

## 資工系 110 年度

# 「大專學生研究計畫」 創意無限

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我國科技部為鼓勵公私立大專院校學生執行研究計畫，使其儘早接受研究訓練，體驗研究活動、學習研究方法，進而加強實驗、實作之能力，特別設立「大專學生研究計畫補助」期望能吸引學生搭配指導教授之專長輔助，研究具自發性構想之嘗試性題目，以達提早培育並儲備基礎科學、應用科學、人文社會科學各領域之優秀研究人才之目的。本校本年度共核定 95 件大專學生研究計畫提案，其中資工系獲核 11 件名列前茅，本院院生通過審核之研究計畫構想不乏各類與科技發展、軟硬體應用，跨領域相結合等多元且創新之主題。

由張永儒教授指導的林詠涵同學，以研究主題「研究手機通知自動和手動管理對於使用者的差異」通過審核，以獨到的觀察點出手機的通知系統是人們意識到資訊的主要方式，選擇自優化使用者在手機通知管理上的體驗切入，透過開發具有自動管理模式、手動管理模式和兩者結合模式的通知系統，來幫助使用者管理通知，並探討手機通知自動和手動管理對於使用者之差異。同為張永儒教授指導的郭庭均同學則選定「探討如何利用預約形式之承諾提升群眾外包任務執行率」作為研究主題，透過群眾外包逐漸成為平台擴展資料集的流行方法、使用者多以智慧型手機協助相關任務等觀察發現，同時根據「承諾與一致性」理論為基礎提出假設，設計一款可以讓使用者提前預約未來任務的 Android App，研究者將以尋找提升任務執行率的方法為目標展開研究計畫。

另一方面，已廣泛應用於自動停車、輔助駕駛、車道偏移的物件偵測技術旨在找出影像中所有感興趣物體的類別與位置，由林彥宇教授所

指導的黃偉傑同學便選擇以此作為研究核心。由於物件偵測廣泛的下游應用十分仰賴預訓練在大型資料集上的物件偵測模型，當它們被部署於現實場景時，經常會面臨準確度大幅下降的問題，其中的原因是訓練資料（源域）與現實場景（目標域）的影像特徵有所不同所導致。以「利用 Transformer 的領域自適應物件偵測」為主題，研究者試圖改善現有方法的效能與執行時間，期待能解決此項研究問題。而同為林彥宇教授所指導的吳季嘉同學則以「三維點雲的弱監督式語意分割」作為研究主題，探討如何透過弱監督式學習的方式，對只有部份被標註的訓練資料進行學習，來減輕標註訓練資料需要大量時間的問題，並且在訓練資料不完整的情況下，訓練出和使用完整訓練資料表現相差不大的模型。

由林靖茹教授指導的陳昱丞同學於「利用 RDMA 提升軟體定義網路路由查詢效率」研究計畫中，提及交換機上的路由表因記憶體空間有限，需要向遠端控制器詢問路由規則，造成延遲之問題。研究者提出一個路由規則安裝機制，將大流量資料的路由資訊盡可能存放在交換機記憶體中，而小流量資料路由資訊則留在遠端控制台。希望能大幅降低交換機與遠端控制器的溝通次數，增進網路效能與路由資訊即時性，同時也能作為一種新型且高效的網路遙測手段。

各研究計畫繳交研究成果報告經審查後，獲評為成績優良且有創意者，科技部將再頒發「大專生研究創作獎」給研究者，每人可獲獎金及獎狀，並頒授獎牌予指導教授。期盼眾院生之研究成果能從數千件計畫中脫穎而出，實踐所學造福社會的同時，再次為校、為院爭光！

## Endless Creativity – Department of Computer Science Won 2021 “MOST Research Grant for University Students”

In order to cultivate talented researchers in basic science, applied science, the humanities, and the social sciences, the Ministry of Science and Technology (MOST) has established “MOST Research Grant for University Students” to encourage students at public and private institutions of higher education can begin—as early as possible—to carry out research projects, learn research methodology, and strengthen their abilities in conducting experiments and solving practical problems, so that students can work with their advisors on a topic that the student has come up with on his/her own, and that he/she has a strong interest in. A total of 95 NYCU students research project proposals were approved this year. The Department of Computer Science gains 11 students research project grants, which is the highest number at NYCU. The approved research proposals seek diverse and innovative concepts, including science and technology development, software and hardware applications, and cross-field integration.

Yong-Han Lin, advised by Professor Yung-Ju Chang, received the grant for the research proposal "Study on the Difference between Automated and Manual Management of Mobile App Notifications for Users". Lin, with unique perspectives, pointed out that the mobile app notification system will be the main way people recognize and interact with their apps. By starting from optimizing user experience for mobile notification services, Lin developed a notification system with multiple management modes, such as automatic, manual, or hybrid mode, to help users manage notifications, so as to explore the different impact to users between automated and manual management of mobile app notifications.

The research topic of Ting-Chun Kuo, also advised by Professor Yung-Ju Chang, is "How to Leverage the Commitment of Job Agreement to Improve the Execution Rate of Crowdsourcing Tasks". With the observation that crowdsourcing becomes a popular method to expand dataset and most tasks are completed on smartphones, as well as the theory of "commitment and consistency", Kuo first designed an Android app that allows users to book future tasks in advance. Then he will conduct research looking for a way to increase effectiveness at task execution.

In addition, the main goal of object detection technology widely used in automatic parking, assisted driving, and lane-deviation is to identify and locate one or multiple salient targets in images. Wei-Jie Huang, advised by Professor Yen-Yu Lin, chose it

as his research core. The extensive applications adopting object detection rely heavily on the object detection models pre-trained on large data sets. When these applications are deployed in real-world scenarios, it is not rare that users encounter the problem of significant accuracy drop. These kinds of problems usually come from the difference of the image characteristics between the training data and the application scenario. Setting the research topic of "Domain Self-Adaptive Object Detection Using Transformer", Huang tried to improve the performance and execution time of existing methods so as to solve the research problem.

JiJia Wu, also advised by Professor Yen-Yu Lin, chose "Weakly-Supervised Semantic Segmentation of 3D Point Cloud" as his research topic to explore how to use weakly supervised learning methods to train a model with partially annotated data so as to reduce the amount of time needed for labeling training data. In the meantime, the derived model can perform nearly on a par with the model trained with a complete training data.

In the research project "Using RDMA to Improve Routing Query Efficiency in Software Defined Networks", Yu-Cheng Chen, advised by Professor Kate Ching-Ju Lin, mentioned that due to the limited local memory space for the routing table, the switch may need to inquire a remote controller for additional routing rules, which causes performance drops. Chen proposed a dispatch mechanism for routing rules to store large-flow routing information on switch memory as much as possible, while the small-flow routing information is kept in the remote control panel. In addition, he expected to maximally reduce the communications between the switch and remote controller to improve network performance via real-time routing information, and play as an efficient network telemetry method.

MOST will review the submitted research-achievement reports and present the University Student Research Award to projects graded especially outstanding and creative. Award recipients will receive prize money and a certificate celebrating their achievement. In addition, advisors of award recipients will receive a medal commemorating their achievement. We sincerely hope that the research results of our students will stand out from thousands of projects. Not only will the young talented students contribute themselves to benefit society, but they will also win glory once again for the school and the college!