

Department of Computing 電子計算學系

# COMP SNEWS KAUTUMN 2021

The Research Centre on Data Science and Artificial Intelligence (RC-DSAI) of PolyU and the Centre for Artificial Intelligence and Robotics, Hong Kong Institute of Science & Innovation, Chinese Academy of Sciences (HKISI-CAS) are now recruiting young talents to apply for the Joint PhD Supervision Scheme under a collaborative research project on **"Frontier Research in Data Science and Artificial Intelligence"**.

# PolyU RC-DSAI and HKISI-CAS Joint PhD Supervision Scheme

To address the societal problems that arise from Industry 4.0 and urbanization, the project focuses on exploring the possibilities in the specific areas of Fundamental AI techniques, Big data management and analytics, Computational AI theory and algorithms, and Visual computing with big multimedia data.

Led by experienced and distinguished scholars from both PolyU COMP and HKISI-CAS, PhD students could gain strong research support and extensive exposure under their supervision.



Prof. Li Qing Co-director of RC-DSAI Chair Professor of Data Science & Head, Department of Computing, PolyU



Prof. Zhang Lei Co-director of RC-DSAI Chair Professor of Computer Vision & Image Analysis, Department of Computing, PolyU



Prof. Chen Changwen Associate Director of RC-DSAI Chair Professor of Visual Computing, Department of Computing, PolyU



Prof. Zhang Zhaoxiang Centre for Artificial Intelligence and Robotics, Hong Kong Institute of Science & Innovation, Chinese Academy of Sciences

Adjunct Professor, Department of Computing PolyU



Prof. Lei Zhen Centre for Artificial Intelligence and Robotics, Hong Kong Institute of Science & Innovation, Chinese Academy of Sciences

Adjunct Professor, Department of Computing PolyU

In addition to the regular PhD scholarship package, successful applicants will have internship opportunity at HKISI-CAS and free access to the research facility in RC-DSAI at PolyU and HKISI-CAS at Hong Kong Science Park.



# **AWARDS & ACHIEVEMENTS**



# Prof. Chen Changwen Elected as Member of Academia Europaea

We are proud to announce that Prof. Chen Changwen, our Chair Professor of Visual Computing, has been elected as a Member of Academia Europaea (Academy of Europe) under the Informatics Section in recognition of his distinguished achievements and outstanding contribution in the field of computer science.

Prof. Chen's research interests include Multimedia Communication, Internet of Video Things (IoVT), GAN/CNN for Image Aesthetics, Immersive Tele-systems, Machine Learning, Mobile Virtual Reality, etc. He served as the Editor-in-Chief for IEEE Transactions on Multimedia from 2014 - 2016 and has also served as Conference Chair for several major IEEE, ACM and SPIE conferences related to multimedia video communications and signal processing. As an expert in visual computing, Prof. Chen's research has been supported widely by the industry including NSF, DARPA, Air Force, NASA, Whitaker Foundation, Microsoft, Intel, Kodak, Huawei, and Technicolor.

With his exceptional research efforts, Prof. Chen has been named an IEEE Fellow and SPIE Fellow. He has also received a series of research and professional achievement awards, including the University at Buffalo Exceptional Scholar - Sustained Achievement Award in 2012, the State University of New York System Chancellor's Award for Excellence in Scholarship and Creative Activities in 2016, and the Distinguished ECE Alumni Award from University of Illinois at Urbana-Champaign in 2019.

Formed in 1988, Academia Europaea is the pan-European academy of science, humanities and letters, with a membership of over 4,000 eminent scholars, drawn from all countries of Europe, and all disciplines, nationalities and geographical locations. In July 2021, the Academy announced that 366 international scholars have been invited to accept membership of the Academia Europaea, following a rigorous peer-review process.



# Best Research Paper Award at VLDB 2021

Dr Shi Jieming, our Assistant Professor, together with other five researchers received the Best Paper Award at the 47th International Conference on Very Large Data Bases (VLDB) held from 16 - 20 August 2021 with the paper titled "Scaling Attributed Network Embedding to Massive Graphs".

