Chi Cheng
This is a spy game. The feature of this game is to combine VR and AR together. Three players in this game should be the leader of social movement, the assistant of the leader, and the spy who wants to frame the leader. The interaction among three players has an impact on the results of this game. The leader should use VR to find some resources for escaping a maze. This role could get the direction from the other two roles: the assistant and the spy. The assistant and the spy should separately use AR to assist or hinder the leader. The voice of these two roles will be changed, and the leader should judge which one is the enemy and escape the maze in time. In addition, the application of XR could strengthen the suspenseful atmosphere in this game.

The creative award: Rainbow Gomoku Members: Feng-I Wang, Chia-Yang Li, Ping-Cheng Yang, Chih-Ta Tai, I-Shan, Lai
This project tries to apply the technique of VR for making a dual-mode in Gomoku. Considering that the offensive move in Gomoku has its advantage, this project changes the rule to four chess pieces. The most interesting thing about this game is that the checkerboard is 3D. In addition, every chess consists of six dimensions, and each dimension has its own color. This design examines players' spatial logic. Moreover, to increase the fun among players, the interactive menu in this game could let players talk smack to each other. The mechanism of judgment is to project all chess pieces in six dimensions. If someone makes the connection of four chess pieces, he/she will be the winner. This game also provides a small checkerboard for players to make the big picture of each chess game.

The challenge award: Shan You Mu Xi
Members: Hsiao-Chuan Huang, I-Ju Pan, Tung-Ting Li, Wei-Hao Tseng, Chih-Wei Liao
Shan You Mu Xi is a relationship simulation role-playing game. The player in this game could have the feeling of virtually through the technique of VR. At the beginning of this game, the player acts a role of a tree that wants to pursue a girl passing by him every day. In the midst of this game, the player should complete certain missions so that this character could reincarnate into other creatures (i.e., cat, parrot, and human.) for interacting with this girl. The player could beat the game if the character achieves a certain level of affection with this girl. We took lots of time to design this game. For the plot part, we dwell on the details of describing characters. Along with the completion of each mission, the player could be gradually immersive in the story of each character. For the game experience design, we dwell on the feeling of virtually. The player could experience being other creatures through VR. We try the whole bag of tricks to this game, and our efforts during this process become an unforgettable memory in our life.

The best presentation award: The Escapists
Members: Hsiao-Chuan Huang, I-Ju Pan, Tung-Ying Li, Wei-Hao Tseng
The Escapists is a racing game. For the plot part, two characters trying to escape from jail on an island. One is a human being who drives a racing car for escaping. The other one is a ghost who can help the human being overcome emergencies and beat enemies. For the game design part, this game needs two players working together. Acting as a role of the human being, one player should use the first-person point of view to drive a racing car on a computer. Acting like the role of the ghost, the other player should use the third-person point of view to collect and operate props through VR. Also, these two players need to discuss together anytime to face a variety of situations and come up with different strategies. Thus, each player in this game can have totally different game experiences.

The most popular award: NCTU-RUN
Members: An-Chi Liu, Kuan-Yu Lin, Sung-Cheng Wang, Ya-Chih Chen, Tao-Yun Huang
NCTU-RUN is a sports game combining music rhythms and the latest wearable device, Holoens. To increase the fun during jogging, this game provides a variety of information and entertainment for players. Before jogging, players will be reminded to warm up to avoid sports injuries. During jogging, players will have a lot of fun through different missions, such as alternate tracks, hit beats, and escaping virtual obstacles. After jogging, players will get body data and some advice of his/her jogging positions. In the future, as game designers, we hope this game can be designed in a lighter device, and combine smartphone and smartwatch for providing more functions, such as recording body data more conveniently and uploading favorite songs.

Showcase nominations:
Fire:
Members: Ko-Fan Lin, Yung-Shih, Lin, Chin-Cheng Chang, Hsu-Tao Wei, Yu-Chiao Lo
Fire is ac game to combine promoting fire prevention and escaping from a fire. It was inspired by the issue of fire disasters. We aimed to design a game that has entertainment and education meanings to promote knowledge related to fire. There are two parts in the game: the first part happens before the fire, the maintenance person has to check fire equipment and clear the emergency exit door. The second part of the game involves characters in the game who need to apply the knowledge about the fire to escape within the time limit. For future improvement, the game developer will focus on the special image effect in the game to create more real scenes.

