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NYCU CCS MAGAZINE

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Let's Go Towards All the World

讓我們走向全世界

國際交流活動重新熱絡，今年四月我擔任領隊帶領本院及其他學院一同出訪美國伊利諾大學香檳分校，我們拜會伊利諾大學 iSchool 及資訊系，商洽簽署多邊合作備忘錄。本院同時亦辦理首次海外教師招募活動，廣招各界菁英來台任教。這一連串國際交流在在展現本院擴展國際影響力的努力與雄心，相信掌握知識與人才是頂尖大學競爭力的核心。

本院向來以著重人才培育著稱，本期介紹系所推行課程改革現況。作為教育部智慧創新關鍵人才躍升計畫之人才培育示範系所，本院將不遺餘力投入、整合各項資源，培育智慧創新關鍵人才，協助國家資通訊領域打下厚實基礎，提升產業競爭力。

在豐沛的研發能量支持之下，本院研究團隊有許多開創性的研究成果。本期介紹彭文孝教授研究團隊首創增強式學習 AI 影像壓縮技術，在國際壓縮標準組織 JPEG AI 委員會舉辦提案徵求獲第二名佳績。莊仁輝教授與謝君偉教授的研究團隊以「5G 與智慧無人機建構之海岸巡防與環境永續調查系統」、袁賢銘教授研究團隊以「開放銀行區塊鏈個資安控平台」，皆在 2022 未來科技獎脫穎而出，也收錄在本期資訊人院刊中。

校友是我們最引以為傲的珍貴資產，於本屆陽明交大十傑之中，便有兩位來自資訊學院。恭喜聯強國際副總裁杜書全學長，廣達電腦副總蔡文弘學長同獲本年度傑出校友殊榮。他們精彩多姿的經歷與故事，對母校多面向支持的力量，為在校的學弟妹們立下了最佳的榜樣與學習典範。

本院師生傑出獲獎表現亦是本期報導重點。國科會傑出研究獎是重要的學術成就指標，恭喜林靖茹教授榮獲 111 年度國科會傑出研究獎。另外，本院一向重視參與重要的國際競賽，在吳毅成教授帶領之下學生分別榮獲 2022 AWS DeepRacer 世界賽前三名！

本院有全國最具規模與研究能量之資訊科系，致力於培育具前瞻視野的資訊產業人才。為朝永續經營前進，本院也推出資心專案／出國交換獎學金、青年講座教授獎勵金、興建資訊二館等募款計畫，以延攬最優秀的老師，培養最國際化的學生，提供最高品質的研究與學習環境為目標。歡迎校友、家長、企業與各界朋友與我們一起完成這巨擘藍圖，有您的捐款贊助，是本院邁向卓越的關鍵力。

資訊學院院長

陳志成

2023.06

International exchange activities have regained their vibrancy. I led our college and other colleges at NYCU on a visit to the University of Illinois at Urbana-Champaign in the United States in April of this year. During our visit, we had fruitful discussions and formalized a Multilateral Memorandum of Understanding with the iSchool and the Department of Computer Science at the University of Illinois. At the same time, our college successfully hosted its first overseas faculty recruitment event, actively attracting accomplished individuals from diverse backgrounds to join us in Taiwan. These endeavors in international engagement exemplify our college's dedicated efforts and ambitions to enhance its global impact. We believe that the acquisition of knowledge and talent forms the cornerstone of a top-tier university's competitiveness.

Our college has established a strong reputation for prioritizing the development of talented individuals. In this edition, we provide an overview of the ongoing curriculum reforms implemented by our department. As a designated department for talent cultivation within the Ministry of Education's Smart Innovation Talent Promotion Program, our college is fully committed to investing in and integrating various resources to foster key talents for smart innovation, aiming to establish a robust technical foundation and enhance industrial competitiveness in the field of information and communications in Taiwan.

With our abundant research and development capabilities, the research teams at our college have achieved numerous groundbreaking outcomes. In this edition, we present the pioneering work of Professor Wen-Hsiao Peng's team, who developed an innovative technology called "AI-assisted Image Compression with Reinforcement Learning." Their proposal received the second-place award in the Call for Proposals organized by the JPEG AI Committee, an international compression standard organization. Additionally, Professor Jen-Hui Chuang and Professor Jun-Wei Hsieh's team project, titled "Investigation System Constructed by 5G and Intelligent Unmanned Aerial Vehicles (UAVs)," along with Professor Shyan-Ming Yuan's team project, titled "Blockchain-based Identity Management and Access Control (BIMAC) Framework for Open Banking Ecosystem," have received recognition at the 2022 Future Technology Awards. These exceptional projects are prominently featured in the current edition of NYCU CCS Magazine.

Our alumni are a source of great pride and invaluable assets to us. Among this year's ten outstanding alumni of NYCU, two of them are from the College of Computer Science. Congratulations to David Tu, the Vice President of Synnex Group, and Alan Tsai, the Vice President of Quanta Computer, for receiving the prestigious Outstanding Alumni award this year. Through their extraordinary experiences and stories, as well as their extensive support for our alma mater, they have set the best examples and role models for our fellow students.

The remarkable accomplishments and awards of our faculty and students are also a highlight of this edition. We extend our congratulations to Professor Kate Ching-Ju Lin for being honored with the Outstanding Research Award of the National Science and Technology Council in 2022, which serves as a significant benchmark for academic excellence. In Addition, our college has consistently prioritized participation in prestigious international competitions. Under the guidance of Professor I-Chen Wu, our students have achieved impressive success, receiving 1st place, 2nd place, and 3rd place in the 2022 Championship Cup sponsored by the AWS DeepRacer League.

Our college houses the country's foremost and research-intensive computer science department, dedicated to nurturing visionary talents for the information industry. To promote sustainable growth, we have initiated various fundraising projects such as the "Information Heart" campaign (scholarships for international exchanges), incentives for renowned guest lecturers, and the construction of Computer Science Building II. Our goal is to attract excellent faculty, nurture globally-minded students, and provide an unparalleled environment for research and learning. We extend a warm invitation to our alumni, parents, and our friends from all sectors to join us in realizing this ambitious vision. Your generous contributions and sponsorship are vital for our college to strive for excellence.

Dean of the College of Computer Science

2023.06

推廣開源系統軟體
培育智慧創新關鍵人才

文／翁健棋

身為國內規模最大之資訊學院與資訊科系，本院向來以邁向國際頂尖系所，培育下一世代精英資訊人才為目標，希望能藉由豐沛的師資與設備，持續追求教學及研究之卓越成果，延續並提升台灣 IT 產業的榮景。以著重人才培育著稱的本院資工系，在易志偉教授、張立平教授積極爭取下，於近期榮獲為教育部「智慧創新關鍵人才躍升計畫」擔任示範系所資格，將在未來國家數位發展、數位轉型過程中，扮演關鍵的智慧創新人才產出角色，為厚植資通訊領域發展基礎盡一份心力。

由易志偉教授所主持的計畫類別屬 B 類計畫，目標在於培育跨域軟體服務實踐人才，計畫名稱為「基於微服務的智慧軟體開發與教學平台」。考量到 B 類計畫對 CS+X 人才培育模式的教學需求，包含提供資訊領域學生「傳統程式設計環境」與跨域學生「簡便應用程式開發環境」兩大面向，計畫執行團隊嘗試開發一個雲端微服務平台，讓程式導向的學生皆可在該平台上實作各種微服務。利用 Kubernetes 建構微服務管理系統，提供應用程式使用 RESTful API 呼叫各項微服務來完成任務，使應用開發者只需專注在如何串連各項微服務來完成預定功能，無需花費大量時間在各項功能開發的程式撰寫，讓欲開發之概念得以迅速得到驗證，正是該平台最大的特色。

該計畫目前預計以「影像處理在羽球運動上的應用」為雛形系統進行設計，透過建構攝影系統所需的影像處理設計開發微服務 API，搭配影片內容分析處理、對戰重要事件識別等技術，開發出場館經營者及使用者所需的服務。待概念可行性經過驗證，系統趨於穩定成熟，計畫團隊規劃將該系統延伸應用於其他領域，同時將平台導入教學環境。如與高中資訊社團及資訊科教師合作，透過提供高中生共同協作的方式，讓相關智慧軟體與微服務開源核心技術進入高中校園，成為資訊基礎教育一環；另一方面，將平台開發與平台的應用置入大學、研究所及在職班的教學中，結合多元教學推廣、產學合作，達成吸引跨領域人才成效，落實 CS+X 人才培育之精神。

而由張立平教授所主持的「開源系統軟體教育與實踐計畫」屬 C 類開源軟體創作前瞻人才培育範疇。有鑑於系統軟體的開發與設計之學習曲線過於陡峭，大幅提升相關領域人才培育難度，該計畫預計設計一個主題式課群，內含包括「編譯器設計概論」、「高等 UNIX 程式設計」、「計算機系統管理」、「計算機網路管理」、「作業系統總整與實作」等五個課程，透過循序漸進之學習歷程，提升學生的學習意願與對開源軟體概念、應用之了解。以系統軟體為主題，開源軟體精神為核心，該計畫預計達成的目標任務包括：

(1) 確保特色課程具有長期固定開設的能力
(2) 協調課群內所有課程以開源軟體精神前後貫穿
(3) 傳授開源社群運作與生態文化，消除學生參與貢獻的門檻
(4) 對開源軟體專案產生具體貢獻並能持續追蹤統計相關產出
(5) 增加學生對於開源社群會議的參與度
(6) 確保同學完修特色課群的比例

由於該計畫的重點包含將課程植入「推廣開源系統軟體」的精神，如何常態化、有系統性的統整本院資工系學生豐富分散的開源軟體貢獻便是計畫的積極目標之一。透過有策略性地協調各課程主軸，強調開源系統軟體使用，同時以「營造環境」的思維讓修課同學主動成為貢獻者，輔以本院系計中之開發環境及其助教群、丁組碩士生與過去培育之系友等支援管道，相信對於實踐三大計畫目標：落實課群之課程完修的學生數、提升學生參與開源社群活動的人數、執行產出開源軟體專案有著極大助益，從而達到開源系統軟體創作前瞻人才培育之目的。

作為教育部智慧創新關鍵人才躍升計畫之人才培育示範系所，本院將不遺餘力投入、整合各項資源，協助計畫目標加以實踐，滿足產學研各界對軟體專業人才之需求，協助國家資通訊領域打下厚實基礎，提升產業競爭力。

Promoting Open Source System Software and Cultivating Innovative Talent

As one of the largest departments of Computer Science in the country, we aim to become a top international department and cultivate professional elites in computer science for the next generation. With excellent guidance from faculty members and state-of-the-art equipment, our goal is to achieve outstanding results in teaching and research, and enhance the glory of Taiwan's IT industry. With great efforts by Dr. Chih-Wei Yi and Dr. Li-Pin Chang, the Department of Computer Science has recently been honored with the model example of the "Smart Innovation Key Talent Development Program" by the Ministry of Education. In the future digital development, our department will play a crucial role in cultivating innovative talents, In addition, a category B project, led by Dr Chih-Wei Yi, aims to cultivate interdisciplinary software service practitioners. The project is titled "Intelligent Software Development and Teaching Platform based on Microservices". It focuses on two main aspects of talent cultivation using the CS+X mode. First, it provides students with traditional programming training. Second, it offers a user-friendly application development environment for students in interdisciplinary fields.

Furthermore, the project team aims to develop a cloud-based microservices platform that enables students with a programming background to implement various microservices. By utilizing Kubernetes to construct a microservices management system, the platform allows application developers to focus on connecting and integrating microservices to achieve the desired functionality without spending a significant amount of time in programming individual features. This allows concepts to be rapidly validated and developed, which is the platform's greatest feature.

Dr. Yi's project is currently planning to design a prototype system based on the application of image processing in badminton. The project aims to develop microservice APIs for image processing required by the camera system, along with technologies such as video content analysis and identification of significant game events. By doing so, it seeks to provide the services needed by venue operators and users. Once the feasibility of the concept is validated and the system becomes stable and mature, the project team plans to extend the application of the system to other domains and introduce the platform into different teaching environments. For example, through collaboration with high school computer clubs and computer science teachers, the platform aims to bring software and open-source core technologies into high school campuses as part of fundamental computer education.Additionally, to attract interdisciplinary talent and implement the spirit of CS+X talent cultivation, the platform will be integrated into universities, research institutes, and professional training programs to promote teaching and industry-academia cooperation.

Another project led by Dr. Li-Pin Chang, titled "Open Source System Software Education and Practice Program," belongs to Category C. It focuses on cultivating future talents in open-source software creation. The project plans to design a theme-based curriculum consisting of five courses: "Introduction to Compiler Design," "Advanced UNIX Programming," "Computer System Management," "Computer Network Management," and "Operating System Integration and Implementation." the project aims to enhance students' willingness to learn and their understanding of the applications of open-source software. With a focus on system software and the core principles of open-source software, the project aims to achieve the following objectives:

1. Ensure that the featured courses can be offered on a long-term basis.
2. Coordinate all courses within the curriculum to consistently focus on open-source software principles.
3. Teach students about open-source community operations and culture with an appropriate standard for student involvement.
4. Generate tangible contributions to open-source software projects and maintain ongoing tracking and statistics of relevant outputs.
5. Increase students' participation in open-source community conferences.
6. Ensure a completion rate for students enrolled in the curriculum.

The focus of this project is to promote open-source system software into the designed curriculum. Thus, one of the main objectives of the project is to normalize and consolidate the computer science students' work to open-source software. By strategically coordinating the main themes of each course and emphasizing the use of open-source system software, students actively become contributors through this environment. In addition, this learning journey is supported by the assistance of teaching assistants, graduate students, and alumni who have been cultivated in our department. It is believed that this approach will greatly contribute to achieving the three main goals of the project: increasing the number of students completing the curriculum, enhancing student participation in open-source community activities, and producing tangible outcomes in open-source software projects. Ultimately, the aim is to cultivate forward-thinking talents in the creation of open-source system software.

The focus of this project is to promote the integration of open-source system software into the designed curriculum. Therefore, one of the main objectives of the project is to standardize and consolidate the contributions of computer science students to open-source software. By strategically coordinating the main themes of each course and emphasizing the utilization of open-source system software, students actively engage as contributors with the mindset of "creating an environment."

This is facilitated by the development environment and the assistance provided by teaching assistants, graduate students, and alumni who have been nurtured in our department. It is believed that this approach will significantly contribute to achieving the project's three main goals: increasing the number of students who successfully complete the curriculum, enhancing student participation in open-source community activities, and yielding tangible outcomes in open-source software projects. Ultimately, the objective is to cultivate forward-thinking talents in the creation of open-source system software.

Our department serves as a model example for the Ministry of Education's Smart Innovation Key Talent Development Program. We are dedicated to assisting in the realization of project goals, addressing the needs of industry, academia, and research in terms of software professionals, and establishing a strong foundation in the field of information and communication technologies to enhance industrial competitiveness.

以 5G 與智慧無人機建構之海岸巡防與環境永續調查系統

文／翁健棋

近年來，伴隨科技高速發展，用於生產、服務、消費端等各項技術革新的同時，環境保育與永續發展意識亦逐步抬頭，人們開始認知到與環境共存的重要性。有鑑於此，本院資工系的莊仁輝教授與智慧計算與科技研究所的謝君偉教授，將無人載具、5G 通訊兩大新興技術做結合，共同開發出一款「以 5G 與智慧無人機建構之海岸巡防與環境永續調查系統」，希望藉由無人機的高機動性與 5G 通訊的高速低延遲特性，為我國現有與未來的永續發展規劃盡一分份心力。

綜觀當代，無人機技術的應用並不少見，其所能提供的寬廣視野與靈活性被廣泛運用於生活中，自私人拍攝、娛樂用途，至公私部門勘救災、資料蒐集、環境監測等各領域，皆可見無人機技術現蹤。然而，無人機對於「極小物件」的拍攝與分析存在一定的難度，如此技術瓶頸持續困擾學界與業界多年。莊仁輝教授與謝君偉教授所開發系統之技術核心，主要利用深度學習技術，使極小物件「即時偵測」化為可行，同時保留對大尺寸物件的分析能力，解決前述關鍵問題的同時，突破技術應用限制。

該技術目前已發表於影像處理領域的最頂級期刊 IEEE transactions on Image Processing，Impact factor = 10.865（2021, Nov.），其所提出平行特徵金塔（parallel pyramid）的概念，不單解決了物件尺度差異帶來的偵測問題，同時具有很強的通用性，可直接架構於不同的偵測器，例如直接掛放於 YOLO v4 與 YOLO v7 上，

立即改善極小物件偵測的效能，達到比原系統更高的辨識準確率。以此技術為基礎，研發團隊不單開發出海洋廢棄物影像即時辨識系統、海面油汙偵測與分析系統，另一方面，更與台電、緯創、義隆電子、新竹市警察局等公私部門合作開發白海豚調查系統、公安巡檢系統與交通流量分析系統，希望能對環境保育、永續發展有所貢獻。

此外，團隊更與中華電信 5G 團隊長期合作，將該技術結合 5G 無線通訊，實現「即時回傳分析結果」的可能，相較過去「先錄影事後分析」的監測模式，5G 通訊的即時性有效的避免「違規事件發生後無法及時控管」的問題。不僅如此，除去前述所提及海洋保育、車流減碳等領域的技術應用，目前團隊也提出了數項該技術的潛在產業應用性，其中包括與智慧農業結合，不單能做到農作物產量統計，還能協助颱風過後的災損評估、人員搜救。除了空拍影像領域外，極小物件的偵測技術也能應用於智慧醫療領域，執行如大腸癌、肝癌、腎腫瘤之偵測與分析，滿足精密醫療需求，造福社會大眾。

開發團隊除了將「以 5G 與智慧無人機建構之海岸巡防與環境永續調查系統」所應用之技術發表於國際頂級期刊，亦報名參加 2022 未來科技獎，並從中脫穎而出，獲得產學研各界專家所組成之評審團肯定具備「科學突破性」與「產業應用性」，未來將有機會實踐技術應用於各大領域。再次恭喜獲獎的莊仁輝教授、謝君偉教授開發團隊！

Coastal Patrol and Sustainable Environmental Investigation System Constructed by 5G and Intelligent Unmanned Aerial Vehicles (UAVs)

In recent years, there has been a rapid development of technology leading to significant innovations in production, service, consumer sector, and more. Consequently, a growing concern for environmental conservation and sustainable development has emerged, which has resulted in an increasing awareness among people about the importance of coexisting with the environment. Therefore, Professor Jen-Hui Chuang from the Department of Computer Science and Professor Jun-Wei Hsieh from the Institute of Computational Intelligence have combined two emerging technologies, unmanned vehicles and 5G communication, to jointly develop a "Coastal Patrol and Sustainable Environmental Investigation System Constructed with 5G and Intelligent Unmanned Aerial Vehicles." By utilizing the advanced mobility of unmanned aerial vehicles and the high-speed, low-latency properties of 5G communication, the system aims to make a meaningful contribution to both the present and future sustainable development strategies of our country.

Currently, the application of drone technology is widespread and its capability to offer a wide range of views and versatility is extensively utilized in various aspects of daily life. The presence of drones can be observed in numerous fields from personal photography and entertainment to public and private sectors like disaster relief, data collection, and environmental monitoring, among others. However, both academia and industry have been struggling for many years with the technological difficulties associated with detecting and analyzing "extremely small objects" on drones. Professor Chuang and Professor Hsieh developed a system that primarily utilized deep learning technology to enable the feasible "real-time detection" of extremely small objects while retaining the ability to analyze large-sized objects. By addressing the critical problem, the technology overcomes limitations of its applications.

The technology has been published in the top-tier journal of the image processing field, IEEE Transactions on Image Processing, with an impact factor of 11.041 (Nov. 2021). The proposed parallel pyramid feature extraction not only addresses the issue of detecting objects with varying sizes, but also has high versatility, as it can be easily incorporated into various detectors. For instance, it can be implemented directly onto YOLO v4 and YOLO v7, leading to an immediate enhancement in the detection of extremely small objects, and achieving higher recognition accuracy compared to the original system. The accuracy of this PRB-Net outperforms YOLO v7. The research team has applied this technology to a real-time image recognition system for marine debris and another one for detecting and analyzing oil spills in offshore areas. In addition, they have partnered with public and private organizations, including Taiwan Power Company, Wistron Corporation, ELAN Microelectronics Corp, and the Hsinchu City Police Bureau, to develop systems for white dolphin investigation, public safety patrols, and traffic flow analysis with the aim of making a meaningful contribution to environmental conservation and sustainable development.

In addition, the team has established a long-term collaboration with Chunghwa Telecom's 5G team to integrate the technology with 5G wireless communication, enabling the possibility of real-time analytics and reporting. Compared to the traditional monitoring mode of "recording first and analyzing later", low-latency 5G communication effectively reduces the response time after violations occur. Furthermore, in addition to the aforementioned applications in marine conservation and carbon reduction in transportation, the team also identified several potential industrial applications, such as integration with smart agriculture, for this technology. This could not only generate crop yield statistics, but also aid in post-typhoon damage assessment and personnel search and rescue. Apart from its use in aerial imaging, the detection technology for ultra-small objects has potential applications in the field of smart healthcare. It can be utilized to detect and analyze conditions such as colorectal cancer, liver cancer, and kidney tumors, addressing the needs of precision medicine and benefiting the general public.

The development team not only published the technology applied to the "Coastal patrol and sustainable environmental investigation system constructed by 5G and intelligent unmanned aerial vehicles (UAVs)" in renowned international journals, but also participated in the 2022 Future Technology Awards and received recognition for its "scientific breakthrough" and "industrial applicability" from the judging panel composed of experts from academia and industry. The potential of this technology to be applied in various domains in the future is significant. Congratulations once again to Professor Jen-Hui Chuang, Professor Jun-Wei Hsieh, and the entire development team for their award-winning achievement!