In this paper, Dr Shi and his team present "PANE", an effective and scalable ANE approach for massive graphs, which achieves state-of-the-art quality, measured by the accuracy of three prediction tasks. In particular, for a large graph with over 59 million nodes, 0.98 billion edges, and 2000 attributes, "PANE" is the only known viable solution that obtains effective embeddings on a single server, within 12 hours. "PANE" obtains superior performance through three main algorithmic designs. First, it formulates the learning objective based on a novel random walk model. Second, "PANE" includes an efficient solver for the objective, to drastically reduce the training cost. Finally, "PANE" utilizes multi-core CPUs through non-trivial parallelisation, which achieves scalability while retaining the high quality of the results.

# Best Paper Award at BlockSys' 2021

Our research team led by Prof. Cao Jiannong won the Best Paper Award at the International Conference on Blockchain and Trustworthy Systems (Blocksys'2021) on 6 August 2021 with the paper titled "PolyChain: a Generic Blockchain as a Service Platform".

In recent years, blockchain technology has been attracting intensive attention from both industries and academia because of its capability of rebuilding trust in trustless environments. There are increasing demands for developing and delivering blockchain applications and services in an agile and continuous way. To this end, Blockchain as a Service (BaaS) emerges which refers to cloud-based blockchain infrastructure developed by a vendor allowing users to develop, host, and use their own blockchain components, functions, and applications. There are many BaaS platforms developed by industries and academia, e.g., Bitcoin, Ethereum, and Hyperledger Fabric. However, they are either limited in scalability or difficult for configuration and customisation.



In this paper, the research team proposes and develops PolyChain, a generic BaaS platform with high modularity, flexibility, scalability, reliability, and security, which are achieved with the following three design principles. First, each blockchain node is designed as four modularized components, e.g., network, storage, consensus, and application, based on the functionalities. Second, the components in a logic blockchain node interact via communication interfaces and can be deployed on different physical nodes. Finally, the component deployment is optimized based on the capabilities of the physical nodes. PolyChain will benefit the industries and academia in agile development and continuous delivery of blockchain prototypes and applications.

# PolyU Library Virtual Reality Contest 2020/21





Declan Leung Chun-hin, (BSc (Hons) in Enterprise Information Systems, Year 4) and Wu Chun-hung, (BSc (Hons) in Computing, Year 3) won the Champion and First runner-up with their projects titled "Chernobyl Disaster" and "Green Ark" respectively in the Virtual Reality (VR) Contest organised by PolyU Library on 27 July 2021.

Declan's VR work is a storytelling simulation of the Chernobyl nuclear catastrophe. Users can immerse themselves in conducting a VR safe test on a nuclear reactor and get the first-person experience in the incident.

Chun-hung's Green Ark is based on PolyU's Green Deck plan to build a green public park above the Hung Hom Cross-Harbour Tunnel for recreation use.







# PolyU Student Ambassador 2021-22

Under the "PolyU Student Ambassador Scheme", vibrant students are appointed as Student Ambassadors (SAs) to promote PolyU to secondary students and the general public through outreaching activities such as Info Day, admission talks, etc. This year, we are glad to have two energetic and enthusiastic COMP students are being appointed as SAs and the Inauguration Ceremony was held on 10 September 2021.

Prof. Wong Kwok-yin, Vice President (Education) of PolyU delivered the welcome speech and presented the Certificate of Appreciation to SAs of the previous year in recognition of their contributions, followed

by the presentation of the official appointment to new SAs by Mr Edward Shen, Registrar of PolyU.

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Our student, Declan Leung Chun-hin (BSc

(Hons) in Enterprise Information Systems, Year 4) was invited to give a delightful sharing on why he joined the scheme and his expectations.

THE HONG KONG POLYTECHNIC UNIVERSITY

Another student, Isabel Madeleine Kemp, (BSc (Hons) in Computing, Year 4) also shared with us how grateful she was being one of the ambassadors.

I want to take my sharing opportunity, to give secondary students my perspective on studying at PolyU and Computing.