Music Kingdom
Members: Ching-Wen Tai, Yuan-Hsin Huang, Shih-Chi Cheng, I-No Chen, Fang-Yu Lin
This is a music game. The story in the game is about a princess in the music kingdom who fell asleep, and only the most beautiful music in the world can wake her up. Players will be the musicians who are convened by the royal family, and they need to compose music in the kingdom. There are three topographies in the game, stairs, flat road, and slope, which contribute to the variation of the music. There are spring, summer, and winter in different settings. The fog, magic stick, and different obstacles increase the difficulties of the game. While players shift between different mazes, music will be playing at the same time.

NEMO
Members: Ching-Wen Tai, Yuan-Hsin Huang, Chi-An Li
This is a puzzle game, which is adapted from a comic book, Scribbly G. In the story Nemo has passed away, his parents decided to change to a new fish before Timmy finds out. However, the plan was not successful and Nemo started to notice the unusual situation around it. The players will be Nemo to discover its true identity with Timmy. Players can interact with objects in the game. During the journey, Timmy can provide hints. In the future, we hope to improve the quality of the art style in the game. Also, we want to add more hints and increase the interaction between the main characters. Furthermore, we would like to emphasize the smoothness of different stages and increase the completion of plots to surprise the players in the end.

Find out more:
https://www.facebook.com/groups/1023220511094576

系友活動錦集

文／郭明華

7 月 31 日假台北市慕軒飯店舉辦傑出校友 & 傑出系友餐敘活動，系友齊聚一堂，敘舊同樂。109 年傑出系友出席的有范長康學長 (計控 64、計科所 68、資工博 78 級)、楊仁達學長 (計科所 78 級、資工博 79 級)、李選士學長 (計工 72、計工所 74、資工博 80 級)、吳乙南學長 (計工 77 級)、蔡祈岩學長 (資工 82 級)，親到現場領獎，主任報告系所現況及發展，期能在系友、教授的共同努力下，讓交大資工更發光茁壯。

▲ 范長康學長 (計控 64、計科所 68、資工博 78 級)- 資拓宏宇國際股份有限公司執行長

▲ 楊仁達學長 (計科所 78 級、資工博 79 級)- 財團法人資訊工業策進會副執行長

▲ 李選士學長 (計工 72、計工所 74、資工博 80 級)- 海洋大學航運管理系教授，海洋大學前副校長

▲ 吳乙南學長 (計工 77 級)- 現任安碁資訊總經理

▲ 蔡祈岩學長 (資工 82 級)- 現任星展銀行 (台灣) 科技長暨資訊及營運處執行董事

▲ 教授與系友同歡敘舊

Alumni Gathering

NCTU Computer Science outstanding alumni gathering dinner was held at Madison Taipei hotel on 31st of July, 2020. Chang-Kang Fan (class year 78), Jen-Ta Yang (class year 79), Li-Hsuan Shih (class year 80), I-Nan Wu (Class year 77), Chi-Yen Tsai (class year 82) were presented with an award. The chairperson of the Computer Science Department, Wen-Chih Peng also gave a presentation about the current situation and the future outlook at the department. With all the efforts between CS alumni and professors, the Department of Computer Science will grow stronger together.

▲ Chang-Kang Fan (class year 78), the director of International Integrated Systems, Inc.

▲ Jen-Ta Yang (class year 79), the deputy chief executive of Institute for Information Industry

▲ Li-Hsuan Shih (class year 80), the professor of the Department of Shipping & Transportation Management of National Taiwan Ocean University, former vice president of National Taiwan Ocean University

▲ I-Nan Wu (Class year 77), the general manager of Acer Cyber Security Inc.