文／翁健棋

開放銀行區塊鏈個資安控平台

談及大眾對個人、組織資產管理的需求，自存提款、消費支付到投資理財、信用貸款，這些傳統銀行所能提供的服務和產品，相信對多數人來說並不陌生。然而，傳統銀行各間獨立運作，資料無法整合的特性，往往於辦理相關手續、填寫審核資料時無形增加客戶的時間成本。正因如此，開放銀行（Open banking）的概念於近年逐步興起，希望能藉由透過開放金融數據和服務接口，促進銀行、第三方金融機構和客戶之間的資訊交流和互動，提升客戶的服務體驗。

本院資訊科學與工程研究所的袁賢銘教授，與就讀博士班的廖家鴻同學，亦藉由對金融服務模式轉變趨勢的洞察，基於區塊鏈的身分管理和訪問控制（BIMAC）框架，開發出能強化金融服務資安，整合用戶金融資訊的「開放銀行區塊鏈個資安控平台」，報名參加 2022 未來科技獎並成功獲獎。該技術之最初發想源於開發團隊發現，過去幾年在新冠肺炎疫情肆虐下，各種數位應用受「減少實體接觸」的需求影響，如雨後春筍出現，開發團隊觀察到，這類應用往往需要建立數位身分方可使用；然而，個人數位身分增加的同時，除了個資分散難以管理、資料外洩導致身分遭竊風險提高等難題隨之浮現。

如同前段所述，近幾年傳統銀行業轉型開放銀行的浪潮盛行，將金融資訊的控制權交還給顧客已為趨勢，此一轉變使得顧客有權決定是否要讓第三方服務提供者（TSP）存取自身帳戶資訊。於此考量下，為了實現數位身分整合及去中心化資料存取控制，開發團隊嘗試將目前以財金公司為中心的生態系統去中心化，建立一個用於開放

銀行的區塊鏈個資安控平台，設計並實作去中心化應用程式（DApp）。在用戶同意的前提下，第三方服務提供者便可透過該平台整合用戶在多家銀行的資產、帳單等金融資訊，進而分析用戶數據，提供多元且新穎的服務，滿足用戶需求。

在 BIMAC 的框架下，該平台能夠實現開放銀行業務所需，包括用戶去中心化數位身分整合、私鑰一鍵登入第三方服務、線上開戶、符合歐盟 GDPR 標準之資料共享、繳費與支付交易授權和 TSP 訪問監控等六大功能。整體來說，這套框架不單可強化創新金融服務的資安、延伸現有的產品服務，還可提供開放銀行一個標準化共享服務的模式，促進市場上銀行及 TSP 的合作與創新，實現「聯盟鏈共同治理」、「用戶身分整合」、「資料安全共享」等目標，打造多元開放的銀行生態圈。

目前我國尚未融入可操作的三階段開放銀行業務，未來若順利進入允許用戶授權 TSP，向銀行發出交易申請的「交易面資訊」之開放銀行第三階段， BIMAC 框架將可滿足此階段中繳費、整合支付、線上簽署合同等需求。開發團隊藉由融合傳統銀行和區塊鏈技術之優勢，使「用戶實名註冊」但於「鏈上匿名」，進而實現隱私保護與數據共享；另一方面，在去中心化目標達成的同時，確保監管單位不致喪失監控能力。該技術已確認可支持金管會力推的「無接觸金融服務」及「手機身分識別 App」，未來將有機會做為各項整合性服務之關鍵架構，完善金融服務的數位生態系！

Blockchain-based Identity Management and Access Control (BIMAC) Framework for Open Banking Ecosystem

When we discuss the demand for asset management by individuals and organizations, it's common knowledge that traditional banks offer services such as self-service banking, consumer payments, investment management, and credit loans. However, traditional banks often operate independently, which can result in a lack of data integration in their workflows. This often leads to longer processing times for customers when dealing with relevant procedures and filling out information. To improve the customer experience, the concept of Open Banking has gradually emerged in recent years. It aims to facilitate information exchange and interaction among banks, third-party financial institutions, and customers by opening up financial data and service interfaces.

Professor Shyan-Ming Yuan and PhD student Chia-Hung Liao from the Department of Computer Science developed the "Blockchain-based Identity Management and Access Control (BIMAC) Framework for Open Banking Ecosystem" to enhance financial service security and integrate customer financial information. The platform, based on the BIMAC framework, won an award at the 2022 Future Tech Awards. The team initiated the development of this technology, as there has been a growing need to reduce physical contact during the COVID-19 pandemic. In recent years, diverse digital applications have emerged, which inevitably require the establishment of a digital identity. However, as the digital identities scatter in different service platforms, it has led to issues such as managing decentralized personal information and the increased risk of identity theft due to data breaches.

In recent years, there has been a prevalent trend of traditional banks transforming into open banks, as previously mentioned. This shift involves relinquishing control of financial information to customers, allowing them to decide whether to grant third-party service providers (TSPs) access to their account information. To achieve digital identity integration and decentralized data access control, the team endeavors to decentralize the current financial ecosystem that revolves around financial companies. They aim to create a blockchain-based platform for personal information security and control for open banks, along with designing and implementing decentralized applications (DApps). Upon receiving the customer's

consent, third-party service providers can utilize the platform to aggregate the customer's financial information, including assets and bills, from multiple banks. They can then conduct the data analysis to offer a wide range of innovative services that cater to the customer's needs.

The platform under the BIMAC framework is equipped with six essential capabilities for open banking, including decentralized integration of digital identities of customers, single-click access to third-party services through private keys, online account opening, data sharing that conforms to EU GDPR, authorization of payments and transactions, as well as monitoring of TSP access. Overall, this framework serves to enhance cybersecurity for cutting-edge financial services while expanding the current product offering. Additionally, it establishes a standardized model of sharing services for open banks and encourages collaboration and innovation among banks and TSPs in order to accomplish objectives like "blockchain consortium governance," "user identity integration," and "secure data sharing." As a result, it fosters a dynamic and inclusive banking ecosystem.

At present, our country has not yet incorporated the third-stage of open banking business. However, once we manage to progress to the third stage so-called "transactional information" of open banking in the future, which allows customers to authorize TSPs to submit transaction requests to banks," the BIMAC framework will be capable of fulfilling the requirements for bill payment, integrated payment, and online contract signing. By combining the advantage of traditional banking and blockchain technology, the team enables customers to register with their real identities while remaining anonymous on the blockchain so as to ensure privacy protection and data sharing. Meanwhile, it can also prevent regulatory agencies from losing their monitoring capabilities while achieving the goal of decentralization. The technology has been verified to support "contactless financial services" and "mobile identity verification apps" that the Financial Supervisory Commission R.O.C. strives to promote. It has the potential to serve as a core infrastructure for various integrated services in the future, ultimately enhancing the digital ecosystem of financial services.

首創增強式學習 AI 影像壓縮技術

文／翁健棋

自 Open AI、Google 所開發之 ChatGPT、Bard 等 AI 聊天機器人問世以來，人工智慧領域內相關技術逐漸為大眾所熟知，其所能應用領域之廣，執行產出之高效率、高完成度無不令人驚嘆。伴隨 GPU 運算能力大幅飆升、演算法成熟，AI 技術已被廣泛應用於許多智慧應用服務中，然而於多媒體領域內，關鍵的「影像／視訊壓縮技術」卻無法取得重大演進，導致此難題持續困擾產學研各界二十載有餘。

近幾年受新冠疫情影響，串流影音娛樂、遠距互動需求顯著提升，考量到時下流行之娛樂影音平台（如：YouTube、Netflix）與視訊會議服務皆十分仰賴影像／視訊壓縮技術協助，由本院資訊工程學系彭文孝教授領軍開發的「增強式學習 AI 影像壓縮技術」便希望透過人工智慧學習進化之特性，進行影像編碼優化，實現壓縮效能突破之可能。彭文孝教授於受訪時表示，若想在未進行壓縮之情形下傳輸視訊影像，以每秒傳輸之畫面數約為 20 至 60 張來說，遠超一般網路所能負荷之頻寬，如何進行有效的影像／視訊壓縮是各界專家、學者苦思已久，長久以來面臨突破瓶頸的重要課題。

原先影像視訊使用之壓縮技術，係採用人類開發的數學演算法，彭文孝教授團隊選擇跳脫既定思維，欲嘗試透過 AI 技術取代數學演算法，提高壓縮效能，同時顧及影像品質需求，突破現有技術限制。目前全球將 AI 應用於影像／視訊壓縮領域的發展趨勢，共有 AI-based、AI-assisted、Hybrid-based 三大面向。在 AI-assisted 影像／視訊壓縮技術方面，開發團隊首創採用「增強式學習」進行編碼優化，該技術可在不更改既有編解碼器前提下，實現壓縮效能之提升；團隊已將此技術發表於 2021 年的 Data Compression Conference，且分別在台灣及美國完成專利申請。

另一方面，開發團隊也在 AI-based 端對端學習式影像與視訊壓縮技術領域有所突破。利用最新的 Normalizing Flow 生成模型，可使目標影片在相同位元率下，擁有最佳重建影像品質，同時在效能上超越傳統的壓縮標準 HEVC，甚至可接近 2020 年由 ITU（國際電信聯盟）和 ISO（國際標準化組織）最新制定的視訊壓縮標準 VVC。此外，學習式影像與視訊壓縮技術相較傳統 HEVC 之壓縮品質，在主觀視覺效果上顯著提升，可見技術之突破性與發展潛力。未來待 4k 和 8k 等高畫質視訊影像需求普及，能進行高效能、高品質產出之 AI 技術導向影像／視訊壓縮技術將扮演關鍵角色，左右相關產業之發展趨勢。

憶起開發時所遭遇的瓶頸，彭文孝教授特別感謝國家高速網路與計算中心所提供的硬體設備支持。原先團隊在投入開發該技術時，皆需透過平行運算將研究室內 20 多台的電腦串連起來，方能免強滿足專案需求，但仍舊無法避免 AI 參數調整、模型建置時所需付出之時間成本。自從租用國網中心所提供的台灣杉一號服務後，受惠於該平台支援多種深度學習框架容器的特性，原先需要數小時的環境建置時間，縮短到數秒鐘即可完成，還同時解決了運算架構維護曠日費時、電腦設備難以定時更新等問題。

目前，由彭文孝教授所領軍的開發團隊不單已完成多項專利申請，同時與國際大廠簽訂合作專案，更在國際壓縮標準組織 JPEG AI 委員會舉辦的學習式圖像編碼提案徵求中獲得第二名之佳績。期待團隊所開發之增強式學習 AI 影像壓縮技術能於未來普及應用，顛覆並突破現有的技術限制！

Revolutionizing Image and Video Compression with Artificial Intelligence

Ever since the emergence of AI chatbots like ChatGPT and Bard, developed by OpenAI and Google, the public is getting acquainted with related technologies in the field of artificial intelligence. The wide range of applications, the remarkable efficiency, and quality of their outputs are all astounding to everyone. Thanks to substantial improvements in GPU computing power and algorithm development, AI technology has been widely applied in diverse intelligent application services. However, the crucial domain of "image/video compression technology" in multimedia has remained a long-standing challenge for academia, industry, and research, with no significant breakthrough achieved over the past two decades.

Due to the impact of the COVID-19 pandemic in recent years, there has been a significant increase in demand for streaming video entertainment and remote interaction. Recognizing the heavy reliance on video/image compression technology by popular video streaming services like YouTube and Netflix, as well as video conferences, Professor Wen-Hsiao Peng and his team from the Department of Computer Science have successfully developed an innovative technology called "AI-assisted Image and Video Compression with Reinforcement Learning." Their objective is to enhance image or video coding through the evolutionary characteristics of machine learning, leading to significant advancements in compression efficiency. During an interview, Professor Peng emphasized that the bandwidth requirement to transmit an uncompressed video sequence with a frame rate ranging from approximately 20 to 60 frames per second exceeds the capacity of typical networks to handle. As a result, how to effectively compress video/image data has been a longstanding crucial challenge faced by experts and scholars in various fields.

Previously, video and image compression relied on mathematical algorithms designed by humans. However, Professor Peng's team decided to break away from conventional methods and explore the use of AI technology as a substitute for these algorithms in order to improve compression efficiency while considering visual quality requirements and overcoming existing technological limitations. Currently, there are three major trends in the global development of AI applications in image and video compression: AI-based, AI-assisted, and Hybrid-based approaches. Regarding AI-assisted image/video compression, the team made significant strides by introducing "reinforcement learning" for encoding process. This innovative technique levels up compression efficiency without modifying the existing codec. The team successfully presented this method at the Data Compression Conference in 2021 and subsequently filed patents in both Taiwan and the United States.

On the other hand, the team has made breakthroughs in the field of AI-based end-to-end learning-based image and video compression. By utilizing the latest Normalizing Flow generative model, the new method can attain the optimal visual quality of the reconstructed target video while maintaining the same bitrate. Not only does this surpass the performance of the traditional compression standard, HEVC, but it also approaches the most recent video compression standard, VVC, established by the ITU (International Telecommunication Union) and ISO (International Organization for Standardization) in 2020. Moreover, compared to the conventional HEVC, the learning-based image and video compression technology substantially enhances the subjective visual quality, which indicates the groundbreaking nature and potential development of this technology. In the future, as there is an increasing demand for high-definition video sequences such as 4K and 8K, AI-based image/video compression technology with high efficient and high-quality reconstruction will play a pivotal role in influencing the development trends across relevant industries.

Recalling the bottlenecks encountered during development, Professor Peng deeply expresses appreciation to the National Center for High-Performance Computing (NCHC) for their hardware support. Initially, the team had to connect over 20 computers in the laboratory using parallel processing to barely meet the project requirements. However, it is still inevitable to incur time costs in AI parameter adjustment and model construction. The adoption of NCHC's Taiwania 1 HPC service, which provides extensive support for various deep learning framework containers, has brought significant benefits to the team. Notably, the previous time-consuming process of environment setup, which used to take hours, has been remarkably reduced to a matter of seconds. This solution has simultaneously addressed issues such as the time-consuming maintenance of computing architecture and the timely upgrades of computer equipment.

At present, Professor Peng and the team have accomplished numerous patent applications and established partnerships with major international companies. They have achieved second place in the Call for Evidence on learning-based image coding organized by the JPEG AI Committee, an international compression standard organization. We hope that the team's innovative technology, AI-assisted image compression with reinforcement learning, will revolutionize and surpass current technological constraints to become widespread in the future.
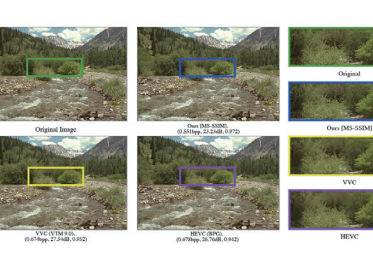

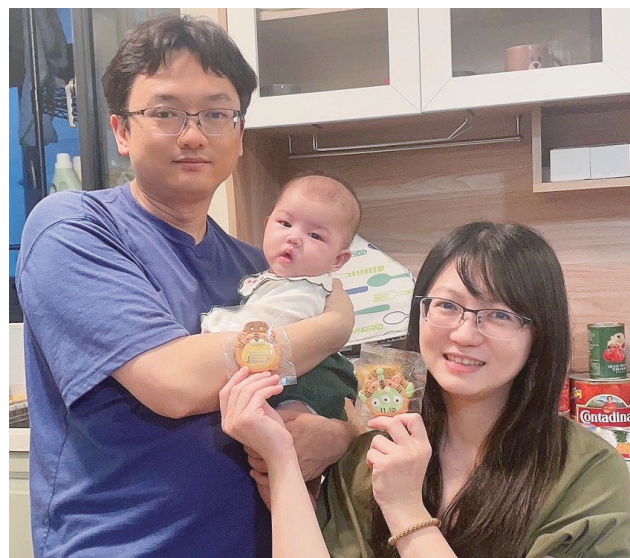視覺效果比較 - 以增強式學習進行編碼優化壓縮技術
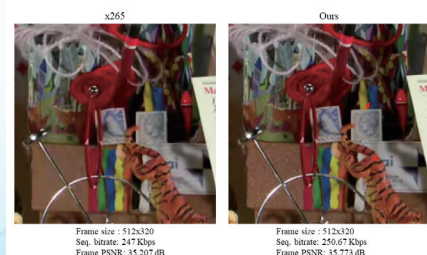
視覺效果比較 - 端對端學習式視訊壓縮
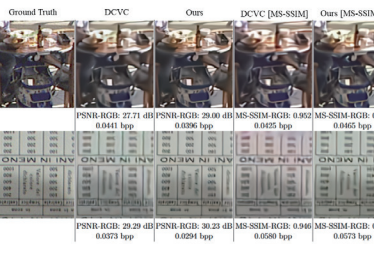
視覺效果比較 - 端對端學習式影像壓縮

高孟駿老師：關懷社會、貢獻所學

文／翁健棋

本次資訊人有幸邀請到本院資訊工程學系，以基礎組合最佳化問題之近似演算法設計分析、可近似困難度研究領域為專長的高孟駿副教授，擔任受訪嘉賓。希望能藉由高孟駿老師豐富多元的旅外求學、學術研究經驗分享，供同樣流淌資訊人血脈的資工系同學們作為生涯規畫參考。高老師投身極具挑戰性的理論研究領域數載有餘，相信其經歷與心境可協助引導對理論研究有熱情的學子們，順利於求學過程中尋得理想的發展方向。

熱忱與興趣，是化身資訊研究者的最大動力

談及投身資訊領域，成為理論研究工作者之契機，高孟駿老師憶起小學第一次接觸電腦設備時，便對 DOS 環境裡各式奇妙又強大的工具感到震撼，同時也被各種有趣好玩的電腦遊戲所吸引。緊接著於高中求學階段，高老師偶然接觸到程式競賽，於賽前練習和實際參賽時發現，持續的解題思考、嘗試學習、了解各種新奇演算法的過程，為其帶來很大的樂趣和啟發；也正因如此，整理吸收先備知識、實作練習等競賽所需事務成為了高老師高中時的生活重心。

而後，高老師順利考取感興趣之目標科系，進入臺灣大學資訊與工程學系就讀，儘管參與競賽的機會減少，其對數學及解題的熱愛仍舊不減，在眾多師長與前輩的啟發下，選擇帶著濃厚的熱忱與興趣，投身國內相對小眾的理論研究領域，將自身所受之紮實訓練、所具之數學天賦實踐並貢獻於研究成果中。

學思並重、打穩基礎，理想藍圖自然浮現

高孟駿老師曾於就讀博士班的期間，前往德國卡爾斯魯爾理工大學（Karlsruhe Institute of Technology）進行為期兩年的研究訪問。回憶起該段時間之經歷，除了充分體會到國內外文化與價值觀差異之衝擊，同時高老師也深刻感受到，自身對理論研究領域內眾多基礎工具的掌握程度有諸多不足之處。

「這不是天賦上的差異，卻成為我想做出更好的研究的極大阻礙，限制我只能做原本就會做的事情。」透過落實至聖先師孔子「學而不思則罔，思而不學則殆。」學、思並重的求學態度，經反覆思考後，有所感悟的高老師選擇更加努力理解並內化學習過程所需應用到之基礎理論工具。伴隨外在學習方向的調整與內在認知的轉換，前段時間所打下的紮實基礎，給予高老師充足的自信面對同領域內最前端的研究成果；也使其重新開始相信，自身具備在最好的研究問題上做出貢獻的能力。

同樣作為資訊領域教育體系所培育之學生，高孟駿老師以過來人身分期許本院資工系的同學們，能把握並充分利用身邊充沛的教育資源、優質的學習環境，以造福、貢獻社會為己任，擦亮「國立陽明交通大學資訊工程學系」的招牌，努力躋身產學研各界龍頭，引領技術革新，共創未來發展榮景。同時胸懷「關懷社會、貢獻所學」之思想，將求學時受挹注之資源、福利回饋於社會，促成溫暖正向力量的循環。高老師亦同時以自身指導老師之座右銘「件件工作，反映自我；凡經我手，必為佳作。」勉勵自己，期許自己未來所發表的論文內容，皆是經反覆雕琢、去蕪存菁，優質且紮實的研究成果。祝福高孟駿老師能順利實踐自我所設之目標！

Professor Mong-Jen Kao: Caring for Society and Applying what We Have Learned

We are deeply honored to have Associate Professor Mong-Jen Kao join us for this interview. Professor Kao, from the Department of Computer Science, specializes in approximation algorithms, combinatorial optimizations, algorithm design and analysis, and geometric computing. By leveraging the wealth of diverse experiences gained from Professor Gao's studies and academic research abroad, we hope to provide valuable career guidance for our fellow students in the department who share the same passion for the field of computer science. For years dedicated to rigorous theoretical research, Professor Gao has immersed himself in highly challenging academic pursuits. We believe that his invaluable experiences and unique perspectives can serve as guiding beacons for students who are passionate about theoretical research, helping them find their proper path for personal growth throughout their academic journey.

Passion and interest serve as the primary motivators for researchers in the field of Computer Science.

When Professor Gao talked about the moment that he decided to dive into the field of computer science and pursue a career as a theoretical researcher, he recalled that he used a computer in elementary school for the first time and was amazed by the various fascinating and powerful tools within the DOS environment. He was also drawn to various interesting and enjoyable computer games. During his time in high school, Professor Gao happened to participate in programming competitions. By engaging in pre-competition practice and actively participating, he experienced the profound delight and inspiration that came from continuous problem-solving, experimental learning, and the exploration of diverse, innovative algorithms. Consequently, organizing and assimilating fundamental knowledge, as well as practical exercises for competitions, became the central focus of Professor Gao's high school years.