# **Undergraduate Orientation 2021**

To prepare new students for adapting to university studies, COMP organised the Orientation Session virtually for all new undergraduates on 24 August 2021, attracting nearly 200 freshmen.

Ir Prof. H. C. Man, Dean of Faculty of Engineering, officiated the Orientation by extending his warm welcome to students and encouraged them to grasp every opportunity to learn during the time at PolyU, while Dr Leong Hong-va, our Associate Professor and Associate Head (Teaching & Learning), began with the Academic Advising System and learning initiatives at COMP.

Various lecturers were invited to briefly introduce the subjects they will be teaching for Year 1. The Orientation



# **MSc in Information Technology Orientation 2021**

COMP MSc Orientation Session was smoothly concluded on 28 August 2021. More than 130 newly admitted taught postgraduates participated this year.

Dr Korris Chung, Associate Professor and Coordinator of MSc Postgraduate Scheme in Computing, warmly welcomed the students with a brief introduction to the latest development of COMP. Dr Chung also provided information on subjects offered and study patterns. Dr Ken Yiu, Associate Professor and MScIT Programme Leader, shared about programme structure and curriculum while Dr Wang Qixin, Associate Professor and MSc Thesis Coordinator, further explained the study plan for the dissertation and project. Other support including departmental facilities and access to learning resources were demonstrated as well.

The Orientation serves as an informative platform for the freshmen to get familiar with the MScIT programme and campus life before the commencement of the semester.

# LEARNING & TEACHING

also covered Work-Integrated Education and internship, and other student supports and services offered by PolyU.

The Orientation was concluded with individual group meetings in breakout rooms between the students and their designated Academic Advisors, who will guide them throughout their studies at COMP, providing them with a great chance to get connected before the commencement of the new academic year.

## University of Cambridge (Girton College) Online Summer Programme

Co-organised by Girton College of the University of Cambridge and the Faculty of Engineering (FENG) of PolyU, the "University of Cambridge (Girton College) Online Summer Engineering School" was held from 26 – 30 July 2021. Thirty-nine FENG students including nine from COMP joined the programme.

Dr John Longley, Senior Lecturer of the Department of Engineering from the University of Cambridge, delivered a course "Mathematics for Engineering". Focusing on the theoretical concept, the course covered useful knowledge for engineers, including vectors analysis, matrices algebra, numerical solutions and quadrature, statistics, as well as data analysis.

To enable participants to know more about Girton College and Cambridge study life, a series of special events were arranged such as Orientation, Watch Party of Girton College Experience, Guest Lecture on Graduate Studies



at Cambridge. Students were also honoured to meet with the Mistress of Girton College, Prof. Susan Smith on 29 July, discussing educationrelated topics.

Apart from the class learning, the summer programme also offered attendees opportunities to communicate with students who are currently studying at Girton College through social activities with Student Ambassadors like "Quiz and Discussion Night" and "Walking Tour of Girton College".

## UG Summer Research Experience at MIT Hong Kong Innovation Node

Sponsored by PolyU's UG Summer Research Abroad Sponsorship Scheme (USRA), six COMP students participated in a 6-week summer research programme at the Massachusetts Institute of Technology (MIT) Hong Kong Innovation Node from 15 June to 30 July 2021. USRA is a signature student learning scheme, which aims to provide financial support to encourage students to undertake research under the guidance and supervision of academics in overseas pre-eminent universities. Our students joined the programme as Research Assistants to work on several Smart City research projects including "Smart Traffic Light System" and "The Supermarket Navigation System". By the end of the programme, students had to give presentations at the Hong Kong Science and Technology Parks (HKSTP) in front of a panel of IoT experts who gave valuable comments and professional advice. During this research internship, participants could gain not only technical knowledge but also teamwork and soft skills.

By working with MIT people, I have a chance to exchange ideas with the most intelligent brains in this world!





The internship is a fruitful experience. I gained much knowledge of hardware and IoT, and advanced my skills in communication and programming.

learned how to develop MIT App Inventor 2 extensions and use them for some smart city projects~



# **Information Security Management** Workshop on CISA and CISSP

We organised a 3-day online summer workshop on the professional examinations of information security management for our Year 3 to Year 4 students and fresh graduates to prepare them for their career in the related field.