▲ Chi-Yen Tsai (class year 82), the chief information officer and the executive director of operation office

▲ Professors catching up with alumni members

本刊每學期發刊一期，做為本院師生與系友、家長的溝通橋樑。每期報導本院近期研究現況，內容包括學人來訪、國際交流等。期能經由本刊使讀者掌握資訊學院最新動態，促進彼此互動。

一、人事動態

◇ 本院陳志成教授於 109 年 8 月起擔任本院新任院長。

◇ 本院陳添福教授、陳穎平教授於 109 年 8 月起擔任本院新任副院長

◇ 本院黃俊龍教授於 109 年 8 月起擔任數據科學與工程研究所所長。

◇ 資工系莊仁輝教授、荊宇泰教授於 109 年 7 月底正式卸下院長、副院長行政職務，感謝教授們多年推動院務之重大貢獻。

二、教師榮譽

◇ 本院陳志成教授、林盈達教授、李奇育教授、易志偉教授、曾煜棋教授團隊榮獲科技部未來科技獎。

◇ 黃敬群教授榮獲 109 年度中華民國消費電子學會傑出青年獎。

◇ 曹孝櫟教授榮獲 108 學年度傑出教學獎。

◇ 陳冠文、黃俊穎教授榮獲 108 學年度優良教學獎。

◇ 游逸平、張立平教授榮獲 108 學年度院傑出教學獎。

◇ 彭文孝教授、邱維辰教授榮獲 2020 CVGIP 優良論文獎。

◇ 陳冠文教授、陳永昇教授榮獲 2020 CVGIP 優良論文獎。

◇ 邱維辰教授榮獲 2020 CVGIP 佳作論文獎。

三、學生榮譽

◇ 陳志成教授指導林逸豪、林獻庭、何鳳雯、林家弘、陳逸群、林芳妤、林元偉、曾怡婷同學榮獲 2020 TCSE 最佳展示論文獎。

◇ 袁賢銘教授指導吳昱陞同學、廖家鴻同學榮獲 ICKII 2020 Best Conference Paper Award!

◇ 黎梁偉同學榮獲 2020 第十三屆崇越論文大賞優良論文獎。

◇ 陳平揚同學 NCWIA 2020 最佳論文獎。

◇ 林文杰教授、Sabarish V. Babu 教授指導林芸萱同學榮獲 ACM Symposium on Applied Perception 2020 Best Paper Award!

◇ 陳冠文教授指導陳柏亨同學榮獲 IPPR 第十三屆博士論文優等獎。

◇ 黃敬群教授指導吳侑峰同學榮獲 IPPR 第十三屆碩士論文佳作獎。

◇ 邱維辰教授指導鄭家期同學榮獲 IPPR 第十三屆碩士論文佳作獎。

Published twice per year, this periodical, as a bridge between faculty, students, alumni and parents, is dedicated to the latest research updates, including visiting scholars, international collaboration, etc., in order to assist readers to keep abreast of the latest developments of College of Computer Science and encourage mutual interaction.

1. Personnel Changes

· Dr. Jyh-Cheng Chen has been named Dean of the College of Computer Science, effective August 1st, 2020.

· Dr. Tien-Fu Chen has been named Associate Dean of the College of Computer Science, effective August 1st, 2020.

· Dr. Ying-Ping Chen has been named Associate Dean of the College of Computer Science, effective August 1st, 2020.

· Dr. Jiun-Long Huang has been appointed as Director of the Institute of Data Science and Engineering, effective August 1st, 2020.

· Dr. Jen-Hui Chuang, Dean of the Computer Science, and Dr. Yu-Tai Ching, Associate Dean of the Computer Science, stepped down at the end of July, 2020. Thank you for your great service and dedication to our college over the years.

2. Faculty Honors and Awards

· The team of Professor Jyh-Cheng Chen, Professor Ying-Dar Lin, Professor Chih-Wei Yi, and Professor Yu-Chee Tseng received the Future Tech Award of the Ministry of Science and Technology.

· Professor Ching-Chun Huang received the Outstanding Young People Award of the Consumer Electronics Society of the Republic of China for 2020.

· Professor Shiao-Li Tsao received the Outstanding Teaching Award of National Chiao Tung University for 2019.

· Professor Kuan-Wen Chen and Professor Chun-Ying Huang received the Excellent Teaching Award of National Chiao Tung University for 2019.

· Professor Yi-Ping You and Professor Li-Pin Chang received the Outstanding Teaching Award of College of Computer Science, NCTU for 2019.

· Professor Wen-Hsiao Peng and Professor Wei-Chen Chiu received the 2020 CVGIP Excellent Article Awards.

· Professor Kuan-Wen Chen and Professor Yong-Sheng Chen received the 2020 CVGIP Excellent Article Awards.

· Professor Wei-Chen Chiu received the 2020 CVGIP Article Award.