Afterward, Professor Gao was admitted to the Department of Computer Science and Information Engineering at National Taiwan University, embarking on his chosen academic path. Despite fewer opportunities to participate in competitions, his passion for mathematics and the art of problem-solving remained unwavering. Motivated by numerous seniors and mentors, he chose to immerse himself with a profound passion and keen interest in theoretical research that was a relatively niche field in Taiwan. With the expectation to leverage his comprehensive training and innate mathematical ability, he aims to make significant contributions to his research.

Give balanced importance to learning and critical thinking and build a strong foundation, and then the blueprint for self-fulfillment will effortlessly materialize.

While pursuing his doctorate, Professor Gao embarked on a two-year research visit to Karlsruhe Institute of Technology in Germany. Looking back on that period, he not only encountered cultural differences and value disparities between his home town and abroad but also became acutely aware of the numerous deficiencies in his mastery of fundamental tools within the field of theoretical research.

"It's not a matter of talent difference, but rather a devastating hindrance that prevents me from pursuing better research and confines me to tasks that I am already familiar with." By embracing the learning philosophy of Confucius, the great ancient Chinese teacher who emphasized the importance of thoughtful learning in his famous quote, "Learning without thought is labor lost; thought without learning is perilous," Professor Gao adopts a harmonious approach to learning and thinking. Guided by profound insights, he diligently strives to comprehend and internalize the essential theoretical tools during his learning process. As Professor Gao adjusts the external direction of his learning and undergoes a shift in the internal cognition, the strong groundwork established in the past equips him with sufficient confidence to deal with the cutting-edge research achievements in his field. Furthermore, this renewal of belief reignites his confidence in his self-efficacy to make valuable contributions to the most outstanding research inquiries.

Professor Gao, as a former student, has high expectations for the students of the Department of Computer Science in our college. He hopes that they can fully utilize the abundant educational resources and excellent learning environment available to them. It is their responsibility to benefit society while enhancing the esteemed reputation of the Department of Computer Science at National Yang Ming Chiao Tung University. They should strive to become leaders in industry, academia, and research, pioneer technological innovation and collectively shape a prosperous future. Simultaneously, he hopes that the students will hold the mindset of "caring for society and applying what we have learned," and give back the resources and benefits they have gained during their studies to the community. This will cultivate a cycle of warmth and positive influence. Inspired by his advisor's motto, "Every task is a reflection of myself; everything I undertake must be a masterpiece," Professor Kao expects that the content of his future research papers will undergo meticulous refinement to present high-quality and substantial research findings without any redundancy. We express our best wishes to Professor Mong-Jen Kao for the successful realization of his goals!

陽明交大校慶 資訊雙傑大受表揚

文／翁健棋

一年一度的陽明交大合校日於今年 2 月 1 日登場，伴隨而至的還有 2 月開學第一週的校慶週，本次校慶主題為「蛻變」，象徵並希冀兩校經融合而脫胎換骨後，能為台灣產學研界帶來嶄新的蛻變風氣，引領高等教育圈開創新格局，迎接未來人才輩出，產學共榮之榮景。於校慶活動期間，本校同步公布十位第二屆傑出校友獲獎名單，恭喜立積電子總經理王是琦，中榮副院長吳杰亮，杰力科技董事長李啟隆，聯強國際副總裁杜書全，交通部政次胡湘麟，高榮副院長陳垚生，板橋榮民之家首長陳桂美，中科院航空所所長齊立平，廣達電腦副總蔡文弘，安侯建業總經理蘇嘉瑞，同獲本年度傑出校友殊榮！

於本屆陽明交大十傑之中，便有兩位來自資訊學院，身上流淌著交大資訊人血脈，分別是現任聯強國際集團副總裁暨董事的杜書全先生，與現任廣達電腦執行副總經理的蔡文弘先生。透過自身不懈努力之毅力與累積之學經歷，於資訊領域打拚多年的兩位已有一番顯著成績，本次特別藉由出席傑出校友頒獎典禮，返回母校與學弟妹分享自身的學職涯歷程，期許以自身躋身傑出校友之成功案例，鼓勵並引導與會眾學子未來之發展、努力方向，同時傳承交大資訊人飲水思源，不忘根本之精神。

傑出校友──杜書全先生

民國 69 年，於國立交通大學計算機工程學系畢業後，杜書全先生即投身小神通中文電腦之研發。伴隨實作經驗累積，杜書全先生秉持「學無止境」的積極進取精神，選擇赴美進修並成功取得碩士學位，進入資訊產業雲集的矽谷，任職 Novell 負責作業系統開發，成為我國少數於早期即投入通訊協定與網路作業系統領域的研發先驅。民國 83 年，杜書全先生返台加入聯強國際集團，積極引進伺服器、網路、軟體、雲服務等產品之世界品牌，帶領聯強成為全方位資通訊產品通路服務商。深耕台灣之餘，其亦積極複製成功經驗，應用於國外市場，拓展企業版圖涵蓋大陸、紐澳、東協各國、印度、中東、非洲、土耳其等地，成為年營收達 8000 億的亞太第一大資通訊通路集團。

此外，杜書全先生也致力推動全球產業合作，協助台灣與歐美品牌合作開拓亞太市場，連年獲得各品牌廠年度最佳合作夥伴。民國 111 年，其更憑藉對資通訊領域之卓越貢獻，獲我國唯一入選 Intel 全球名人堂殊榮。杜書全先生謙虛地將部分自身擁有傑出成就的原因歸功於交大的學習環境，正因交大提供四年紮實的課程訓練，養成學生「求實學、務實業」的精神，讓其於面對留學、求職時的各項挑戰仍能得心應手。憶起過去師長們孜孜不倦的教導，杜書全先生深表感謝的同時，期許自己未來能持續回饋母校，榮耀母校！

傑出校友──蔡文弘先生

現任廣達電腦執行副總經理的蔡文弘先生，民國 73 年畢業於國立交通大學計算機工程學系，民國 91 年進入廣達集團服務。任職於廣達電腦期間，蔡文弘先生多次透過細膩的產業趨勢觀察，以精準犀利的眼光洞燭機先，創立各式新事業體。如透過與 Google 合作開發新式筆記型電腦 Chromebook，創下全球市佔率逾八成之驚人佳績，開創後續百家爭鳴的新筆電時代；另一方面，蔡文弘先生於 20 多年前便預見電動車發展趨勢與潛力，其所創建之汽車電子事業部門，現已成為電動車中控電腦及各式汽車運算處理單位世界最大供應商。

不僅如此，蔡文弘先生憑藉卓越的領導能力，率領千人團隊積極投入筆記型電腦、行動導航、AI 等領域的產品創新研發，致力為集團打造不易取代的絕對優勢，同時奠定我國於世界資通訊科技領域之領航地位。於發表得獎感言時，蔡文弘先生同樣提及交大「重實作」之學習風氣，紮實的學習基礎搭配上豐富的實作經驗，使其多次在遭逢公司運營決策難題時，運用自身於求學階段便逐步積累之硬實力突破困境，結合「凡事做到好」的理念追求，做出最有利集團之適宜決斷並加以執行。

再次恭喜獲獎的兩位資訊學院系友，身兼傑出校友身分的兩位於資通訊領域活用所學貢獻之實績，不單造福我國相關產業、社會大眾，其所帶來的影響力甚至擴及全球，左右科技發展趨勢，恰落實本校校訓：「知新致遠，崇實篤行。」是為眾學弟妹之表率！

Two Outstanding Alumni Honored at NYCU Anniversary

The event celebrating the merger of National Yang Ming University and National Chiao Tung University into National Yang Ming Chiao Tung University took place on February 1st, coinciding with the Anniversary Celebration Week that commences in the first week of February. The theme of this year's celebration was 'Metamorph,' symbolizing the transformation of NYCU after the merger. It represents the university's efforts to drive change in Taiwan's academia and industry, creating a fresh and active atmosphere. This paves the way for a new era in higher education and fosters a prosperous future characterized by the emergence of talented individuals and harmonious collaboration between academia and industry. During the Anniversary Celebration Week, NYCU announced the recipients of the 2nd Outstanding Alumni Awards. Congratulations to the following individuals: Shyh Chyi Wong, the President of RichWave Technology Corp; Chieh-liang Wu, the Vice Superintendent of Taichung Veterans General Hospital; Chi-lung Li, the Chairperson of the Board of Excelliance MOS; David Tu, the Vice President of Synnex Group; Allen Hu, the Deputy Political Minister of the Ministry of Transportation and Communications; Yao-shen Chen, the Vice Superintendent of Kaohsiung Veterans General Hospital; Kui-mei Chen, the Director of Banqiao Veterans Home; Li-Pin Chi, the Director of the Aerospace Department of National Chung-Shan Institute of Science and Technology; Alan Tsai, the Vice President of Quanta Computer; and Chia-jui Su, the general manager of the accounting firm KMPG Taiwan. They have all been honored with the title of Outstanding Alumni of the Year. Congratulations to each of them!

Among the ten recipients of the Outstanding Alumni Award this year, two of them are from the College of Computer Science. They are David Tu, the Vice President of Synnex Group, and Alan Tsai, the Vice President of Quanta Computer. These excellent awardees embody the character of NYCU computer science professionals. Through their relentless efforts and accumulated academic and professional experiences, they both have achieved remarkable accomplishments in the information industry. By attending the outstanding alumni award ceremony, they returned to their alma mater to share their own academic and career journeys with students,

expecting to inspire and provide guidance to the students in their future endeavors through their remarkable success stories as distinguished alumni. Additionally, they aimed to instill in the students the spirit of cherishing their origins, which holds great significance within the computer science community of National Yang Ming Chiao Tung University.

An Outstanding Alumnus – David Tu

After graduating from the Department of Computer Engineering at National Chiao Tung University in 1980, David Tu dedicated himself to the development of the Xiao Shentong Chinese computer. With the accumulation of practical experience and enthusiasm driven by the spirit of "learning without boundaries", Tu decided to pursue further studies in the United States. Following the successful completion of his master's degree, he ventured to Silicon Valley, the hub for information technology, and took on a role in operating system development at Novell. He became one of the pioneering Taiwanese that dared to explore the field of communication protocols and network operating systems in the early days. Upon his return to Taiwan in 1994, Tu joined the Synnex Group, where he proactively introduced renowned brands in servers, networks, software, and cloud services. Under his leadership, Synnex Group transformed into a comprehensive provider of ICT products and channel services. While deeply rooted in Taiwan, he successfully replicated his experiences and applied them to international markets. Synnex Group expanded its business presence in mainland China, Australia and New Zealand, ASEAN countries, India, the Middle East, Africa, Turkey, and various other regions. As a result, Synnex Group grew into the largest ICT channel group in the Asia-Pacific region, with annual revenue reaching NTD 800 billion.

Additionally, Tu has devoted himself to fostering global industrial cooperation and facilitating partnerships among Taiwan, European, and American brands to penetrate the Asia-Pacific market. He has consistently been recognized as the annual recipient of the Best Partner of the Year by various brand manufacturers. In 2022, he received the prestigious honor of being the only Taiwanese selected for the Intel Global Hall of Fame in recognition of his remarkable contributions to the field of information and communications. Tu

modestly attributes a portion of his outstanding accomplishments to the learning environment provided by National Chiao Tung University. The university's four-year comprehensive curriculum training and the instilled values of practical learning and pragmatic approach equipped him to effortlessly confront challenges encountered during his study abroad and job hunting. Fondly recalling the unwavering guidance from his instructors and mentors, Tu expresses sincere gratitude while also aspiring to continuously contribute to his alma mater and bring glory to it in the future!

An Outstanding Alumnus – Alan Tsai

Alan Tsai, the Executive Vice President of Quanta Computer, completed his studies in the Department of Computer Engineering at National Chiao Tung University in 1984. He joined Quanta Computer in 2002. While working at the company, Tsai has consistently utilized his keen insight into industry trends to successfully establish several new business ventures with excellent precise foresight. One notable achievement is his collaboration with Google for the development of the groundbreaking Chromebook, which attained a remarkable global market share of over 80% and ushered in a new era of fierce competition in the laptop industry. Moreover, Tsai foresaw the emerging trend and potential of electric vehicles over two decades ago. The automotive electronics division he established has now evolved into the world's leading supplier of central control computers and various computing units for electric vehicles.

Furthermore, leveraging his exceptional leadership abilities, Tsai has successfully guided a team of thousands of people towards active involvement in the innovative research and development of products in fields like laptops, mobile navigation, and AI. He unwaveringly dedicated himself to forging an unparalleled competitive advantage for the Quanta Group and solidifying Taiwan's prominent position in the global landscape of information and communications technology. During his acceptance speech, Tsai also highlighted the culture of practical learning at National Chiao Tung University. This amalgamation of a strong educational foundation and extensive hands-on experience has empowered him to surmount complex operational challenges by the practical skills he gradually acquired during his studies. Moreover, by embracing the spirit of "striving for excellence in every task", he endeavors to make optimal decisions for the group and ensure their thorough implementation.

Congratulations once again to the two outstanding alumni from the College of Computer Science. As outstanding alumni of the university, their accomplishments in the fields of information and communications have not only brought significant benefits to the industries and the general public in Taiwan but have also exerted a lasting global impact, influencing the pace of technological advancements. Their performance exactly embodies our university motto, "Striving for new knowledge to accomplish ambitious goals, embracing practicality and perseverance," and sets an example for all younger students.

超級電腦的前世今生

文／林一平 講座教授

「級電腦能為社會做許多事。有一年超級電腦預測美國佛羅里達州將會有大雪霜，這個訊息提早在 2 週前傳達給佛州果農，預先準備，救了那一整年的橘子收成。當年台灣氣象局要進口 Cray 電腦，美國有軍事科技管制的顧慮，批准有困難。經陳世卿博士幹旋，得以圓滿進口。」

克雷研究公司於 1976 年開發第一部超級電腦 CRAY-1，銷售至羅斯阿拉摩斯 (Los Alamos) 國家實驗室時，造價 880 萬美元。超級電腦之父克雷再接再厲，於 1981 年發表 Cray-2 超級電腦，採用水冷技術運作。

在發展 Cray-2 時，公司有另一個團隊發展 Cray X-MP，主要設計者為陳世卿 (Steve Chen)。這位台灣來的年輕小夥子於 1979 年加入克雷研究公司。當時克雷給陳世卿 2 個選擇，一是加入 Cray-2 的研發團隊，有許多研發資源可用；其二是構思一個新計畫，但僅提供有限的資源。

事過境遷的 30 年後，陳世卿很優閒的告訴我：「經過思考，我選擇冒險性高、比較辛苦，但較創新的後者。」他採用多處理器的設計，以較便宜的處理器來製作出 Cray X-MP 超級電腦，每秒可執行 10 億個指令，速度較 Cray-2 稍差，而成本則大大降低。陳世卿一炮而紅，於 1983 年舉行記者發表會。他回憶道：「我第一次在那麼大的場面講話，英文說得結結巴巴。」

陳世卿於 2009 年 7 月訪問交通大學，我有幸與他共處一段時間，受益良多。他提到，超級電腦能為社會做許多事。有一年超級電腦預測美國佛羅里達州將會有大雪霜，這個訊息提早在 2

週前傳達給佛州果農，預先準備，救了那一整年的橘子收成。當年台灣氣象局要進口 Cray 電腦，美國有軍事科技管制的顧慮，批准有困難。經陳世卿博士幹旋，得以圓滿進口。1985 年鄧啟福教授擔任國科會工程處處長，研議籌備高速電腦中心，亦曾派員到美國請教陳世卿博士的意見。

近年來陳世卿博士仍然十分投入研發，但更深入偏遠地區。某日我和他在新竹共進晚餐，幫他點了羊肉，問他菜還可以嗎？他僅是客氣回答還可以。後來他說了實話。他在甘肅吃過哈薩克人招待的羊肉後，其他地方的羊肉都不覺得好吃。他談起在偏遠的平原，現代哈薩克人騎摩托車牧羊的情景，相當有趣。

1986 年 德 國 曼 漢 大 學 (University of Mannheim) 的 Hans Meuer 開始追蹤高速計算的發展趨勢，而一群專家們更在 1993 年成立 TOP500 超級電腦系統排名，來評估現有的超級電腦系統。這個排名，不是比賽處理器 (CPU) 或硬碟數目的多寡，而是比運算量。

超級電腦主要用於科學應用，需要執行大量浮點運算 (Floating-point Operations；FLO)，於是超級電腦的能力以每秒能執行的 FLOPS 來評量。浮點運算最早的標準 (IEEE 754-1985) 由卡亨 (William Kahan) 所主導完成。卡亨持續對浮點運算的研究有重大貢獻，被稱為浮點運算之父 (The Father of Floating Point)。

我於 2014~2016 年間在科技部擔任政務次長，督導超級電腦的建置，了解此技術的複雜度，更能體會過去計算機先驅者的貢獻。

林一平與陳世卿博士合影。林一平提供
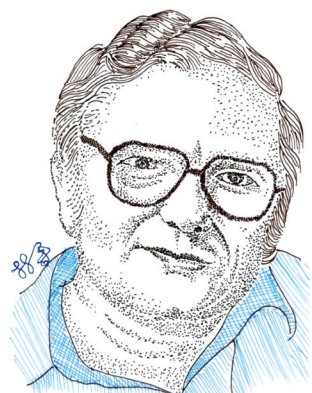
林一平手繪之卡亨 (William Kahan)。林一平提供

Supercomputers : The Past and Present

"Supercomputers can be hugely beneficial to society. In one example, supercomputers accurately predicted a heavy snowstorm and widespread frost in Florida, USA, allowing fruit farmers to take preventative measures two weeks before the storm hit, ultimately saving their orange crop for the year. However, there have been challenges in acquiring supercomputers. For instance, when Taiwan's Central Meteorological Administration attempted to purchase a Cray weather forecasting supercomputer from the United States, concerns over the US military's science and technology strategy threatened to impede the process. Fortunately, with the help of Dr. Steve Chen, the import of the Cray supercomputer was successfully completed."

Cray Research designed and manufactured its first supercomputer, the Cray-1, in 1976. The initial Cray-1 system, which was delivered to Los Alamos National Laboratory, had a price tag of 8.8 million US dollars. Building on the success of the Cray-1, Seymour Cray, widely regarded as the father of supercomputing, unveiled the Cray-2 in 1981, which featured liquid immersion cooling technology.

During the development of the Cray-2, Cray Research launched a parallel project to create the Cray X-MP, led by Dr. Steve Chen, who served as the principal designer of the system. Chen, who had joined the company in 1979, was presented with two options at the time: to join the well-resourced Cray-2 team or to spearhead a new project with limited support from the company. Chen opted for the latter, leading the development of the Cray X-MP alongside a dedicated team of engineers.

Over 30 years later, Dr. Steve Chen spoke to me in a relaxed manner, explaining that he had chosen to pursue the riskier and more innovative option presented to him when he joined Cray Research in 1979. This choice led him to develop the CRAY X-MP supercomputer, utilizing a multiprocessor design with cheaper processors. Despite slightly lower performance compared to the Cray-2, the Cray X-MP boasted an impressive overall instruction issue rate of 1 billion instructions per second (1000 MIPS), while greatly reducing the total cost. All eyes were on Dr. Chen, who recalled the 1983 press conference as his first public speaking event in English, which had made him feel nervous and caused him to stammer.

During Dr. Chen's visit to the National Chiao Tung University in July 2009, I had the honor of spending time with him and gaining invaluable insights. He emphasized that supercomputers can greatly benefit society, citing an instance where a supercomputer accurately predicted heavy snow and frost in Florida, USA, allowing fruit farmers to

take preventative measures two weeks prior to the storm and save their crops. Dr. Chen also played a crucial role in overcoming an obstacle encountered by the Taiwan Central Meteorological Administration during the purchase of a Cray weather forecasting supercomputer from the United States, helping to ensure a successful import. In 1985, while Dr. Chi-Fu Den was directing the Engineering Division of the National Science Council and working on plans to establish a high-speed computer center, he sent staff to seek advice from Dr. Chen, underscoring the latter's reputation as a leading expert in the field.

In recent years, Dr. Chen has dedicated himself to research and development that extends to rural and ethnic minority regions. During a dinner I had with him in Hsinchu, I ordered lamb chops and asked him how the food was. Initially, he replied politely that it was fine. However, a few moments later, he revealed the truth - ever since he tasted lamb dishes served by the Kazakhs in Gansu, he had never been satisfied with lamb from other places. He went on to describe a fascinating scene he had witnessed of modern Kazakh herders on motorcycles herding sheep and goats in rural plains.

For the development of supercomputers, Hans Meuer from the University of Mannheim in Germany began tracking significant trends and developments in High-Performance Computing (HPC) back in 1986. In 1993, a group of experts initiated the TOP500 project to evaluate and rank supercomputer systems based on their computing capacity. The Top 500 list does not focus on the number of processors (CPUs) or hard disks, but rather on the amount of computation that a system can perform.

Supercomputers play a critical role in the field of computational science by performing massive and complex calculations, such as Floating-point Operations (FLO). The performance of a supercomputer is commonly measured in floating-point operations per second (FLOPS). The first standard for floating-point arithmetic, IEEE 754-1985, was established under the leadership of William Kahan in 1985. William Kahan is widely recognized as "The Father of Floating Point" due to his significant contribution to the advancement of IEEE standards for floating-point computation.

During my tenure as the Deputy Minister for the Ministry of Science and Technology from 2014 to 2016, I oversaw the establishment of supercomputers. This experience helped me appreciate the complexity of the technology and deepened my recognition of the significant contributions made by past computing pioneers.

計算機作業系統的誕生

文／林一平 講座教授

計算機能變得很好用，編譯器（Compiler）及作業系統（Operating System）的發展功不可沒。

作業系統管理計算機或行動裝置的軟體和硬體功能，讓所有應用和程式能順暢運行。桌面運算裝置最常用的作業系統包括微軟（Microsoft）Windows 及蘋果（Apple）macOS。這些作業系統的功能複雜，很多原理歸功於 1960 年代電腦科學家的努力。

1965 年時，貝爾實驗室（Bell Labs）、奇異電子（General Electric）和麻省理工學院（MIT）合作建立一套多使用者（Multi-user）、多工（Multi-processor）、多層次（Multi-level）的作業系統，稱為 MULTICS，主要貢獻者是「分時處理作業系統」之父柯巴托（Fernando José "Corby" Corbató, 1926~2019）。

當時參與計畫的湯普森（Ken Thompson）在 MULTICS 寫了一款電動遊戲程式「星際旅行」（Space Travel）。貝爾實驗室在 1969 年終止參與 MULTICS 的研發。有人開玩笑說，為了能繼續玩這個遊戲，湯普森找來瑞奇（Dennis MacAlistair Ritchie, 1941~2011），發展出一套更有效率的作業系統，稱為 Unix。這套作業系統後來成為主流，廣泛的被各種電腦採用。

在 Thompson 及 Ritchie 獲得圖靈獎（Turing Award）的次年（1984 年），貝爾實驗室的技術期刊《AT&T Bell Laboratories Technical Journal》編輯一期特刊，專門討論 UNIX 系統。1984 年這一期特刊，具有紀念性，成為我的珍藏版。為此特刊撰文的作者都赫赫有名。當中寫 Preface 的 Robert L. Martin 是我在 Bellcore 時的大老闆，而 Robert H. Morris 則為 2010 年 IBM 的全球服務副總裁，他於 2010 年來台灣，頒發 IBM Faculty Award 給我。

近年來，超級電腦業者打破「高速計算」必須透過一部高速運轉的超級電腦來執行計算工作的思維，而作業系統更加重要。

2008 年 4 月克雷公司（Cray Inc）開始與英特爾技（Intel）術合作，用 Xeon 處理器及刀鋒系統設計來打造超級電腦，稱為 Cray CX1。這種蛻變的高速計算，稱為「高階計算」(High-end Computing)。以多部 CPU 進行高階計算，原理是平行理論（Concurrency Theory），早期的主要貢獻者是米爾納（Arthur John Robin Gorell Milner, 1934~2010）。

我於 2014 ～ 2016 年間在科技部督導超級電腦的建置，了解其技術的複雜度，更能體會過去計算機先驅者的貢獻。
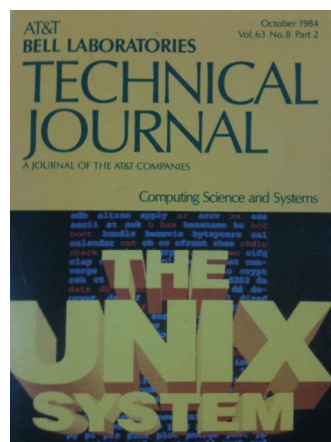
貝爾實驗室技術期刊。

林一平
國立陽明交通大學資工系終身講座教授暨華邦電子講座

現為國立陽明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＞。

The Birth of Computer Operating System

Computers have become more user-friendly and useful to human beings, largely due to the development of compilers and operating systems. An operating system (OS) is a system software that manages hardware resources and software functions of a computer or a mobile device so that all applications and programs can run smoothly. The most widely used operating systems for desktop computers include Microsoft Windows and Apple macOS. These operating systems are composed of many complicated functions, most of which were developed by computer scientists in the 1960s.

In 1965, Bell Labs, General Electric and MIT collaborated on a project to build a multi-user, multi-processor, and multi-level operating system, called MULTICS. The man behind the MULTICS was Fernando José "Corby" Corbató (1926~2019), who is also known as the father of the "time-sharing processing system".

Ken Thompson, who was part of the MULTICS project, developed a video game called Space Travel on the operating system. However, Bell Labs ended its involvement in the project in 1969. Some people jokingly said that in order to continue playing the game, Thompson brought in Ritchie (Dennis MacAlistair Ritchie, 1941-2011) to develop a more efficient operating system called Unix. This operating system later became mainstream and was widely adopted by various computers.

The year after Thompson and Ritchie won the Turing Award, a special issue of the AT&T Bell Labs Technical Journal from 1984 was devoted to UNIX systems. This commemorative special issue holds a special place in my heart. The articles in this special issue were contributed by renowned authors, including Robert L. Martin, who was the author of the Preface and my former boss at Bellcore, and Robert H. Morris, the

Vice President of Global Services at IBM in 2010. He came to Taiwan in 2010 and presented me with the IBM Faculty Award.

In recent years, supercomputer manufacturers have challenged the notion that "high-speed computing" can only be achieved with a high-speed supercomputer, highlighting the importance of the operating system. In April 2008, Cray Inc collaborated with Intel to develop a supercomputer called Cray CX1, which utilized a Xeon processor and blade system design. This new era of high-speed computing is also known as "High-end Computing," and is built on the core concept of Concurrency Theory, to which Arthur John Robin Gorell Milner (1934~2010) made significant contributions in its early stages.

During my tenure as Deputy Minister for the Ministry of Science and Technology from 2014 to 2016, I oversaw the establishment of supercomputers, which gave me a greater appreciation for the complexity of the technology and the invaluable contributions of past computing pioneers.

Dr. Jason Yi-Bing Lin

Lifetime Chair Professor of the Department of Computer Science at National Yang Ming Chiao Tung University and Winbond Chair Professor

Dr. Lin is currently a lifetime chair professor of the Department of Computer Science at National Yang Ming 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.

Woodpecker Technology 產品總監 張智凱博士：Cybersecurity Market Survey: Products, Services, and an Emerging Trend

文／翁健棋

隨著網路科技的蓬勃發展，人們對於網際網路的依賴程度越來越高。然而，網路的普及也同時帶來了新的風險和挑戰，近年來頗受社會大眾關注的「網路安全問題」便是其中一例。據統計，全球網路使用者已經超過 40 億人，而每年因網路攻擊所造成的經濟損失高達數十甚至數百億元。不僅如此，網路攻擊手段也越來越多樣化，從惡意程式、網路釣魚到身份盜用等，都對個人和企業的資訊安全構成了威脅，網路安全意識和各項措施的補強可謂刻不容緩。

有鑑於此趨勢，本院資訊科學與工程研究所於去年底舉辦一場以「Cybersecurity Market Survey: Products, Services, and an Emerging Trend」為主題的論文研討會，由於本校取得博士學位，現任職於 Woodpecker Technology 公司，擔任產品總監的張智凱學長擔任主講人。張智凱學長曾任富士康的網路安全解決方案團隊負責人，並於 2015 年至 2016 年期間擔任 IEEE Reliability Magazine 的助理編輯。不單如此，張智凱學長還曾擔任本校亥客書院、HITCON Community 2018 和其他相關培訓計劃的網路安全講師，是極具資格與歷練經驗的合適主講人選。

本次研討會主要希望能協助聽講者了解資安市場及其相關產品、服務和趨勢，以期對未來的學習和研究有啟發作用。於研討會開頭，張智凱學長列舉數項網路安全市場中的防禦產品，點出企業對於「免受網路攻擊之防禦系統」的需求和重要性，藉此帶出開放網路軟體安全計畫 OWASP （Open Web Application Security Project）所推崇的 Cyber Defense Matrix（CDM）框架。該矩陣架構列出了幾個關鍵區域，如預防、偵測、反應和恢復，並將每個區域細分為不同的部分，幫助企業更好地了解所需的安全產品和服務，並制定適當的保護措施，避免遭受惡意網路攻擊。

緊接著，張智凱學長談到資安可視性（cyber security visibility）的概念，引用孫子兵法名句：「知己知彼，百戰不殆。」闡釋除了對外部威脅的監控與預防，清楚了解自身的各項資產並洞悉相關風險和漏洞亦十分重要。舉例來說，從產品的硬體資訊到程式運作情形、用戶帳號使用狀態、網路流量，皆是建構資安可視性的重要資料。然而，根據 Forrester 組織的市調研究，現今只有約 17% 的組織落實資安可視性的部署，其原因便在於資安學術圈領先資安應用圈很長一段距離，導致很多新技術在產品化時會有一道較難跨越的檻，無法將最新的技術妥善運用，達到資安防護效果。

於研討會末段，張智凱學長談及由 AI 驅動的安全可視性技術之優缺點。對於企業和組織來說，使用人工智慧來監控、分析數據，可以大幅降低對人力資源的依賴，從而節省時間和人力成本。不僅如此，還可以透過對大量數據進行分析和比較，快速識別不正常的行為或模式，提前預警潛在的安全威脅，從而避免因攻擊帶來的損失和損害。然而，此技術也存在一些缺點和挑戰，包括其需大量的數據來支撐和培訓模型，以及 AI 模型和算法可能存在偏差，導致分析和預測結果出現誤判等，皆是尚待優化、解決的問題。

總的來說，AI 驅動的安全可視性之相關技術深具發展潛力，可以幫助企業和組織更好地保護數據安全，使其能及時發現和處理潛在的安全威脅。然而，相關部門在實施前仍需仔細權衡其利弊，同時採取必要的安全措施來確保數據的安全性和可靠性，方能落實「知己知彼」策略，實踐網路安全防護！

Dr. Chih-Kai Chang's speech on Cybersecurity Market Survey: Products, Services, and an Emerging Trend

As internet technology continues to thrive, people's reliance on the internet is increasing. However, the popularity of the internet also brings new risks and challenges, and "cybersecurity issues" have become a topic of concern for society in recent years. According to statistics, there are now over four billion internet users worldwide, and the economic losses caused by cyber attacks reach tens or even hundreds of billions of dollars each year. Not only that, cyber attack methods are also becoming more diverse, from malicious software, phishing, to identity theft, all of which pose a threat to individuals and companies' cybersecurity. Therefore, strengthening cybersecurity awareness and measures is urgently needed.

In light of this trend, the Institute of Computer Science and Engineering at NYCU held a seminar last year on "Cybersecurity Market Survey: Products, Services, and an Emerging Trend." The keynote speaker Dr. Chih-Kai Chang is an experienced speaker to talk about this topic. He obtained his doctoral degree at NYCU and currently serves as the product director at Woodpecker Technology. Dr. Chang previously served as the head of a cybersecurity solution team at Foxconn and was an assistant editor of IEEE Reliability Magazine from 2015 to 2016. Moreover, he has also served as a cybersecurity lecturer at College of Hacker, HITCON Community in 2018, and other related training programs.

The purpose of this seminar was to inspire future learning and research in the field of cybersecurity through guiding the audience in learning about the cybersecurity market and its related products, services, and trends, with the hope of inspiring future researchers in this field. At the beginning of the seminar, Dr. Chang emphasized the importance and demand for defense systems against cyber attacks among companies. He listed several categories of product available in the cybersecurity market. Dr. Chang then introduced the Cyber Defense Matrix (CDM) framework promoted by the Open Web Application Security Project (OWASP). The CDM framework lists several key areas such as prevention, detection, response, and recovery. Each area is subdivided into different parts to help companies better understand the required security products and services. This framework can help companies formulate appropriate protective measures to avoid malicious cyber attacks.

Next, Dr. Chih-Kai Chang talked about the concept of cyber security visibility. He cited a famous quote from Sun Tzu's The Art of War: "know yourself and know the enemy, and you can fight a hundred battles with no danger of defeat." He then explained that in addition to monitoring and preventing external threats, it is also important to have a clear understanding of one's own assets and to be aware of related risks and vulnerabilities. For example, data such as hardware information, program operations, user account usage status, and network traffic are all important for building cyber security visibility. However, according to market research by Forrester, only about 17% of organizations currently have implemented cyber security visibility. One of the possible reasons is that cybersecurity in the academic field is still ahead of cybersecurity applications in reality. As a consequence, many new technologies face challenges in productization, making it difficult to utilize the latest technologies to achieve cybersecurity protection efficiency.

In the final stages of the seminar, Dr. Chih-Kai Chang discussed the advantages and disadvantages of AI-driven security visibility technology. For enterprises and organizations, using artificial intelligence to monitor and analyze data can greatly reduce dependence on human resources, thereby saving time and labor costs. Moreover, through analyzing and comparing large amounts of data, abnormal behaviors or patterns can be quickly identified, potential security threats can be detected in advance, and losses and damages caused by attacks can be avoided. However, this technology also has some shortcomings and challenges, including the need for a large amount of data to support and train models, as well as the possibility of bias in AI models and algorithms, which can lead to misjudgments in analysis and prediction results, and these issues need to be optimized and resolved.

Overall, the related technologies of AI-driven security visibility have great development potential and can help enterprises and organizations better protect data security. In addition, potential security threats can be dealt with and detected in a timely manner. However, each company or organization needs to carefully consider the pros and cons before implementation. Furthermore, it would be better to implement necessary security measures to ensure the security and reliability of data, as the strategy "know yourself, know your enemy" suggested by Dr. Chang for network security protection.

日本沖繩科學技術大學院大學 Kenji Doya 教授演講：
What Can We Further Learn From the Brain for AI and Robotics

文／洪偉 資科工博士生、 解佳穎 資科工博士生

Prof. Kenji Doya 於東京大學取得博士學位，目前於沖繩科學技術大學院大學 (OIST) 擔任教授，Prof. Doya 的研究領域涵蓋人工智慧、深度學習、機器學習、神經科學和機器人學，帶領的神經計算團隊致力於透過神經生物學和計算工程等研究方法的結合，嘗試了解大腦或人工智慧作為 agent，如何對未知的環境進行強化學習，並進一步提出在學習方面穩健且靈活的演算法。

Prof. Kenji Doya 於 2023 年 2 月 13 日受資訊學院和神經科學研究所邀請，在大腦與人工智慧學術講座進行專題演講，主題為" What Can We Further Learn From the Brain for AI and Robotics"。在演講中，Prof. Doya 分享了神經科學與人工智慧過去的研究和歷史發展。許多機器學習架構能和大腦的生物特性能進行類比，如神經元細胞和 perceptron 結構，或是對應不同功能的腦區劃分和神經網路中不同目標的模組切割等等。經由這些觀察，能發現腦科學與深度學習的高度關聯性，因此以腦科學的角度去發想研究，進一步提升人工智慧和機器人學的發展，成為一門研究課題。其中，機器學習領域中的強化學習和神經科學中大腦的學習機制存在許多相似的例子；除了大腦可以被視為 multi agent 加上不同學習方法的複雜系統，強化學習的時序差分學習和多巴胺的制約機制，大腦基底核的獎勵預測和 deep Q network 原理等也顯示結構之外的相似性。

上述的例子再次顯示出神經科學與人工智慧發展之間密不可分的關係。因此，基於腦部神經科學的進展，講者與我們分享了人工智慧的潛在發展方向，以及現階段進行中的研究主題。討論的方向主要涵蓋三大主題，包括能源效率、數據效率和自主性與社交性。基於 biophysical computing 的概念，研究者利用分布式的記憶體發展出了具有極佳能源效率的神經形態晶片。除此之外，大腦科學提出了 "mental simulation"，通過重組預先訓練好的預測模型和行動策略來幫助學習，這能有效地利用現有的數據。最後，就如人類的自我學習，能夠自行找到新理論、算法或目標的人工智能就會是現階段最有潛力的研究方向，然而背後還有許多問題我們需要審慎評估，舉例來說，人工智能的自我發展是否會違反現階段的道德標準，並且是否會被有心人士作為犯罪的用途。

除了介紹腦科學、神經科學和強化學習的關聯，Prof. Doya 也展示了他帶領的團隊在前述具自主性或社交性的人工智慧領域近年的一些研究成果。例如經由特殊設計的 value function，透過調整其中的某些 factor，可以讓機器人對於 reward 的反應像是不同個性的人類對於風險的評估態度，或是藉由強化學習，讓機器人主動調整位置達成行走或站立等指定任務等等。這些和機器人行為或決策有關的研究能作為參考，奠定開發對環境適應更有彈性或更自動化的人工智慧或機器人的基礎。

Professor Kenji Doya's speech on What Can We Further Learn from the Brain for AI and Robotics

Professor Kenji Doya received his Ph.D. degree from the University of Tokyo and is currently a professor at the Okinawa Institute of Science and Technology Graduate University (OIST).

His research interests include artificial intelligence, deep learning, machine learning, neuroscience, and robotics. He leads a neural computation team dedicated to understanding how the brain or artificial intelligence, as agents, can perform reinforcement learning in unknown environments and further develop robust and flexible algorithms for learning.

On February 13, 2023, Professor Doya was invited by the College of Computer Science and the Institute of Neuroscience to give a keynote speech on "What Can We Further Learn From the Brain for AI and Robotics". In his speech, Dr. Doya shared the history and development of neuroscience and artificial intelligence research. Many machine learning architectures can be analogized with the biological properties of the brain, such as the structure of neurons and perceptrons, or the division of different brain regions for different functions and module segmentation for different goals in neural networks. Through these observations, the high correlation between neuroscience and deep learning can be discovered. Therefore, by approaching research from the perspective of neuroscience, further advancements can be made in the development of artificial intelligence and robotics has become a research topic.Among them, there are many similar examples between the learning mechanism of the brain in neuroscience and the reinforcement learning in machine learning. For instance, the brain can be regarded as a complex system of multi-agents with different learning methods, the dopamine constraint mechanism, the reward prediction of the basal ganglia in the brain, and the principle of the deep Q network. These examples demonstrate similarities that go beyond their structural aspects."

The above examples once again demonstrate the close relationship between neuroscience and the development of artificial intelligence. Therefore, based on the advancements in brain neuroscience, the speaker shared with us the potential directions of AI development and the current research topics. The discussion primarily covers three main themes: energy efficiency, data efficiency, and autonomy and sociality. Building on the concept of biophysical computing, researchers have developed neural morphology chips that exhibit excellent energy efficiency through distributed memory. Additionally, mental simulation was proposed to utilize reconfigured pre-trained predictive models and action strategies to aid learning, as well as to leverage existing data. Lastly, similar to human's self-learning, the most promising research direction at this stage would be artificial intelligence that can independently discover new theories, algorithms, or objectives. However, there are still many issues that need to be carefully evaluated. For example, whether the self-development of artificial intelligence might violate current ethical standards and whether it could be exploited by malicious individuals for criminal purposes.

In addition to introducing the connection between neuroscience, brain science, and reinforcement learning, Prof. Doya also showcased some recent research achievements in the field of autonomous or social artificial intelligence led by his team. For example, robots can exhibit responses to rewards that resemble the risk assessment attitudes of different personalities in humans. Furthermore, through reinforcement learning, robots can actively adjust their positions to accomplish specific tasks such as walking or standing. These studies related to robot behavior and decision-making serve as references and foundation for developing more flexible and automated artificial intelligence or robots that can adapt to different environments.

電腦遊戲與智慧實驗室（CGI Lab）包辦 AWS DeepRacer League 前三名

CGI Lab Winning All 3 Medals at AWS DeepRacer League

文／李頤 機器人碩士學位學程碩士生
李政毅 數據科學與工程研究所碩士生
施囿維 資訊科學與工程研究所碩士生

2022 AWS DeepRacer 全球自動駕駛賽車聯盟，自 2022 三月起展開為期八個月的線上資格賽，吸引世界眾多業界與學術界的高手參加，總計超過 15 萬人次的挑戰和篩選，最終由 50 位全球各界好手，在拉斯維加斯進行總決賽。

AWS DeepRacer 是一個由進階機器學習技術「強化學習」（Reinforcement Learning,RL）驅動的 1/18 比例自動駕駛賽車，自 Amazon Web Services(AWS) 於 2018 年發表以來受到各界注目，並為此每年舉辦賽車比賽，參賽者須運用強化學習驅動，是 AWS 專為強化學習初學者所設計的機器，希望透過有趣和高娛樂性的方式為開發人員提供探索機器學習的機會。

歷年來實驗室的學長們在 AWS DeepRacer 的表現就相當卓越，2019 的朱詠嘉學長獲得季軍、2020 的許博鈞、郭奎廷學長獲得冠軍、季軍等佳績。而去年我們也有參賽，但在 2021 我們 (李頤、李政毅、施囿維) 參賽時在總決賽的時候失誤，在 24 強就輸掉了比賽沒能晉級。

而 2022 年總決賽時我們不止記取去年的教訓，也透過歷屆參與過比賽的學長們的經驗分享和技術傳承，在每一場比賽中觀察對手、優化模型讓模型在賽道上跑得更快，爭取到總決賽的參賽資格，而在決賽第一輪 50 取 32 強階段時，我們的模型表現並不如預期，雖然順利晉級了前 32 強，但第一輪時跑得最快的前三名都是來自 JPMC（摩根大通）頂尖的工程師，其中包含去年 2021 的冠軍選手 Rogue。我們在比完第一輪決賽後回飯店緊急賽後討論，根據當天我們三人對車子及場地的狀況進行分析，並對模型做調整，到隔天第二輪決賽（32 取 8）、第三輪決賽（8 取三）都在不斷調整我們的模型，最終才成功調整出最優的模型跑出最佳成績。

在第二輪決賽時李政毅以最短時間 13.768 的時間打破第一輪決賽時 JPMC 所保持的最快紀錄，而在最終決賽時李頤又以最短時間 13.756 秒的打破李政毅的最快紀錄，成為該賽道的紀錄保持人，最終由李頤、李政毅、施囿維分別拿下冠軍、亞軍、季軍的成績，成功打敗許多優秀的企業參賽者，將世界總冠軍抱回台灣，再度向世界顯示台灣的科技人才不容小覷。

The 2022 AWS DeepRacer League has launched an eight-month qualification tournament from March 2022. The tournament attracted developers from academia and industry around the world to participate in the qualifying stage. More than 150,000 developers participated in the challenges and screenings and eventually 50 players from all over the world advanced to the knockout stage of the championship in Las Vegas.