3. Student Honors and Awards

· The team of Yi-Hao Lin, Hsien-Ting Lin, Fong-Man Ho, Chia-Hung Lin, Yi-Chuan Chen, Fang-Yu Lin, Yuan-Wei Lin, and Yi-Ting Tseng, advised by Dr. Jyh-Cheng Chen, was awarded the 2020 TCSE Best Demo Paper Award.

· The team of Yu-Sheng, Wu and Chia-Hung, Liao, advised by Dr. Shyan-Ming Yuan, was awarded the 2020 Best Conference Paper Award at 3rd IEEE International Conference on Knowledge Innovation and Invention.

· Le Luong Vy was awarded the thirteenth TSC Thesis Award for 2020.

· Ping-Yang Chen was awarded best article award at the National Conference on Web Intelligence and Application.

· Yun-Xuan Lin, advised by Dr. Wen-Chieh Lin and Dr. Sabarish V. Babu, was awarded the Best Paper Award at ACM Symposium on Applied Perception 2020.

· Po-Heng Chen, advised by Dr. Kuan-Wen Chen, was awarded the IPPR 2020 Best PhD Dissertation Award.

· Yu-Feng Wu, advised by Dr. Ching-Chun Huang, was awarded the IPPR 2020 Master's Thesis Award.

· Chia-Chi Cheng, advised by Dr. Wei-Chen Chiu, was awarded the IPPR 2020 Master's Thesis Award.

親愛的系友，您好！

一直以來，系友的支持是交大資工最引以為傲的堅強後盾。在全體師生共同努力及系友們的支持下，交大資工已然成為國內外資訊領域最具聲望的系所。今年交大資工甲組指考排名進入到全國第二類組排名第 6 名，交大資工系為了吸引優秀學生就讀，提供第一志願入學獎學金，今年有高達 88 位同學選填交大資工系為第一志願。然而面對劇烈的競爭環境，我們並不以此自滿，持續追求進步、創新、卓越。在現今教育部及學校經費補助都十分有限的條件下，我們亟需要您的力量以成就傑出的願景。

而「空間」作為「人」的延伸，我們將藉由活化改造工三館，提供師生更完善的教研環境，同時保存資工人在這裡凝聚的共同記憶。資工系所在的工程三館已三十年未翻新，內部軟硬體設施已老舊不敷使用，亟需整建。在學校經費補助相當有限，無多餘的經費加速改善教學軟硬體環境，特別需要系友們慷慨解囊。

從 107 年開始我們擬定各項整建計畫，並向各屆系友以班級方式募款來翻修多年未整建的教室，感謝 79 級系友協助整建系計中二樓機房、70 級系友整建工三館 114 R 階梯教室，後續仍有許多空間，如提供給大學部學生更多創意發想的討論與實作空間的整建，交大資工電腦博物館空間規劃等，需要系友齊心協助改善，達到工程三館全館翻修之目標，以提供師生更好的學習環境。

值此之際，希望大家齊力相挺，有錢出錢、有力出力。您的捐款將會依您的意願妥善運用在整修教室或指定的其他用途上，每一份捐款，我們都深懷感恩並珍惜。

交大資工有堅強深厚的實力，而我們需要讓大家看見「NCTU CS」是開創歷史，承先啟後，走在尖端！

交大資工系系主任
彭文志 敬上

1. 捐款用途：

資工系系務發展：相關行政、教學等支出。
資工系學務發展：贊助學生所舉辦之社團活動、獎助學金、急難救助、興建館舍、講座教授酬金、整建計算機中心機房、更新網路與設備以及整修教室館舍。

2. 線上專案捐款

請先點選連結：https://my.nctu.edu.tw/contents/project_ct?p_id=5
輸入欲「捐款金額」後→點選「加入愛心車」→我的愛心車內，選「非會員捐款」(此網站會員係指捐款平台之會員，與交大校友會員無關連性)。

國立交通大學 National Chiao Tung University

捐款意願書

西元　　年　　月　　日

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我們誠摯邀請學長姊們共襄盛舉，一同支持本院所發起的募款活動，協助培育學弟妹們為未來產業之棟樑。

計畫目的

- 帶動本院學生出國交換學習風氣，把國際經驗與競爭刺激帶回交大
- 培養具國際觀的人才

運作方式

- 補助金額以交換一年 20 萬元、一學期 10 萬元為上限
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交大資訊人 2020.10

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