AWS DeepRacer is an autonomous 1/18th scale race car powered by advanced machine learning technology called "Reinforcement Learning (RL)". Since AWS DeepRacer was announced by Amazon Web Services (AWS) in 2018, it has attracted attention from all over the word and the racing competition is held every year. Participants have to develop a reinforcement model to control throttle and steering. The platform designed by AWS for RL beginners provides an interesting and fun way for developers to get started with machine learning.

Over the years, the seniors of CGI Lab have performed very well in AWS DeepRacer League, including Yongjia Zhu (bronze medal 2019), Bo-Chun Hsu (gold medal 2020), and Kuei-Ting Kuo (bronze medal 2020). CGI Lab also participated the competition last year, although we (Lee I, Lee Cheng Yi, Shih Yu Wei) made a mistake in the final and finalized the top 24 in 2021.

In the 2022 finals, we not only remembered the lessons from the last year, but also shared the experience and technical inheritance of the seniors who have participated in the past competitions. By observing our opponents in each game and optimizing the model to make the model run faster on the track, we finally strive to compete for the spot in the finals. In the round-of-32 stage of the finals, our model did not perform as expected. Although we successfully advanced to the top 32, the top three fastest runners in the first round were top engineers from JPMC (JPMorgan Chase), including 2021 champion Rogue. After the first round of finals, we went back to the hotel for an urgent postgame discussion. We analyzed the conditions of the car and the venue on the day and adjusted the model accordingly. We kept adjusting the model in the second round of finals (8 out of 32) and the third round of finals (3 out of 8), thereby optimizing the model to get the best result.

In the second round of finals, Lee Cheng Yi broke the record held by JPMC in the first round of finals, posting a personal best time of 13.768 seconds. In the third round of the final, Lee I broke Lee Cheng Yi's record with 13.756s, thereby becoming the track record holder. In the end, Lee I, Lee Cheng Yi, and Shih Yu Wei won the championship, runner-up, and third place, respectively. We have successfully defeated many outstanding competitors from industry. Bringing the world championship back to Taiwan, we showed once again the world that Taiwan's scientific and technological talents should not be underestimated.

紀念 資通訊時代的領航與擘畫者林寶樹教授

文／翁健棋

　　我們敬愛的林寶樹教授於 2022 年 11 月 13 日逝世，享年 74 歲。為感念林寶樹教授對本校至整個資訊領域產、學、研各界之貢獻，本校特別於 2022 年 12 月 23 日為林寶樹教授舉辦緬懷追思會，廣邀各界先進出席參與，共同回顧林寶樹教授的人生歷程與卓越事蹟，以此悼念並緬懷此位身兼研究者、教育家及台灣寬頻網路通訊應用重要推手等多重身分的資通訊領域優秀人才。

　　回顧寶樹教授的人生歷程，出生於屏東縣內的小農村，寶樹教授共有三名手足，在雙親的悉心栽培下，四兄弟姊妹皆取得大學學位，可見其父母對於下一代教育的重視，同時體現寶樹教授與眾手足奮發向上、積極進取的企圖心。自屏東縣新埤國小、省立潮州中學打下穩固學習基礎，寶樹教授接著考入省立臺南第一高級中學，而後於 1966 年進入國立交通大學，成為交大人，並於 1970 年畢業（59 級）。取得國立交通大學計算與控制工程學士學位後，寶樹教授選擇進入國立交通大學電子研究所進修碩士（62 級），之後留任交通大學擔任計算工程學系專任講師。

　　從事教職期間，深感所學仍有不足的寶樹教授面臨出國深造或就業的選擇難題，經指導老師郭南宏教授的指點與鼓勵，其順利獲得學校資助，前往美國留學。並於 1976 年取得佛羅里達大學電腦工程碩士學位，接著於 1980 年取得伊利諾大學芝加哥校區電腦科學博士。完成學位後，寶樹教授開始他在美國的職業生涯，先後擔任 AT＆T 貝爾實驗室（Bell Labs）高級研發研究員、Racal Data Comm. 數據通訊公司研發經理、美國波音公司（Boeing Computer Services）網路軟體開發經理、Teknekron Comm. Systems

公司網路部門資深經理等要職。憶起這段美國學、職涯經歷，寶樹教授認為自己有幸能參與全球一流公司的開發流程，見證頂尖資通訊領域技術革新，實屬寶貴且難得的人生經驗，且很大程度地開拓自身的眼界。

　　1991 年，寶樹教授帶著海外實務經驗歸國，先後擔任工業技術研究院（下稱工研院）電腦與通訊工業研究所電腦通訊組組長、副所長，為我國網路與通信的研發與管理奠定堅實研究基礎；更於 1997 年接受網羅成為飛利浦全球研究實驗室資深副總裁、亞洲研究院院長，肩負振衰起敝的使命，也確實帶領飛利浦突破開發瓶頸，締造實驗室營運呈現逐年加倍成長的奇蹟。受當時工研院史欽泰院長之邀，寶樹教授於 2001 年回台擔任工研院電腦與通訊研究所所長，同時秉持「為台灣做研發」的精神接任電通所所長，致力提升我國資通訊研發實力、協助開創友善人才的產業環境。

　　2009 年自工研院榮譽退休後，寶樹教授選擇返回母校交通大學，成為本校資工系終身講座教授，兼任電資中心主任。其不遺餘力協助年輕學者作研究為職志，並輔導績優的博士後研究員尋找教職，讓研究者、教育家的經驗與熱忱得以傳承延續，可謂飲水思源的最佳典範。投身資通訊領域三十載，寶樹教授發表過 120 篇重要的技術與管理論文，獲得 IEEE 第三千禧年獎章（Third Millennium Medal, 2000）、IEEE 2007 院士榮銜等傑出獎項，如此資通訊領域巨擘，將一生所學奉獻給他的母校，他的家鄉，他所熱愛的這片土地，且讓我們以此文紀念這位推動資通訊時代高速發展的領航先鋒！

A Father, Husband, Mentor, and Leader.
謹此紀念 資通訊時代的領航與擘畫者
林寶樹 Paul Lin
1948 - 2022

In Memory of Professor Bao-Shuh Paul Lin, a Pioneer and Visionary in the Information and Communications Technology (ICT) Era

It is with profound sadness that we announce the death of our colleague and friend, Professor Bao-Shuh Paul Lin, who passed away on November 13th, 2022 at the age of 74. In gratitude for Professor Bao-Shuh Paul Lin's contributions to National Yang-Ming Chiao Tung University and the computer science industry, academia, and research fields, our university held a memorial service to honor and remember him on December 23rd, 2022. We cordially invited all distinguished guests from various fields to join us in the memorial service and reflect on the remarkable life journey and accomplishments of Professor Lin. This event is to express our grief and honor his exceptional contribution to the field of information and communications technology, where he excelled as a researcher, educator, and a pivotal figure in advancing the broadband communication applications in Taiwan.

Professor Lin was born in a small farming village in Pingtung County and grew up with three siblings. All four siblings have received their university degrees, which is a testament to the careful upbringing they received from their parents. This highlights the value that their parents placed on education for the next generation, as well as the ambitious and proactive approach towards self-improvement shared by Professor Lin and his siblings. Professor Lin built a solid educational foundation at Shinpi Elementary School and National Chao-Chou Senior High School in Pingtung County, then continued his studies at Tainan First Senior High School before enrolling in National Chiao Tung University in 1966. He graduated in 1970 (Class of '59). Following his Bachelor's degree in Computer and Control Engineering from National Chiao Tung University, he decided to pursue a Master's degree at the Institute of Electronics at NCTU (Class of '62) and stayed on as a full-time lecturer in the Department of Computer Engineering.

Professor Lin realized that he lacked sufficient knowledge during his time as a lecturer, which presented him with the challenging decision of either pursuing further studies overseas or seeking employment. With the guidance and encouragement of his mentor, Professor Nan-Hung Kuo, he successfully received grants from the university and went to study in the United States. He earned a master's degree in computer engineering from the University of Florida in 1976, followed by a PhD in computer science from the University of Illinois at Chicago in 1980. After earning his PhD, Professor Lin began his professional career in the United States, including positions such as senior research scientist at AT&T Bell Labs, research and development manager at Racal Data Comm., network software development manager at Boeing Computer Services, and senior manager of the network division at Teknekron Comm. Systems. After contemplating his time studying and working in the United States,

Professor Lin deems himself lucky to have participated in leading global companies, witnessed pioneering advancements in the foremost areas of information and communications, and acquired exceptional and precious life experiences that has greatly broadened his horizons.

In 1991, Professor Lin returned to Taiwan after gaining practical experience abroad. He took up the position of Head and Deputy Director of the Computer Communications Division at the Industrial Technology Research Institute (ITRI) with the aim of establishing a strong research foundation for the development and administration of Taiwan's network and communication technology. He joined Philips in 1997 as Senior Vice President of Global Research Labs and Director of the Asian Research Institute, taking on the responsibility of revitalizing the company. He effectively guided Philips in surmounting developmental obstacles and witnessed the miracle of doubling annual growth. Subsequently, Professor Lin accepted an offer from President Chintay Shih of ITRI to return to Taiwan in 2001 and lead Information and Communications Research Laboratories. He took over as the director of Information and Communications Research Laboratories with the spirit of "conducting research and development for Taiwan", aiming to promote the development of Taiwan's information and communications technology industry and help create a friendly environment for talented professionals in research and development.

After retiring with honors from the Industrial Technology Research Institute in 2009, Professor Lin chose to return to National Chiao Tung University, his alma mater, as a Lifetime Chair Professor in the Department of Computer Science, and the Director of Information Technology Service Center. He spares no effort in assisting young scholars in pursuing research as their career aspiration, and mentoring outstanding postdoctoral researchers in finding teaching positions. He is truly an excellent model of remembering one's roots and giving back, allowing the experience and passion of researchers and educators to be passed down and continued. Professor Lin has devoted himself to the information and communications technology field for three decades. Throughout his career, he has published 120 significant papers on technical and management topics, and received numerous awards, including the IEEE Third Millennium Medal in 2000 and the title of IEEE Fellow in 2007. Professor Lin, a prominent figure in the field of information and communications technology, devoted his life to serving his alma mater, hometown, and the land he cherished. Let us dedicate this article to commemorate Professor Bao-Shuh Paul Lin, the pioneer driving the rapid development of the information and communications technology era.

資訊＋醫學 跨校區學院交流活動

文／林珮雯

　　為使本院在資訊領域的專業技術，與陽明校區在醫學相關領域充分的合作，發揮一加一大於二的效果，本院與醫學院、牙醫學院和護理學院於 112 年 2 月 9 日聯合舉辦跨校區交流活動，藉由學術交流及參觀活動，進一步深化資訊與醫學跨領域學習交流。

　　林奇宏校長為交流活動開場致詞表示，經過疫情的洗禮，加速了很多事情進展，包括醫療型態及教學方式的改變。特別是伴隨科技進步，透過資通訊、大數據的技術介入，應用在醫學及公共衛生領域，期待可以達到更好疾病預測，讓醫療服務去集中化，並強化保健及疾病的連結。林校長也指出，數理工程及生物醫學融合的重要性，在陽明交大現有的利基上，未來將在新竹博愛校區推動新的學科「工程生物學」，以培育能實現生物科技、精準醫藥、永續科技的工程生物人才，成為未來醫院的發展基地。

　　資訊學院曾建超副院長先介紹本院生醫研究相關教授群及智慧健康照護跨域學程學生修課情況。

醫學院凌憬峯副院長進一步說明醫學系醫師工程師組及醫學系特色教學「問題導向學習（Problem-based Learning）」課程。資訊學院陳志成院長表示，感謝護理學院，目前在陽明校區的護理館內設立本院跨校區合作推動辦公室之院辦公室。跨校區辦公室已成立快二年，過去因疫情，交流活動受限，但現在漸漸開放，未來會繼續推動更多跨校區合作交流。醫學院陳震寰院長、牙醫學院高壽延院長、護理學院張秀如院長亦於會議中簡介該學院之研究與未來發展。

　　交流會最後，兩校區老師一同至軍艦岩健走。軍艦岩海拔約 185.6 公尺，從陽明校區登山口出發，一路石階步道向上，沿途風光明媚，到達山頂後四周可以俯瞰台北盆地、大屯火山群。軍艦岩最特別之處是其地質景觀，由兩千多萬年前沈積的木山層、砂岩、頁岩層交錯組成的，並經長時間的海水沖刷形成白灰砂岩地形。在資訊技術服務中心副主任陳麗芬老師的導覽介紹之下，本院老師對陽明校區有不同的認識，老師們合照留影為本次交流活動畫下完美句點。

Comuter Science + Medicine Cross–Campus Exchange Activity

In order to facilitate full collaboration between our college's expertise in computer science and the medical-related fields of Yang Ming Campus to achieve synergistic effects, our college jointly organized a cross-campus exchange activity with the College of Medicine, College of Dentistry, and College of Nursing on February 9, 2023. Our goal is to deepen interdisciplinary learning and exchange between computer science and medicine through academic exchanges and visits.

President Chi-Hung Lin delivered an opening speech at the exchange activity, expressing that the COVID-19 pandemic has brought about development in various areas, including changes in healthcare services and medical education. He envisions improving disease prediction, centralizing healthcare services, and strengthening the connection between healthcare and disease prevention through the integration of information and communications technology (ICT) and big data in the fields of medicine and public health. President Lin also emphasized the significance of the integration of engineering and biomedical sciences. Building upon the existing foundation of Yang Ming Chiao Tung University, a new discipline called "Bioengineering" will be established at Bo'ai Campus in Hsinchu. The goal is to nurture skilled individuals in bioengineering who can spearhead progress in biotechnology, precision medicine, and sustainable technology, and transform the campus into a hub for future hospital advancements.

Vice Dean Chien-Chao Tseng of the College of Computer Science provided an overview of the faculty members in the biomedical field and shared the current student enrollment status in the Cross-Disciplinary Smart Health Care program. Additionally, Vice Dean Jiing-Fong Ling of the College of Medicine further explained the Physician-Engineer Track and highlighted the unique "Problem-based Learning"

curriculum employed in the College of Medicine. Dean Jyh-Cheng Chen of the College of Computer Science expressed gratitude to the College of Nursing for establishing the CCS Promotional Office for Cross-Campus Collaboration within the Nursing Building on the Yang Ming campus. The CCS Promotional Office has been in operation for nearly two years, and despite the challenges posed by the pandemic, exchange activities have gradually resumed. Moving forward, the office will continue to promote cross-campus collaboration. Finally, Dean Chen-Huan Chen of the College of Medicine, Dean Shou-Yen Kao of the College of Dentistry, and Dean Hsiu-ju Chang of the College of Nursing also presented the research and future development of their respective colleges during the meeting.

Upon concluding the exchange activity, faculty members from both campuses took a hike to Junjianyan. The Junjianyan, with an elevation of approximately 185.6 meters, is a scenic spot located in Yangmingshan National Park, Taipei, Taiwan. Starting from the trailhead at Yang Ming Campus, the faculty members hiked along the stone steps, enjoying the beautiful scenery along the way. Upon reaching the mountain top, they could overlook the Taipei Basin and the Datun Volcano Group. What makes Junjianyan unique is its geological landscape, composed of layers of Miocene formations, sandstone, and shale that were deposited over 20 million years ago. These formations have been sculpted by the persistent erosive forces of seawater over time, giving rise to a distinct white-gray sandstone terrain. With a guided tour led by Li-Fen Chen, Deputy Director of NYCU Information Technology Service Center, the faculty members gained a different understanding of Yangmingshan National Park. The exchange activity ended on a high note after they took a group photo to commemorate the event.

跨域實作 Open LABs

文稿整理／林珮雯

本校創創工坊於 112 年 1 月 9 日至 1 月 13 日辦理「Open LABs！續。旭。不休」跨域實作年度成果展，分為「科技智慧永續」、「文化文明永續」和「生命健康永續」3 大主題。本院一共有 7 堂實作課程參與並展出 17 件精采作品，透過豐沛的跨域成果讓每一個師生，不只是在課程中展現優秀作品，也希望打開教室的大門分享給全校師生，達到「全校共享共創」的目標。

當無人機遇見 AI －自動無人機飛航展示

課程名稱：無人機自動飛航與電腦視覺概論
師資：陳冠文

課程以實驗課實作的方式，由課程提供程式取像、操控的無人機 (DJI Tello EDU)，並教授所需之電腦視覺技術，學生於期末完成無人機自動飛航的目標，並透過此實作課程，加深對電腦視覺的學習動力。

貪食蛇

課程名稱：數位電路實驗
師資：范倫達
作者：朱亭霖、陳郁安、楊永琪

同學結合課程中的內容將貪食蛇透過 FPGA 及 VGA 實現出來，將 FGPA 開發板上的操控按鈕與開關跟遊戲中的蛇作連結，並設定不同的難度以及對場景的設計，把貪食蛇成功的實現在硬體上。

俄羅斯方塊

課程名稱：數位電路實驗
師資：范倫達
作者：侯博軒、賴御安、官霆軒、黃彥傑

我們透過結合 FPGA 以及 VGA 把 Tetris 的特色實現。從最基本的 Tetris 邏輯 (移動旋轉方塊、方塊堆疊以及消除) 到方塊的顯示、計時計分板，再到 T 轉等等進階的功能，先透過課程中學到的介面一一將這些功能做測試，再轉到 VGA 螢幕上實現出來。此外，過程裡的每個步驟都包含著時脈的處理、與 FPGA 功能的連接、邏輯的設計以及圖片的雕琢。經過這些步驟才能將最終的成品呈現在大家眼前。

皮卡丘打排球

課程名稱：數位電路實驗
師資：范倫達
作者：鄭鈞瀚、張博凱、羅民棋、黃柏竣

同學使用 FPGA 以及 VGA 把皮卡丘打排球復刻出來。透過對每個 pixel 進行更改，使這次的畫面更加精緻，並且在經過同學集思廣益之後，為遊戲添加了許多功能，例如增加障礙、增加風

阻或是讓對手狂暴化，讓遊戲可玩性增加了很多。

The Dying Walker

課程名稱：XR 跨域專題
師資：莊榮宏 謝啟民 張宏宇 王銓彰
作者：任軒、陳鈺祥、黃靖芳、楊舒云

《The Dying Walker》是一部 VR360 的沉浸式影片，講述了身在科技革新的時代，藉由主角無節制地追尋發財夢，而忘記關心眼前正在發生的事，點出世人在科技的輔助下會有一切唾手可得的幻覺，容易讓生活重心失衡，成為沒有靈魂的「Dying Walker」。

樂光 Music Across Time

課程名稱：XR 跨域專題
師資：莊榮宏 謝啟民 張宏宇 王銓彰
作者：巫廷翰、徐培欽、艾奎華、楊舒云

《樂光 Music Across Time》運用 VR 技術重新詮釋德布西《月光》，並追溯回當時德布西在創作此曲時的靈感詩集 Paul Verlaine, Fêtes galantes《Clair de Lune》，以此詩構築虛擬世界。

Mission: Vegetable

課程名稱：XR 跨域專題
師資：莊榮宏 謝啟民 張宏宇 王銓彰
作者：巫廷翰、徐培欽、艾奎華、楊舒云

2050 年，蔬菜有了自我意識。一顆即將被吃的蔬菜，發送訊號到蔬菜星，蔬菜星不僅發現同族遭受迫害，還得知地球的居住條件有利蔬菜星人發展，因此蔬菜星人便派出特務並給予改造地球上三大資源的指令為了移民做準備。

歡樂星情天 Happy Sunday

課程名稱：XR 跨域專題
師資：莊榮宏 謝啟民 張宏宇 王銓彰
作者：王語新、黃靖芳、洪煥璋、陳鈺祥

有一個很喜歡星空的台灣小男孩向父母表達了想看到星空的願望，父母說：「只要你認識了足夠多的星座，我們就去山上觀星吧！」。某天，小男孩的房間出現了一支望遠鏡，透過望遠鏡，小男孩認識了不同季節的星座，而他的父母也履行約定全家到山上觀星。

鯨魚之歌 Whale Requiem

課程名稱：XR 跨域專題
師資：莊榮宏 謝啟民 張宏宇 王銓彰
作者：任軒、洪煥璋、黃靖芳、王語新

『鯨魚之歌』為 VR 360 的互動詩作，基於白靈的『鯨魚之歌 - 記一九九八年十月 330 頭鯨魚在南半球沙灘擱淺一事』詩作來創作，重現詩所構成的富有想象的意境，並傳遞尊重自然、減少人為干預的環保意識。

畢業大作戰

Graduate Run
課程名稱：3D Game Programming
師資：黃世強
作者：柏叡、蘇柏凱、廖云翔

我們身為一名研究生，我們必須在被迫退學前，想辦法儘快完成學業、論文、口試、計畫、以及程式檢定，並且在這趟學習路程上，需要不斷充實自己。一旦兩年的時間一到，我們要面臨的是畢業前最後的考驗，將前面學習到的知識，轉換為攻擊，利用累積的實力，擊敗最後的大魔王，成功取得畢業證書。

逃離詛咒洞窟

Escape from the cursed cave
課程名稱：3D Game Programming
師資：黃世強
作者：陳姿羽、趙昱婷

主角來到傳說中洞窟探險，主角除了要探索未知的道路，還要躲避怪物的攻擊才能存活。玩家可以使用「WSAD」四個鍵進行前後左右的移動，並以「SHIFT」、「SPACE」鍵進行蹲下和跳躍。利用畫面中央的「十字架」形瞄準儀蒐集寶物。瞄準到怪物時可以使用「E」鍵進行射擊。當玩家蒐集完地圖中所有寶物後，抵達終點位置即可過關，血量歸零時遊戲結束。

尋覓之森

The wizard of Oz
課程名稱：3D Game Programming
師資：黃世強
作者：葉晨、成文瑄

『每個人都在這片森林中尋尋覓覓，尋找的是他們想要的，還是他們忘記的？』 傳說中，只要在這座森林裡找到三把鑰匙，就能夠見到傳說中的大魔法師，實現你所有的願望。

貢丸騎士

Meatball Rider
課程名稱：互動設計與虛擬實境
師資：詹力韋
作者：黃彥鈞，吳岱容，周君睿，朱家瑤

我們利用瑜珈球來模擬在 VR 中騎乘貢丸的感覺，以不同的彈跳力道與頭部的擺動，作為我們 locomotion 的移動方式，控制貢丸的前進、跳躍與轉換跑道。並加入震動來模擬貢丸跑到不同介面時之變化，以讓使用者能有更好的體驗。玩家需在時間內盡可能的搜集道具並閃避障礙物，達到終點以解鎖快樂結局。

阿拉丁

Aladdin
課程名稱：互動設計與虛擬實境
師資：詹力韋
作者：葉晨，蘇敬堯，黃得誠，巫廷翰

我們希望透過 VR 技術，在虛擬世界中解放因疫情無法獲得自由的靈魂。 故事靈感來自於知名童話故事《阿拉丁》，玩家將搭乘飛行魔毯，並跟著神燈精靈到處旅行。我們期望透過實際的物體去模擬在 VR 世界中的飛行體驗，並且透過外部的電器設備進行一個沉浸式的環境建置。

黑森林魔法音樂冒險

Music Birds
課程名稱：互動設計與虛擬實境
師資：詹力韋
作者：許銘耘，成文瑄，戴琬庭，張瑋

魔法黑森林中有一個討厭音樂的黑影，所以居民都會透過音樂趕走黑影。但是有天家中的鋼琴不見了，結果妹妹被黑影帶走，哥哥就踏上了拯救妹妹的旅程。過程需要透過彈琴與三色鳥 - 紅鳥、藍鳥、綠鳥合作打敗黑影。操作上的主要特色是透過操控 controller 彈奏鋼琴或使用 MIDI 電子琴實際彈奏，敘事中的動畫與音效也經過精細安排與設計讓整體互動感提升。

CoachBox：羽球擊球動作評測系統

CoachBox:Badminton hitting action analyzation syst
課程名稱：CoachBox：羽球擊球動作評測系統
師資：易志偉
作者：蕭少柏、劉柏宇、邱輝傑

CoachBox 是一個隨身攜帶電腦視覺方案，且無需穿戴式設備更不需要透過雲服務。其核心技術為透過羽球對戰事件偵測，找出擊球瞬間及擊球前後的關鍵動作進行分析及檢測，其中使用羽球定位、追蹤模型 (TrackNetV2) 及人體姿態模型，透過影像動作回放與影片註解，使教練和學員能輕易了解其訓練重點及控球能力，作為有效溝通的介面。

魔鏡瑜珈

課程名稱：嵌入式系統設計概論與實作
師資：曾煜棋 吳昆儒
作者：張機智、謝承恩、許承壹

電腦視覺有各式各樣的應用，如要與運動健身做結合，可使用姿態識別的技術來分析動作。此作品利用攝影機觀察人體的姿態活動，並自動判斷所做的運動項目為何。在後防疫時期裡，當使用者於室內環境進行運動時，可利用此系統觀看肢體的活動角度。

更多介紹 https://ict-openlabs-2023.act.nycu.edu.tw/

Interdisciplinary Exhibition Open LABs

On January 9th to 13th in 2023, the Innovative Creative Technology (ICT) Center of NYCU held Open Labs Annual Exhibition. This interdisciplinary practical exhibition was categorized into three themes: "Technology and Intelligence for Sustainability", "Culture and Civilization for Sustainability", and "Life and Health for Sustainability". A total of seven practical courses from our institute participated and exhibited 17 excellent projects. Through this exhibition, we aimed to showcase outstanding works in class to all professors and students in the school through sharing this creation and accomplishment.

Project: AI & Drone Collaboration
Course Title: Introduction to Drone and Computer Vision
Advisor: Dr. Kuan-Wen Chen

This is a laboratory course. Students will learn about the necessary computer vision techniques through practical experiments. The course provides programmable and controllable DJI Tello EDU drones, and through hands-on instruction, students will be able to achieve the goal of autonomous UAV flight by the end of the semester. This practical course aims to deepen students' motivation to learn computer vision.

Project: Snake
Course Title: Digital Circuit Laboratory
Advisor: Dr. Lan-Da Van
Students: Ting-Lin Chu, Yu-An Chen, Yong-Chi Yang

In this project, students apply the knowledge acquired in class implement the classic game "Snake" through FPGA and VGA technology. By connecting the control buttons and switches on the FPGA development board with the snake in the game, students design various difficulty levels and game scenes to successfully implement "Snake" in hardware. The authors of this project are Ting-Lin Chu, , Yu-An Chen, and Yong-Chi Yang

Project: Tetris
Course Title: Digital Circuit Laboratory
Advisor: Dr. Lan-Da Van
Students: Bo-Syuan Hou, Lai Yu-An, Guan, Ting-Shiuan, Yen-Chieh Huang,

In this project, we combined FPGA and VGA technology to implement the classic game 'Tetris.' We started by incorporating the fundamental logic of Tetris, including block movement, rotation, block stacking, elimination, as well as displaying blocks, timing, and scorekeeping. Additionally, we incorporated more advanced features such as the T-spin. Also, we systematically tested each of these features individually using the interface learned in class before implementing them on the VGA screen. This project involved processing clock rates, connecting with FPGA functionality, logic design, and image refinement. Throughout this process, we took careful steps to ensure the presentation of the final project to everyone.

Project: Pikachu Playing Volleyball
Course Title: Digital Circuit Laboratory
Student: Chun-Han Cheng, Po-Kai Chang, Ming-Chi Ro, Bo-Jun Huang

In this project, students utilized FPGA and VGA technology to recreate the game 'Pikachu Volleyball.' They achieved improved visual quality by meticulously modifying each pixel. Through collaborative brainstorming sessions, they incorporated numerous features into the

game, including obstacles, wind resistance, and the ability to make opponents go berserk. These additions significantly enhanced the overall playability of the game."

Course: XR Cross-domain Project
Project: The Dying Walker
Advisors: Dr. Jung-Hong Chuang, Dr. Chi-Min Hsieh, Dr. Hong Yu Chang, Dr. Chuan-Chang Wang
Student: Hsuan Jen, Yu Hsiang Chen, Ching-Fang Huang, Shu-Yun Yang

The Dying Walker" is an immersive VR360 film that explores the consequences of living in an era of technological revolution. The protagonist's relentless pursuit of wealth leads to negative consequences due to neglecting his present life. The film highlights how technology can create illusions of everything, potentially causing an unbalanced life. It suggests that individuals with technology addiction may become soulless "Dying Walkers.

Course: XR Cross-domain Project
Project: Music Across Time
Advisors: Dr. Jung-Hong Chuang, Dr. Chi-Min Hsieh, Dr. Hong Yu Chang, Dr. Chuan-Chang Wang
Student:, Ting-Han Wu, Pei-Chin, Hsu, Kuei-Hua Ai, Shu-Yun Yang

Music Across Time" utilizes VR technology to reinterpret Claude Debussy's "Clair de Lune" and traces back to the inspiration found in the poem collection "Paul Verlaine, Fêtes galantes," from which Debussy drew when composing the piece. The virtual world is constructed based on the poem.

Course: XR Cross-domain Project
Project: Vegetable
Advisors: Jung-Hong Chuang, Chi-Min Hsieh, Hong Yu Chang, Chuan-Chang Wang
Student: Ting-Han Wu, Pei-Chin, Hsu, Kuei-Hua Ai, Shu-Yun Yang

In the year 2050, vegetables suddenly gained consciousness. A vegetable, about to be eaten, sends a signal to Veggie Planet, where they not only discover their fellow vegetables being persecuted but also learn about the favorable living conditions for Veggie Planet inhabitants on Earth. Consequently, Veggie Planet dispatches a special agent and provides instructions to modify Earth's three major resources in preparation for migration."

Course: XR Cross-domain Project
Project: Happy Sunday
Advisors: Jung-Hong Chuang, Chi-Min Hsieh, Huang-Chang Hung, Chuan-Chang Wang
Student: Yu-Hsin Wang, Ching-Fang Huang, HUNG, HUAN-CHANG, Yu-Hsiang Chen

In this project, a Taiwanese boy who loves the stars expresses his wish to see them to his parents. His parents responded and said, "we will go stargazing on the mountain as long as you have enough knowledge about constellations." One day, a telescope appears in the boy's room. Through the telescope, the boy learns about constellations in different seasons, and his parents fulfill their promise by taking the whole family to go stargazing on the mountain

Course: XR Cross-domain Project
Project: Whale Requiem
Advisors: Dr. Jung-Hong Chuang, Dr. Chi-Min Hsieh, Dr. Hong Yu Chang, Dr. Chuan-Chang Wang
Student: Hsuan Jen, Huang-Chang Hung, Ching-Fang Huang, Yu-Hsin Wang

The Song of Whales" is an interactive poem in VR 360, based on Bai Ling's poem "The Song of Whales - Remembering the Stranding of 330 Whales on a Southern Hemisphere Beach in October 1998." The piece faithfully captures the rich imaginative atmosphere of the poem and conveys an awareness of environmental protection that respects nature by minimizing human activities

Course: 3D Game Programming
Project: Graduate Run
Advisors: Dr. Sai-Keung Wong
Student: Jui Po, Po-Kai Su, Yun-Ling Liao

As graduate students, we must find ways to efficiently complete our studies, which include finishing the thesis process, oral defense, projects, and programming tests before the risk of expulsion arises. Throughout this journey, we need to continually enhance our abilities. Once the two-year period is over, we will confront the final test, leading to graduation. We will utilize the knowledge we have acquired to confront and overcome the final boss-graduation certificate. "Graduate Run" is a game that symbolizes this journey.

Course: 3D Game Programming
Project: Escape from the cursed cave
Advisor: Dr. Sai-Keung Wong
Student: Tzu-Yu Chen, Chao Yu-Ting

The protagonist embarks on a legendary cave exploration, not only to discover unknown paths but also to evade monster attacks in order to survive. Players can use the "WASD" keys to move forward, backward, left, and right, while the "SHIFT" and "SPACE" keys allow them to crouch and jump respectively. By utilizing the crosshair at the center of the screen, players can collect treasures. To combat monsters, players can aim at them and use the "E" key to shoot. The game is completed when the player collects all the treasures on the map. The game ends when the player's health reaches zero.

Course: 3D Game Programming
Project: The Wizard of Oz
Advisor: Dr.Sai-Keung Wong
Student: Chen Yeh, Wen-Hsuan Cheng

"Everyone is searching in this forest. Are they searching for what they want or what they have forgotten?" According to legend, if one can find three keys in this forest, they will be able to meet the legendary mage and have all their wishes come true.

Course: Interaction design and virtual reality
Project: Meatball Rider
Advisor: Dr. Li-Wei Chan
Students: Yan-Jun Huang, Dai-Rong Wu, Jun-Rui Zhou, Zhu Jia-Yao

We used yoga balls to simulate the sensation of riding on Gong-Wan (meatball) in VR. The varying bouncing forces and head movements serve as our locomotion method to control the meatball's movement, including jumping and lane switching. Additionally, we incorporated vibrations to simulate interface changes when the meatball encounters different obstacles, aiming to provide an enhanced user experience. Players must collect items and navigate around obstacles within a time limit to reach the end and

unlock a joyful game ending."

Course: Interaction design and virtual reality
Project: Aladdin
Advisor: Dr. Li-Wei Chan
Students:, Chen Yeh, Su Jing-Yao , De-Cheng Huang, Ting-Han Wu

Through VR technology, our goal is to provide an escape for individuals whose freedom has been restricted by the pandemic, allowing them to experience liberation in the virtual world. The story draws inspiration from the renowned fairy tale "Aladdin." Players will embark on a journey riding a flying magic carpet alongside Genie. Our objective is to replicate the sensation of flying in VR by incorporating physical objects and create an immersive environment through the use of external electronic devices.

Course: Interaction design and virtual reality
Project: Aladdin
Advisor: Dr. Li-Wei Chan
Students: Ming Yun Hsu, Wen-Hsuan Cheng, Wan-Ting Dai, Wei Chang

In the magic forest, there is a malevolent black shadow that despises music, and the forest residents employ music to ward it off. However, one fateful day, the piano in the protagonist's house vanishes. As a result, his sister being abducted by the black shadow. Determined to rescue his sister, the protagonist embarks on a journey wherein he must play the piano and collaborate with three colored birds - red, blue, and green - to conquer the black shadow. The primary gameplay mechanic involves playing the piano using either a controller or a MIDI electronic piano. Careful attention has been given to the animation and sound effects in the narrative, aiming to enhance the overall sense of interactivity.

Course: CoachBox: Badminton hitting action analyzation system
Advisor: Dr. Chih-Wei Yi
Students: Hsiao-Shao Po, Po-Yu Liu, Hui-Chieh Chiu

CoachBox is a portable computer vision solution that eliminates the need for wearable devices or cloud services. Its core technology revolves around detecting events in badminton matches, enabling the identification of key movements during strokes, as well as before and after them. This is achieved through badminton localization, a tracking model (TrackNetV2), and a human pose model. By utilizing video playback and annotation as an effective communication interface, coaches and students can readily comprehend the training focus and improve their ball control ability.

Course: Introduction to Embedded Systems Design and Implementation
Project: Mirror Yoga
Advisors: Dr. Yu-Chee Tseng, Dr. Kun-Ru Wu
Students: Chi-Chih Chang, Cheng-En Hsieh, Cheng-Yi Xu

Computer vision finds numerous applications, and when combined with sports and fitness, it can facilitate posture recognition and movement analysis. This project employs a camera to observe the user's posture, automatically identifying the type of exercise being performed. Particularly during the pandemic, when users engage in indoor exercises, this system serves as a valuable tool for monitoring their body movements

Please find out more: https://ict-openlabs-2023.act.nycu.edu.tw/

資訊學院碩、博士生
積極參與課外英文學習

文稿整理／劉美君

本學院在 110 學年度起獲選為教育部雙語計畫重點培育學院。為提升本院學生的英語能力，晉升為國際人才，因此開設專屬於資訊學院的小班制客製化六週的免費英語課程，旨在協助本院碩、博班生增進一般英語與學術英語的聽說讀寫能力，學生可依據學習需求彈性選擇課程，以下為 111 學年上學期學生參與課程的心得。

英文學術能力寫作課程

胡雨芳（吳凱強教授實驗室）

參與課程：資工領域學術文獻閱讀與學術寫作前導課程（閱讀 level 1）

閱讀資訊密度極高的論文時如果用之前過去閱讀一般英文文章的習慣來讀，可能閱讀時候會因為眾多不懂的專有名詞迷失文章內，看完除了頭昏腦脹外還發現自己似乎沒抓到重點。在學術文獻閱讀技巧這堂課中，Willy 老師詳細的解構學術論文常使用的句形，教導如何抓住句子的重點，以及分析論文主要會有哪些章節等等。Willy 老師在分析句子的文法這部份講的很仔細，這些分析的技巧在過去上過的英文課都沒有學過，這對於學術文章甚至撰寫論文都很重要。學會這些技巧後可以更快的抓到段落的重點，找到自己想要從論文中得知的資訊，很推薦給閱讀論文有困難的同學們！

陳芷羚（吳凱強教授實驗室）

參與課程：資工領域學術文獻閱讀與學術寫作前導課程（閱讀 level 1）

Willy 老師的閱讀課讓我們學習如何有條理的閱讀學術文章，句型架構的說明也讓我們更容易的理解句子，每一堂課的內容都很豐富充實。老師很用心，會貼近我們的需要去規劃並調整課程，像是會把我們報告中不完整的部分記下來在下次上課時特別拉出來講解。整個上課體驗都很輕鬆活潑，又學得到很多東西，非常推薦大家來上課！

蕭宇辰（吳凱強教授實驗室）

參與課程：資工領域學術文獻閱讀與學術寫作前導課程（閱讀 level 1）

我從 Willy 老師的閱讀課中學習到了許多關於學術論文的閱讀技巧和策略。在這門課中，老師教導我們如何辨識論文的主題、架構、以及作者的論點，也提供了許多學術英文詞彙的應用方法。透過不斷閱讀論文並學習老師所教授的方法，我的閱讀速度和理解能力都得到了提升。我學會了如何更有效率地搜尋需要的信息，也更容易地理解文章的主旨和論點。

張雅筑（吳凱強教授實驗室）

參與課程：資工領域學術文獻閱讀與學術寫作前導課程（閱讀 level 1）

在過往學習英文的過程中比較少有針對學術英文的聽說讀寫課程，但這些能力對碩士生來說是非常重要的，碩一要看相當多的論文，但當時很常會有無法正確理解語意或是閱讀速度太慢的問題，在上完 Willy 老師的課程後，現在閱讀較

長的句子時，只要將句子拆開看，找出主詞、動詞，即可跳脫文法、生字、贅字的干擾，從關鍵字讀出文章重點，除此之外，也能搭配上下文，正確理解單字在句子中的意思。老師上課的方式也很輕鬆愉快，中間會穿插有趣互動，讓上課不會那麼枯燥乏味，推薦大家可以根據自己的需求去參加課程，一定會獲益良多的。

顏珩（吳凱強教授實驗室）

參與課程：資工領域學術文獻閱讀與學術寫作前導課程（閱讀 level 1）

這學期上的是學術文獻的閱讀課程，這已經是我上的第二堂 Willy 老師的課了。經過了濃縮課程的有效學習，讓我能更快的抓出文章的重點，並提高了學術文獻的閱讀速度。這些訓練對於學術寫作都是有幫助的，更加加深了文章架構與學術寫作該具備的觀念。十分感謝 Willy 老師與 Selina 老師的用心，課程的內容依然非常的充實，若有機會非常推薦其他同學參與這樣的課程。

英文口說能力表達課程

周漢璋（曹孝櫟教授實驗室）

參與課程：英語口說課 level 1：溝通與表達課程

當我們在學習英文口說表達時，最重要的就是要有信心和勇氣。有時候在開始說英文之前，我們可能會感到很害怕，也很緊張，但是只要你有勇氣嘗試，就能夠漸漸增加自信心。學習英文口說表達是一個不斷學習和進步的過程，只要多練習，多實踐，你就能夠掌握這個技能，並在日常生活和工作中更加流暢地使用英文。剛好有此次機會，能夠參與英文口說 level1，老師以我們自選英文影片的方式教學，因為是自選的影片，所以更加地有興趣並才能夠輕鬆並有動力的去自主學習本來覺得可怕的英文，並且提出些開放式問題，引導我們與其他同學進行英文溝通表達內心的想法，既能夠跟主題有關聯，又能夠鍛鍊英文的反射思考能力，不會成為只會回答問題的考試機器，非常感謝老師的教學，若來上這堂課絕對能夠精進許多。

張源崒（曹孝櫟教授實驗室）

參與課程：英語口說課 level 1：溝通與表達課程

以前在講英文時總是感到有壓力，加上詞彙量不是很夠，所以常常會描述不出自己想說的話，在課堂中，除了學習新單字外，也從許多不同的素材中學到世界上不同地方的口音、文化、

時事、知識等等。跟同學討論時也在不知不覺中漸漸能流暢問答課堂結束後，我不僅如願讓英文口語更加順暢，還帶走不少額外收穫。真的很感謝 Selina 老師開了這堂課。

黃彥慈（曹孝櫟教授實驗室）

參與課程：英語口說課 level 1：溝通與表達課程

無論是在高中或是大學時期，能夠開口說英文的機會非常稀少，更不用說有一個可以與別人進行完整對話的機會，也因此英文這門科目對我來說一直停留在紙上談兵，一直都是一門了解理論但實際不一定能夠使用出來的課目。而這門課透過了自主學習的方式，在自己有興趣的領域或是題目進行更多了解，一方面讓其他人更加理解這方面的知識的同時，也使得報告者可以有這個機會用整理過、思考過的方式，用英文敘述出所想要表達的訊息。而在報告完後也讓其他人對於剛剛報告的內容進行詢問，便可以使報告者在了解問題的情況下，試著去臨場應變，表達出自己想要回應的回覆。課堂結束後，除了對於英文口說變得更加熟悉、更有勇氣用英文表達自己的想法外，也對於文法以及單字有了更多的認知，讓我獲益良多。

謝秉寰（曹孝櫟教授實驗室）

參與課程：英語口說課 level 1：溝通與表達課程

在中文生活環境下很少有機會碰到需要面對英文口語表達，所以口語表達的能力就慢慢隨著時間而消退，但很慶幸實驗室有機會可以這樣練習英文口說的能力。課堂中幾乎都是以全英文的形式，需要使用全新思考模式，而不是先想到中文再翻譯中文，如此反應時間才會夠快。一方面重新練習口說準確度，也可以培養英文的思維，感謝 Selina 老師 與這堂課程，讓我獲益良多。

林大洋（曹孝櫟教授實驗室）

參與課程：英語口說課 level 1：溝通與表達課程

今年是第二年上英文口說課程，日常生活中雖然很常看英文相關的文件或是教

學，但口說的機會卻很少，也漸漸缺乏自信去跟他人互動，在課程中有很多可以跟同學互動的機會，從討論特定主題到報告中的問答以及日常的聊天，我覺得 英語增能課程的口說課營造了一個很棒的英語環境，也謝謝系上提供學習的資源，以及老師設計的課程，讓我學會如何從有興趣的主題中學習，慢慢建立起流暢的口說架構。
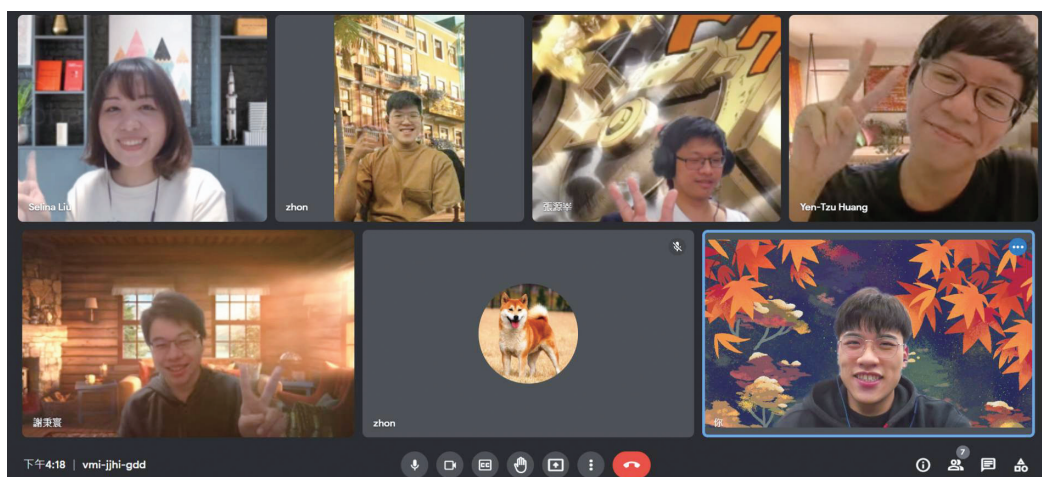
Computer Science students Actively Participated in Extracurricular English Learning

Starting in the 110th academic year, our college was selected as a key bilingual college by the Ministry of Education's bilingual plan. To enhance the English proficiency of our students and promote them as international talents, the English Enhancement Course Program with small-group and customized courses was provided exclusively for graduate and doctoral students in the College. These courses aim to assist students in improving their general and academic English skills. Students can choose courses according to their learning needs. The following are some reflections from students who participated in the courses during the first semester of the 111th academic year.

Academic Reading and Writing Courses:

Yu-Fang Hu (Dr. Kai-Chiang Wu's lab)

Course: The Pre-course of Academic Writing: The Introduction and Application of Academic Reading

When reading an academic paper with extremely high information density, if we only apply the reading strategy as reading for general English articles which we have been using from the past, it is likely that we may get lost in the numerous unfamiliar terms without getting the main points even after finishing reading the entire pages. Our instructor of this course introduced sentence patterns commonly used in academic papers, taught the skills of grasping the key points of sentences, and analyzed the main sections of the paper during this course. In addition, he also explained the grammar of the sentences in detail. These are very important concepts for academic reading and writing an academic thesis which I did not learn from any of the English courses I attended before. After attending this course to learn these skills, I can quickly grasp the key points of the paragraphs and find the information that I want to know from the paper. Highly recommended for students who have difficulty reading academic papers!

Student: Zhi-Ling Chen (Dr. Kai-Chiang Wu's lab)

Course: The Pre-course of Academic Writing: The Introduction and Application of Academic Reading

The academic reading course was very informative. The instructor taught us how to read academic articles systematically, and he made it easier for us to understand the content of academic papers by explaining sentence structures. He also adjusts the course according to our needs. During the class, he took note of incomplete parts in our presentations and explained them in detail in the next session. The class was relaxed and lively, and we learned a lot. I highly recommend everyone to take this course!

Student: Yu-Chen Xiao (Dr. Kai-Chiang Wu's lab)

Course: The Pre-course of Academic Writing: The Introduction and Application of Academic Reading

I learned many reading strategies for academic papers from the course. During the course, the instructor taught us how to identify the topic, structure, and author's argument of an academic paper, and provided many methods for using new academic English vocabulary. Through reading many papers using the methods taught by the instructor, my reading speed and comprehension ability have been improved. I also learned how to search for information more efficiently and understand the main idea and argument of an academic paper more easily.

Student: Ya-Zhu Chang (Dr. Kai-Chiang Wu's lab)

Course: The Pre-course of Academic Writing: The Introduction and Application of Academic Reading

In the past, there were few courses specifically aimed at improving academic English listening, speaking, reading, and writing skills, despite the fact that these abilities are essential for Master's students. As a first-year Master's student, I had to

read a considerable number of papers, but I often had trouble understanding the meaning of the text precisely and reading them too slowly. However, after taking Instructor Willy's course, I learned how to break down longer sentences into sections such as the subject and verb to skip grammar, unfamiliar words, and redundant words to identify the main points in the paper. The instructor's teaching style was lively and engaging, with interesting interactive activities interspersed throughout the class. I highly recommend that everyone attend the course according to their needs. The instructor's teaching style was very relaxing and the class atmosphere was very delightful to attend. There were a lot of interesting interactive activities during class. I learned a lot and I guarantee you will learn a lot, too. It is highly recommended for anyone who wants to improve their English abilities.

Student: Yan Jia-Heng (Dr. Kai-Chiang Wu's lab)

Course: The Pre-course of Academic Writing: The Introduction and Application of Academic Reading

Course: Academic Reading and Writing Integrated Course

This semester, I took The Introduction and Application of Academic Reading course, which was my second course with the course instructor, Willy. Through the intensive training throughout these weeks, I am now able to quickly identify the main points of an academic paper with faster reading speed. In addition, these skills are helpful for academic writing and have enhanced my understanding for academic writing. I am very grateful for instructor Willy's informative courses. I'd also like to thank Selina for helping us to arrange these courses. I highly recommend other students to participate in these courses if they have the opportunity.

English Speaking Courses:

Name: Han-Chang Chou (Dr. Shiao-Li Tsao's lab)

Course: English for communication and delivery

It is important to have confidence and courage when learning to speak and express oneself in English. Sometimes, before starting to speak English, we may feel scared and nervous, but if we have the courage to try, we can increase our confidence over time. Learning to speak and express oneself in English is a continuous process. With more practice, one can master this skill and use English more fluently in daily life and work. This semester, I had the opportunity to participate in the Speaking Level 1 course. During the course, the teacher asked us to select an English video that interested us as learning material. Being able to choose our own videos made learning English more interesting and motivating. In class, the teacher also asked open-ended questions to engage and guide us to express our thoughts in English. This approach allowed us to practice our English communication with immediate responses, making us more reflective instead of just being test-taking machines that can only answer robotic questions. I am very grateful to the teacher for this course, and I highly recommend it to anyone looking to improve their English speaking skills.

Name: Yuan-Shen Chang (Dr. Shiao-Li Tsao's lab)

Course: English for communication and delivery

I used to feel a lot of pressure when speaking in

English, and I often struggled to find the right words to express myself due to my limited vocabulary. However, in this course, I not only learned new words, but also gained knowledge about different accents, cultures, current events, and a variety of topics from various materials. Through engaging in discussions with my classmates, I gradually became more fluent in my speaking. After completing the course, not only did I achieve my goal of improving my English speaking skills, but I also gained a deeper understanding of language. I am truly grateful for Selina's teaching in this course.

Name: Yen-Tzu Huang (Dr. Shiao-Li Tsao's lab)

Course: English for communication and delivery

During our time in high school or university, we did not have a lot of opportunities to speak or have conversations in English. Therefore, for me, English has always been a subject that exists only on exam papers in which I understand the theory but may not necessarily be able to use it practically. However, this course allowed me to learn independently and gain more knowledge in my areas of interest or topics in English. During the course, we learned to express our thoughts in English in a more structured way. We also practiced presentations in class. After each class presentation, everyone can ask questions about the content, which allows me to learn how to respond to questions during this situation. Overall, I have become more familiar and confident in speaking English, and have gained much knowledge about grammar and vocabulary.

Name: Michael Hsieh (Dr. Shiao-Li Tsao's lab)

Course: English for communication and delivery

In a Chinese-speaking environment, there are few opportunities to face English-speaking situations, and therefore, we gradually forget about our ability to speak English. However, I was fortunate that our laboratory was able to join the course and practice English speaking skills. In class, we almost only communicated in English, which required a new way of thinking and we had to get used to it. In a real conversation, it takes too much time to translate Chinese into English. In this way, this helped improve response time and accuracy in actual speaking. On the one hand, it also improved my speaking accuracy, and on the other hand, it helped me develop English logical thinking. Thanks to instructor Selina and this course, I surely learned a lot.

Name: Kent Lin (Dr. Shiao-Li Tsao's lab)

Course: English for communication and delivery

This is my second time taking the English speaking course. Although I often encounter English-related documents or teaching materials in my daily life, I have few opportunities to speak English and gradually lack confidence in interacting with others. In this course, there were many opportunities for interaction with classmates, from discussing specific topics to Q&A in presentations and daily conversations. I think the speaking course provided by the English Enhancement Program at our department course has created a great English-speaking environment. I am grateful to our department for providing great English learning resources. Also, thanks to our instructor who designthis this course for teaching us how to learn from interesting topics in English to build a fluent speaking content and structure.

參與國際會議　開拓國際視野

文稿整理／林珮雯

為強化本院師生國際競爭力，本院鼓勵研究生積極出席國際會議，以增進學生國際視野與跨文化溝通能力，亦可增加本校未來國際合作的機會，提升台灣於國際上的能見度。以下邀請幾位參與國際頂尖會議的同學分享心得：

發表論文：Towards Understanding Cross Resolution Feature Matching for Surveillance Face Recognition

作者： Chiawei Kuo, Yi-Ting Tsai, Hong-Han Shuai, Yi-ren Ye, Ching-Chun Huang

指導教授： 黃敬群老師 帥宏翰老師

國際會議名稱： 30th ACM International Conference on Multimedia (ACM MM 2022)

該會議重要性： ACM MM 於 1993 年創辦至今，為多媒體領域中頂尖的國際會議之一，本年度共有 2473 篇論文提交，其中有 690 篇被接受，接受率為 27.9%。

蔡宜庭同學心得分享： 此論文為團隊共同努力的成果，很感謝黃老師與帥老師的指導，以及玉山銀行的夥伴在討論過程中給予我們很多想法及建議。此論文探討用於監控場景人臉識別的跨解析度特徵匹配，在多個人臉資料庫上都得到非常好的效果。因為疫情的關係，雖然我們只能以線上方式參加 ACM MM 2022，但仍然透過其他學者的交流中，得到許多經驗分享及收穫。

發表論文：MAtt: A Manifold Attention Network for EEG Decoding

作者： Yue-Ting Pan, Jing-Lun Chou, Chun-Shu Wei

指導教授： 魏群樹老師

國際會議名稱： Thirty-sixth Conference on Neural Information Processing Systems, (NeurIPS 2022)

該會議重要性： NeurIPS 與 ICML 以及 ICLR 並稱人工智慧三大頂尖會議之一，目前在 google scholar 的人工智慧領域的國際會議排名第二，僅次於 ICLR。NeurIPS 是近代機器學習及計算神經科學等領域中指標性的會議。NeurIPS 2022 共有 10411 篇論文投稿，2672 篇論文被接受，接受率約為 25.6%。

潘岳廷同學心得分享： 萬分感謝老師在研究方面的指導還有建議，這是我第一篇的論文，也是我的碩論，我學到了好多有關論文撰寫以及做研究該要注意的事情，讓我可以做出更加完善的研究。此次飛往紐奧良參與國際盛會，讓我見識到了好多來自世界各地知名的研究者，可以跟他們共同討論研究相關的主題，互相腦力激盪激發出新的想法以及創意是我最大的收穫。能夠與這麼多厲害的學者分享自己的研究著實是一件令人振奮的事情。希望未來有機會可以繼續參與國際學術會議，增進自己的眼界。

發表論文：Make an Omelette with Breaking Eggs: Zero-Shot Learning for Novel Attribute Synthesis

作者： 李育瑄、趙梓吟、黃敬群、陳品諭、Yu-Hsuan Li, Tzu-Yin Chao, Ching-Chun Huang, Pin-Yu Chen, Wei-Chen Chiu

指導教授： 黃敬群老師、邱維辰老師

國際會議名稱： Thirty-sixth Conference on Neural Information Processing Systems, (NeurIPS 2022)

該會議重要性： NeruIPS 為國際頂級計算神經科學會議，在機器學習領域內極具影響力，每年吸引來自各國的企業大廠以及學術單位參加。2022 年 NeurIPS 有 10,411 篇投稿，最後收錄其中 25.6% 的論文。

李育瑄同學心得分享： 很榮幸也很開心有機會把研究成果展現到大家的視野中。雖然在研究過程中常遭遇挫折與迷茫，但從題目發想到最後參加大會展現，這中間的每一個過程環節都是獨特且令人印象深刻的經驗，極其幸運在人生中可以擁有這樣的回憶，也非常感謝指導老師們的教導指引以及研究夥伴的討論支持！

發表論文：Reward-Biased Maximum Likelihood Estimation for Neural Contextual Bandits: A Distributional Learning Perspective

作者： Yu-Heng Hung, Ping-Chun Hsieh

指導教授： 謝秉均老師

國際會議： AAAI Conference on Artificial Intelligence (AAAI), 2023

該會議重要性： AAAI 是人工智慧中頂尖的會議之一，今年共有 8777 篇論文投稿，1,721 篇論文被接受 (接受率為 19.6%)，會議涵蓋的範圍極廣，包含機器學習，強化學習，自然語言處理以及電腦視覺等熱門的領域。

洪鈺恆同學心得： 這次是我第一次參加實體會議，和線上會議不同的體驗是跟世界各地的研究人員的接觸變多了，也遇到了很多跟自己做類似研究的人，交流的過程不僅收穫良多而且有種自己並不是孤單的感覺。除此之外也很開心能在演講和海報展覽的時間分享自己在做的研究，感謝指導教授這次的幫忙以及提供我出國開會的經費，長達約一年半的研究終於在這次的 AAAI 會議被認可真的蠻感動的，中間多次和教授熬夜討論和改論文都是令我印象深刻的過程。

發表論文：於棋盤類遊戲中目標達成問題之新方法

A Novel Approach to Solving Goal-Achieving Problems for Board Games

作者： Chung-Chin Shih, Ti-Rong Wu, Ting Han Wei, and I-Chen Wu

指導教授： 吳毅成教授 I-Chen Wu

國際會議名稱： The 36th AAAI Conference on Artificial Intelligence

該會議重要性： AAAI Conference on Artificial Intelligence 是人工智慧領域公認的國際權威性頂級會議，旨在促進人工智慧 (AI) 研究人員、從業者、科學家和工程師之間的科學交流。本年度 (AAAI-22) 共有 9020 篇論文被審閱，其中共有 1349 篇被接受，接受率為 15%。

施仲晉同學心得分享： 本論文探討棋盤遊戲中的目標達成問題，並以 Hex 和圍棋為例。此論文曾被拒絕兩次，經不斷改進內容後，終於在 AAAI-22 會議中被接受，也是我第一篇被接受的國際頂尖會議論文。感謝老師與其他作者夥伴的共同努力。很可惜的是因疫情該會議轉為線上會議，無法與各國與會人士面對面交流，但也發現到線上會議的有趣之處，每位參與者可以用虛擬形象 (avatar) 互相交流。我也在線上海報展中與幾位觀眾互動，雖不是實體會議，但仍獲得不少收穫，非常珍惜這次難忘的經驗。

Participating in International Conferences would Broaden a Global Vision

The College of Computer Science, NYCU, motivates graduate students to actively participate in international conferences to improve the global competence of its faculty and students. This not only enhances students' cross-cultural communication skills and international perspectives, but also leads to more prospects for future international collaborations and increases Taiwan's visibility on the global stage.

Here are some insights shared by fellow students who participated in top international conferences.

Title: Towards Understanding Cross Resolution Feature Matching for Surveillance Face Recognition

Author: Chiawei Kuo, Yi-Ting Tsai, Hong-Han Shuai, Yi-ren Ye, Ching-Chun Huang

Advisor: Dr. Ching-Chun Huang, Dr. Hong-Han Shuai

International Conference: 30th ACM International Conference on Multimedia (ACM MM 2022)

The Significance of the conference: ACM MM, established in 1993, stands as a leading international conference in the multimedia field. Out of the 2473 papers submitted this year, a mere 690 were accepted, yielding an acceptance rate of 27.9%.

The experience of Yi-Ting Tsai: This paper was produced as a result of the team's collaborative efforts. We are very grateful for the guidance of Professor Huang and Professor Shuai, as well as the numerous ideas and suggestions provided by our partners at E.SUN Bank during the discussion. The core concept of this paper is to use the cross-resolution feature matching to enhance surveillance face recognition, which has demonstrated impressive outcomes across various face databases. Although our participation in ACM MM 2022 was limited to the online format due to the pandemic, we nevertheless had the opportunity to interact with other scholars and gain valuable insights and knowledge through our exchanges.

Title: MAtt: A Manifold Attention Network for EEG Decoding

Author: Yue-Ting Pan, Jing-Lun Chou, Chun-Shu Wei

Advisor: Dr. Chun-Shu Wei

International Conference: Thirty-sixth Conference on Neural Information Processing Systems, (NeurIPS 2022)

The Significance of the conference: NeurIPS, ICML, and ICLR are the top three conferences in the field of artificial intelligence. NeurIPS is currently ranked second among international AI conferences on Google Scholar, with only ICLR ahead of it. NeurIPS is a leading machine learning and computational neuroscience conference. In 2022, a total of 10,411 papers were submitted to NeurIPS, and 2,672 were accepted, resulting in an acceptance rate of approximately 25.6%.

The experience of Yue-Ting Pan: I am very grateful for Professor Wei's guidance and advice. This is my first paper and also my master's thesis. I have learned a lot about writing papers and paying attention to details when doing research, which helps me to conduct more comprehensive research. Attending the international conference in New Orleans gave me the chance to connect with numerous eminent researchers worldwide. My biggest achievement was to discuss research-related topics with them, which allowed me to generate novel insights and spark creativity. I was thrilled to have the opportunity to share my research with such distinguished scholars. I look forward to participating in more international academic conferences in the future to broaden my horizons.

Title: Make an Omelette with Breaking Eggs: Zero-Shot Learning for Novel Attribute Synthesis

Author: Yu-Hsuan Li, Tzu-Yin Chao, Ching-Chun Huang, Pin-Yu Chen, Wei-Chen Chiu

Advisor: Dr. Ching-Chun Huang, Dr. Wei-Chen Chiu

International Conference: Thirty-sixth Conference on Neural Information Processing Systems, (NeurIPS 2022)

The Significance of the conference: NeurIPS is a top international conference on computational neuroscience and has a significant influence in the field of machine learning. It attracts companies and academic institutions from various countries every year. In 2022, there were a total of 10,411 full paper submissions to NeurIPS, of which the program committee accepted 25.6% for presentation at the conference.

The experience of Yu-Hsuan Li: I am honored and happy to have the opportunity to present my research results to everyone. Despite facing setbacks and confusion during the research process, each stage from identifying the topic to attending the conference was a distinctive and unforgettable experience. I consider myself extremely lucky to have such experiences in my life, and I deeply appreciate the assistance and encouragement provided by my advisors and research fellows.

Title: Reward-Biased Maximum Likelihood Estimation for Neural Contextual Bandits: A Distributional Learning Perspective

Author: Yu-Heng Hung, Ping-Chun Hsieh

Advisor: Dr. Ping-Chun Hsieh

International Conference: AAAI Conference on Artificial Intelligence, 2023

The Significance of the conference: The AAAI Conference on Artificial Intelligence (AAAI) is one of the leading international academic conferences in artificial intelligence. In this year's AAAI-23 conference, 8,777 papers were submitted, and 1,721 papers were accepted, with an acceptance rate of 19.6%. The conference covers a wide range of topics, including machine learning, reinforcement learning, natural language processing, and computer vision, etc.

The experience of Yu-Heng Hung: Attending a physical conference for the first time has been a unique experience for me, as it provided me with more opportunities to interact with researchers from all over the world. Meeting other people who are also working on similar research topics not only gave me valuable insights but also made me feel like part of a larger community. Additionally, I was thrilled to have the chance to present my research during the poster and presentation sessions. I am grateful to my advisor for his support and for providing me with the funding to attend this conference. After a year and a half of hard work, having my paper accepted by the AAAI conference has been a truly touching experience. The late nights spent discussing and revising my work with my advisor have been memorable moments that I will cherish.

Title: A Novel Approach to Solving Goal-Achieving Problems for Board Games

Author: Chung-Chin Shih, Ti-Rong Wu, Ting Han Wei, and I-Chen Wu

Advisor: I-Chen Wu

International Conference: The 36th AAAI Conference on Artificial Intelligence

The Significance of the conference: The AAAI-22 Conference on Artificial Intelligence is a highly acclaimed event in the field of AI that aims to facilitate scientific communication among AI researchers, practitioners, scientists, and engineers. This year's conference (AAAI-22) had a total of 9020 papers reviewed, of which 1349 were accepted, resulting in an acceptance rate of 15%.

The experience of Chung-Chin Shih: This paper focuses on goal-achieving problems in board games, taking Hex and Go as examples. Despite encountering two rejections, the paper was eventually accepted at the AAAI-22 conference after undergoing multiple revisions. This is my first paper accepted at a top-tier international conference, and I would like to express my appreciation to my advisor and co-authors for their collaborative efforts. Regrettably, due to the pandemic, the conference was conducted virtually, thereby eliminating the possibility of in-person interactions with attendees from different parts of the world. Nevertheless, I discovered that online conferences possess intriguing features, such as the utilization of virtual avatars to promote interaction among attendees. During the online poster exhibition, I interacted with some of the audience and gained valuable insights from the conference. Although it didn't turn out to be the in-person conference that I had expected, it was still a memorable experience.

2022 Study Abroad: Experience Sharing Event

2022 出國交換經驗分享會

文稿整理／林珮雯

　　全球從新冠肺炎 (COVID-19) 疫情中逐步復甦，停滯已久的國際交流活動也在校園中重新熱絡起來。2022 年 10 月 26 日本院邀請潘怡汝同學、成文瑄同學分享至瑞士 ETH Zurich、瑞典皇家理工學院交換生經驗。瑞士 ETH Zurich、瑞典皇家理工學院都是世界排名前茅頂尖大學，二位同學分享交換心得，獲得學弟妹熱烈反應。

　　潘怡汝同學於 2021 年 9 月至 2022 年 2 月赴瑞士 ETH Zurich 交換。瑞士 ETH Zurich 是歐陸第一名校，世界 QS 排名第八，為偏向研究型的大學。潘同學選修了 ETH Zurich 三門資工的課，分別是電腦視覺、深度學習和混合實境。她表示，ETH Zurich 像交大一樣，作業很多。其中，深度學習是 ETH Zurich 熱門課程，有 300 多人修課，project 題目是要求要解決一個科學上的問題，簡單來說是能發表論文的題目。潘怡汝同學說，團隊合作溝通蠻順暢的，不過很可惜的是沒有好的設備，所以最後來不及將模型訓練完整。混合實境則是要完成一個小組 project，但實作題目是教授們決定好的。原本很期待和組員的溝通交流、想題目，但後來發現只能討論如何實作，和在交大修過類似的課不同，讓她蠻失落的。

　　成文瑄同學於 2022 年 1 至 6 月赴瑞典皇家理工學院，瑞典皇家理工學院連續二年名列 QS 世界排名百大。在交換期間總共修習三門 CS 的專業課程，分別是 Matlab、Music Acoustics 和 Musical Communication and Music Technology。後面二堂課都是資工的研究所開的課程，雖然它們的名字看起來不像。Music Acoustics 教了各種樂器是如何發聲的，像是弦如何震動，如何合成樂器的聲音之類。Musical Communication and Music Technology 則是一堂很奇妙的課程，期末報告是和斯德哥爾摩的表演藝術博物館合作，製作和博物館裡有關的應用，我們這組是用 Pure Data 來做出一個豎琴的手機應用。

　　最後，二位同學也分享了交換期間生活經驗。由於北歐外食價格偏高，二位同學都練就自己開伙煮飯的功夫。成文瑄同學指出，交換是一個讓她在大學的最後好好放鬆心情的一段時間，比起課堂上的內容，她學到了更多課外、生活上的能力。潘怡汝同學表示，出國交換讓她變得更加獨立了，另外如何平衡生活、學習、休閒也是她在國外學到的很重要的一課。

Amidst the gradual recovery from the COVID-19 pandemic, the international exchange programs on campus have resumed after a long period of stagnation. On October 26, 2022, the College of Computer Science invited Yi-Ju Pan and Wen-Hsuan Cheng to share their experience as exchange students at ETH Zurich in Switzerland and KTH Royal Institute of Technology in Sweden, both of which are top universities in the world. The exchange experience they shared has received enthusiastic responses from our students.

Yi-Ju Pan went to ETH Zurich for an exchange program from September 2021 to February 2022. ETH Zurich, a research-oriented university, is the top ranked university in Europe and has been ranked the eighth best university in the world in the QS World University Rankings 2022. Pan took Computer Vision, Deep Learning and Mixed Reality in ETH Zurich. She said that ETH Zurich, like National Yang Ming Chiao Tung University, has a lot of assignments. Among the courses she took, Deep Learning is a popular course at ETH Zurich, with over 300 students enrolled. The course project is to solve a scientific problem; in other words, it is a topic that can be published. Pan said that the teamwork and communication were effective, but it was a pity that the model was not fully trained in the end due to a lack of good equipment. As for Mixed Reality, the students formed teams to solve the topic decided by the lecturer. Pan had initially looked forward to discussing the topic with her team members, but later realized that they could only discuss how to implement it. The design of this program, which is different from the courses she had previously taken at National Yang Ming Chiao Tung University, left her severely disappointed.

Wen-Hsuan Cheng went to KTH Royal Institute of Technology from January to June 2022. For the second consecutive year, KTH is ranked among world's top 100 universities in the QS World University Rankings. During the exchange program, Cheng enrolled in three computer science courses: Matlab, Music Acoustics, and Musical Communication and Music Technology. Despite their names not indicating it, the last two courses are indeed offered by the Institute of Computer Science. The "Music Acoustics" course taught how various musical instruments produce sound, such as how strings vibrate and how to synthesize instrument sounds, and so on. "Musical Communication and Music Technology" was a fascinating course. The term project was to collaborate with the Swedish Museum of Performing Arts to build applications associated with the museum. At last, her team utilized Pure Data to develop a harp mobile application.

Finally, Pan and Cheng shared their life experiences during the sharing event. Cooking for themselves became a necessity for them in Northern Europe due to the high prices of dining out, and as a result, they have honed their cooking skills. According to Cheng, the time she spent studying abroad provided her with an opportunity to tame stress as she approached the final stage of her university education. In comparison to the content taught in class, she acquired a greater understanding of life skills and extracurricular activities. Meanwhile, Pan said that studying abroad has made her more independent, and furthermore, she acquired a significant insight into maintaining a balance between studies, personal life, and recreational activities while staying abroad.

本刊每學期發刊一期，做為本院師生與系友、家長、院友的溝通橋樑。每期報導本院近期研究現況，內容包括人事動態、國際交流、師生 獲獎等。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

◇ 本院范倫達教授自 112 年 2 月 1 日起為電機資訊國際學位學程新任系主任。

◇ 本院林盈達教授自 112 年 4 月 1 日起為國家資通安全研究院副院長。

◇ 本院資訊工程學系孫春在教授、楊啟瑞教授於 112 年 2 月退休，春風化雨、培育棟樑，希望老師們能常回系上傳承經驗。

二、國際交流

◇ 加拿大阿爾伯塔大學 (University of Alberta) Ting-Han Wei 博士於 2022 年 11 月 16 日至本系演講，講題為：「Exact Solutions in the Age of Deep Learning」。

◇ 英國倫敦帝國學院（Imperial College London）Geoffrey Ye Li 教授於 2022 年 11 月 29 日至本系演講，講題為：「From Conventional to Semantic Communications based on Deep Learning」。

◇ 巴西 Instituto Nacional de Telecomunicacoes Henry Douglas Rodrigues 博士於 2022 年 12 月 5 日至本院演講，講題為：「5G Networks for Agribusiness」。

◇ 美國密西西比州立大學（Mississippi State University） Chun-Hung Liu 教授於 2022 年 12 月 15 日至本系演講，講題為：「Exploiting Networked Intelligence:A Resilient Federated-Learning Approach」。

◇ 美國加利福尼亞大學 (University of California) Li Cheng Lan 博士候選人於 2022 年 12 月 19 日至本系演講，講題為：「Are AlphaZero-like Agents Robust to Adversarial Perturbations?」。

◇ 美國密西根大學 (University of Michigan) Yu-Wei Chao 博士於 2022 年 12 月 19 日至本系演講，講題為：「Vision and Learning for Robotic Manipulation」。

◇ 美國南加州大學 (University of Southern California) 郭宗杰教授於 2023 年 1 月 5 日至本院演講，講題為：「Green Learning: Methodology, Examples, and Outlook」。

◇ 美國路易斯安那州立大學 (Louisiana State University) Hsiao-Chun Wu 博士於 2023 年 1 月 11 日至本院演講，講題為：「How to Extract Dynamics from Data and Signals Subject to Arbitrary Temporal Variations?」。

◇ 日本 Neural Computation Unit Okinawa Institute of Science and Technology Kenji Doya 博士於 2023 年 2 月 13 日至本系演講，講題為：「What Can We Further Learn From the Brain for AI and Robotics?」。

三 . 教師榮譽

◇ 謝秉均教授、游逸平教授、林靖茹教授、曾建超教授榮獲本校 110 學年度優良教學獎！

◇ 吳俊峯教授與中研院資訊所、台大資工合作團隊榮獲 2022 ACM/IEEE CODES+ISSS Best Paper Award!

◇ 林彥宇教授榮獲中華民國資訊學會 2022 年李國鼎穿石獎！

◇ 林靖茹教授榮獲 111 年度國科會傑出研究獎！

◇ 黃敬群教授（應用運算與多媒體實驗室 ACM Lab）執行教育部「智慧創新跨域人才培育聯盟計畫」，成果優異獲選為計畫績優團隊！

◇ 蕭子健教授榮獲 110 年度教學實踐研究計畫績優計畫！

◇ 陳健教授榮獲資訊工程學門 111 年度優良計畫執行成果獎！

◇ 詹力韋教授榮獲第八屆電機資訊年輕學者卓越貢獻獎！

◇ 李奇育教授與 MSU、Purdue、UCLA 合作團隊榮獲 ACM MobiCom 2022 Best Community Paper Award Runner-up!

◇ 彭文孝教授榮獲中國電機工程學會 111 年度傑出電機工程教授獎！

四、學生榮譽

◇ 王昱舜教授、Sabarish V Babu 教授指導鍾智涵同學榮獲 2022 ACM Symposium on Applied Perception Best Paper Award ！

◇ 黃俊穎教授指導林宇翔、尤理衡同學榮獲第 53 屆全國技能競賽中區網路安全競賽第一名！

◇ 黃俊穎教授指導張智諺、吳苡瑄同學榮獲第

53 屆全國技能競賽中區網路安全競賽第三名！

◇ 曾新穆教授指導黃宇同學榮獲 2022 年中華民國資訊學會博士論文佳作獎！

◇ 游逸平教授指導劉安齊同學榮獲 2022 年中華民國資訊學會碩士論文佳作獎！

◇ 魏群樹教授指導張力仁同學榮獲第 27 屆人工智慧與應用研討會 (TAAI 2022) Best Paper Award!

◇ 黃敬群教授、賴欣儀、劉哲愷同學榮獲第十五屆「創意狂想 巢向未來」智慧化居住空間創意競賽金獎！

◇ 魏群樹教授指導數據科學與工程研究所潘岳廷同學榮獲 2022 年鴻海科技獎！

◇ 陳永昇、謝君偉教授指導資科工博陳平揚同學榮獲 2022 年鴻海科技獎！

◇ 吳毅成教授指導李頤、李政毅、施冏維同學分別榮獲 2022 AWS DeepRacer 世界賽冠軍、亞軍與季軍！

◇ 黃俊穎教授指導林宇翔、尤理衡、林祐聖同學榮獲 111 年「資安技能金盾獎」大專組第一名！

◇ 黃俊穎教授指導杜萬珩、張智諺、高瑋哲同學榮獲 111 年「資安技能金盾獎」大專組第三名！

◇ 吳享蓁、劉又聖、簡劭恩、林秉承、劉柏宇同學榮獲 2022 年通訊大賽 5G 領航創新應用競賽實作組亞軍！

◇ 嚴力行教授指導卓旻君同學榮獲 2022 年台灣作業研究學會碩博士論文競賽碩士組優勝！

◇ 黃宇、李育瑄、陸玉霖、顏妤庭同學榮獲中華民國人工智慧學會 111 年度碩博士論文獎！

◇ 張永儒教授指導李育人、吳孟欣、張忠喬、張矽晶同學榮獲台灣人機互動研討會 TAICHI 2022 Honorable Mention Award!

◇ 吳承宇同學、嚴力行教授、謝秉均教授、曾建超教授榮獲 APNOMS 2022 Best Paper Award!

Published twice per year, this periodical, as a bridge between faculty, students, alumni, parents and friends of the college, is dedicated to the latest research updates, including personnel changes, international collaboration, faculty & students honors, etc., in order to assist readers to keep update of the latest developments of the College of Computer Science (CCS) and encourage mutual interaction.

1. Personnel Changes

· Dr. Lan-Da Van has been appointed as the Director of EECS International Graduate Program (IGP), National Yang Ming Chiao Tung University, Taiwan, effective February 1st, 2023.

· Dr. Ying-Dar Lin has been appointed as the Vice President of National Institute of Cyber Security (NICS), effective April 1st, 2023.

· Dr. Chuen-Tsai Sun and Dr. Maria C. Yuang, professors of the Department of Computer Science, retired on February 1st, 2023. It would be great if both professors could return to share their experiences with us in the future. Thank you again for your dedication and contributions to the department over the years.

2. International Collaboration

· Dr. Ting-Han Wei from the University of Alberta gave a talk in our department on November 16,

2022. The topic of the talk was "Exact Solutions in the Age of Deep Learning".

· Professor Geoffrey Ye Li from Imperial College London gave a lecture at our department on November 29th, 2022. The topic of the lecture was "From Conventional to Semantic Communications based on Deep Learning."

· Dr. Henry Douglas Rodrigues from the National Institute of Telecommunications, Brazil, gave a lecture at our college on December 5th, 2022. The topic of the lecture was "5G Networks for Agribusiness".

· Professor Chun-Hung Liu from Mississippi State University, USA, gave a talk on December 15th, 2022. The topic of the talk was "Exploiting Networked Intelligence: A Resilient Federated-Learning Approach".

· Dr. Li Cheng Lan, a Ph.D. candidate from the University of California, gave a talk in our

department on December 19, 2022. The title of the talk was "Are AlphaZero-like Agents Robust to Adversarial Perturbations?"

· Dr. Yu-Wei Chao from the University of Michigan gave a lecture in our department on December 19, 2022. The topic of the lecture was "Vision and Learning for Robotic Manipulation".

· Professor Zongjie Guo from the University of Southern California gave a speech at our college on January 5th, 2023. The topic of the speech was "Green Learning: Methodology, Examples, and Outlook".

· Dr. Hsiao-Chun Wu from Louisiana State University gave a speech at our college on January 11th, 2023. The topic of the speech was "How to Extract Dynamics from Data and Signals Subject to Arbitrary Temporal Variations?"

· Dr. Kenji Doya from the Neural Computation Unit at the Okinawa Institute of Science and Technology in Japan gave a lecture in our department on February 13th, 2023. The topic of the lecture was "What Can We Further Learn from the Brain for AI and Robotics?".

3. Faculty Honors

· Professors Ping-Chun Hsieh, Yi-Ping You, Kate Ching-Ju Lin, and Chien-Chao Tseng have been honored with the Excellent Teaching Award for the 110th academic year by NYCU.

· Professor Chun-Feng Wu and the collaborative team from the Institute of Information Science at Academia Sinica and the Department of Computer Science at National Taiwan University have been honored with the 2022 ACM/IEEE CODES+ISSS Best Paper Award.

· Professor Yen-Yu Lin won the 2021 K. T. Li Breakthrough Award.

· Professor Kate Ching-Ju Lin was awarded the 2022 Outstanding Research Award of the National Science and Technology Council.

· Professor Ching-Chun Huang and the Applied Computing and Multimedia Laboratory (ACM Lab) have been selected as a distinguished team for the "Intelligent Innovation Interdisciplinary Talent Cultivation Alliance Program" executed by the Ministry of Education.

· Professor Tzu-Chien Hsiao has been awarded the Outstanding MOE Teaching Practice Research Program for the 110th academic year.

· Professor Chien Chen has been awarded the ETPC Outstanding Project Execution Award for the 111th year in the field of Information Engineering.

· Professor Liwei Chan has been awarded the 8th EECS Outstanding Young Scholar Award.

· Professor Chi-Yu Li and the collaborative team from MSU, Purdue, and UCLA have received the Best Community Paper Award Runner-Up at ACM MobiCom'22.

· Professor Wen-Hsiao Peng was awarded the outstanding EE faculty award of the Chinese Institute of Electrical Engineering for 2022.

4. Students Honors

· Chih Han Chung, advised by Professor Yu-Shuen Wang and Professor Sabarish V Babu, has won the 2022 ACM Symposium on Applied Perception Best Paper Award.

· Yu Hsiang Lin and Li-Heng Yu, advised by Professor Chun-Ying Huang, were awarded first place in the Central Region Network Security Competition at the 53rd TW National Skills Competition.

· Zhi-Yan Zhang and Yi-Hsuan Wu, advised by Professor Chun-Ying Huang, were awarded third place in the Central Region Network Security Competition at the 53rd TW National Skills Competition.

· Yu Huang, advised by Professor Vincent S. Tseng, has won the 2022 Excellent Dissertation

Award from the Institute of Information & Computing Machinery (IICM).

· An-Chi Liu, advised by Professor Yi-Ping You, has won the 2022 Best Master's Thesis Award from the Institute of Information & Computing Machinery (IICM).

· Li-Jen Chang, advised by Professor Chun-Shu Wei, has won the 2022 TAAI Best Paper Award.

· Hsin-Yi Lai and Che-Kai Liu, advised by Professor Ching-Chun Huang, have won the Gold Prize in 2022 Intelligent Living Space Design Competition.

· Yueh-Ting Pan from the Institute of Data Science and Engineering, advised by Professor Chun-Shu Wei, was awarded the 2022 Hon Hai Science and Technology Award.

· Ping-Yang Chen from the Institute of Computer Science and Engineering, advised by Professor Yong-Sheng Chen and Professor Jun-Wei Hsieh, was awarded the 2022 Hon Hai Science and Technology Award.

· Yi Li, Zheng-Yi Li and YoWei Shi, advised by Dr. I-Chen Wu, were awarded the 1st place, second place, and 3rd place of 2022 Championship Cup sponsored by AWS DeepRacer League, respectively.

· Yu-Hsiang Lin, Li-Heng Yu, and Yu-Sheng Lin, advised by Professor Chun-Ying Huang, have won first place in the college group category of the "2022 Cyber Security Skills Golden Shield Award".

· Wan-Heng Tu, Zhi-Yan Zhang and Wei-Che Kao, advised by Professor Chun-Ying Huang, have won third place in the college group category of the "2022 Cyber Security Skills Golden Shield Award".

· Siang-Jhen Wu, Yu-Sheng Liu, Allex Jian, Bing-Cheng Lin, and Po-Yu Liu have won the Silver Prize in the "Connectivity Innovation Awards" at "Mobileheroes 2022".

· Min-Chun Cho, advised by Professor Li-Hsing Yen, has won first place in the master's category in the 2022 ORSTW Thesis Competition.

· Yu Huang, Yu-Hsuan Li, Yu-Lin Lu, and Yu-Ting Yen, have won the 2021 TAAI Paper Award.

· Yu-Jen Lee, Meng-Hsin Wu, Chung Chiao Chang, and XiJing Chang, advised by Professor Yung-Ju Chang, have been awarded the TAICHI 2022 Honorable Mention Award.

· Cheng-Yu Wu, Dr. Li-Hsing Yen, Dr. Ping-Chun Hsieh, and Dr. Chien-Chao Tseng have been awarded the APNOMS 2022 Best Paper Award.

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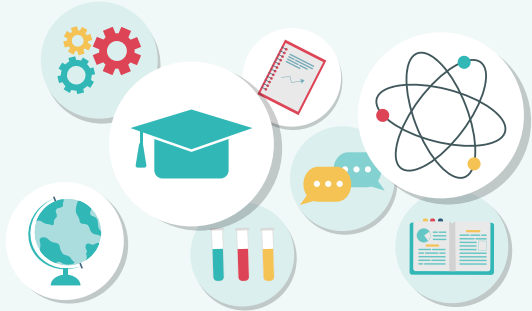捐款專線：(03) 5712121 轉 54701-54703　傳真：(03)5729880　Email:ccs@cs.nycu.edu.tw

院長的一封信

親愛的朋友：

本院結合陽明交通大學最完整的優秀師資，為全國最具規模與研究能量之資訊科系，致力於培育具前瞻視野的資訊產業人才。為朝永續經營前進，本院歡迎校友、家長與企業捐款贊助，也期盼關心本系、資訊教育的各界友人能夠響應，有您的齊力參與，是本院邁向卓越的關鍵力。期許未來有更多捐款做為學院向上提升的動力。敬祝大家平安健康，萬事如意。

國立陽明交通大學 資訊學院院長

陳志成 敬上

募款計畫 資心專案／出國交換獎學金

本院肩負培育國內外資訊領域一流人才重任，全球競爭日趨白熱，若在學生時期及早培養國際觀與視野，更能提升未來的競爭力。是以本院積極推動「資心專案/交換生募款計畫」，校友慷慨溫暖捐款，期能提升在校學子國際化競爭力，燃起更多學生參與國際舞台並貢獻台灣的想法。自2014年起已有近70位學生受惠於本募款計畫，2022年有六位學生至瑞士蘇黎世聯邦理工學院、瑞典皇家理工學院、英國南安普頓大學、日本大阪大學以及中國北京大學等姐妹校交換。

募款計畫 青年講座教授獎勵金

資通訊產業是台灣高科技產業的主軸之一，人才是帶動產業升級創新的重要動力，電機資訊等熱門領域，在延攬人才的薪資缺乏競爭力，再加上目前台灣有三分之一的大學專任教師陸續退休，大批教授退休有斷層的隱憂。為爭取好的青年教授回台，本院啟動青年講座教授獎勵計畫，捐款贊助新進年輕教授加薪，鼓勵優秀人才回台，同時也留住好的教授。

募款計畫 興建資訊二館

近年陸續成立多個研究所及院級研究中心，新的教室、研究室及實驗空間需求孔急，工程三館興建已逾37年，館舍老舊，空間已不敷使用。在學校經費補助相當有限，無法改善現有教學環境的困境下，特別需要系友們慷慨解囊，募款籌措興建資訊二館經費，以提供師生更好的研究與學習環境。

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