Information Security Management is critical in today's IT industry. Many technical applications such as Fintech, Enterprise Resource Planning (ERP) and Data Centre require good information security control and practice. International qualifications such as Certified Information System Auditor (CISA) and Certified Information System Security Professional (CISSP) are highly regarded and recognized by employers.

Dr Walter Fung, the workshop instructor and Teaching Fellow of COMP, reviewed the nature and scope of the examinations, qualifications and requirements for being fully certified upon gaining relevant work experience. Various industry practitioners and recent graduates who have attained CISSP and CISA were invited to share their experiences and tips. They also explained the technical details, modules and sample questions under different scenarios.

# **Cybersecurity Seminar for Undergraduates**



Cybersecurity has become one of the issues that arouse public concern, along with the rise in popularity of financial technologies and related applications, e.g., virtual banking and digital identity. Cybersecurity threats keep evolving, mutating, and occurring in different circumstances. The research community is constantly exploring these vulnerabilities, proposing new models and protocols to fulfil the security requirements of these applications.

Dr Daniel Luo, our Associate Professor, and Dr Dennis Liu, our Teaching Fellow, shared with the participants the research on smart contract analysis by addressing the research questions in detail and illustrating concrete research examples. Dr Luo also talked about smart contract security from the practitioners' perspectives and offered professional advice for the better implementation of smart contracts in blockchain applications.

# **COMP Mentorship Programme 2021/22**

We are pleased to announce that the following COMP alumni will serve as our mentors in the new academic year to provide our undergraduate students with industrial guidance and professional advice on personal development.

1. Mr Brian Choi, Senior Platform Engineer, Manulife Int'l	6. M
2. Mr Tony Chung, VP of Data Services, Asia Satellite	7. M
3. Mr Peter Ho, Solution Architect, Red Hat Hong Kong	8. M
4. Ms Silvia Ihensekhien, CISO of ShipServ	9. M
5. Dr Abraham Lam, CEO of MEGA Automation	10. I



To equip our undergraduate students with the knowledge and skills in cybersecurity and assist them in planning their pathways for further studies or career development in the field, COMP hosted an online seminar "How to be a competent cybersecurity researcher and practitioner?" on 2 August 2021.

Ir Thomas Poon, Assistant Taxation Officer, Inland Revenue Dept Ir Henry Soo, Managing Director, DataDevelop Consulting Ir Darron Sun, Head of IT, Hong Kong Housing Society Ir Andy Wan, Director of Operation Transformation, AXA Mr Lawrence Wong, IT Manager, HAECO

# RESEARCH **EXCELLENCE**

# **Research Donation**

Our research capability is widely recognised by the industry and society. We have successfully obtained large donation from the private and public sectors to support different research projects.

#### School-based Diversity Management (DM) 2.0 - Prof. Cao Jiannong (HK\$26,690,000 donation from Hong Kong Jockey Club Charities Trust)

DM 2.0 aims to transform local schools into self-learning organizations that are capable to manage student diversity effectively and efficiently in their school-based contexts through the development and enhancement of school-based diversity infrastructures in three domains: data-driven/ data-informed school practice, learning and teaching activities that allow maximized opportunities through appropriate differentiated and inclusive practice, and, lastly, close collaboration among school-based support teams that support student learning and development.

#### Multi-modal Video Cover Page Generation - Prof. Chen Changwen (RMB500.000 donation from Tencent Mobility Limited)

The project intends to study a new video cover generation method based on multi-modal information. The current video cover generation method is mainly based on simply extraction of the most representative video frames from the video, and through relatively simple processing to form a video cover thumbnail. To overcome the shortcomings of current video cover technology, the research team proposes to study video cover based on multimodal information including the storyline, creator's profile, etc. to generate a rich semantic and aesthetic video cover.

#### Investigation of Encoding Strategy for Super-Resolution Video - Prof. Chen Changwen (HK\$500,000 donation from SmartMore Corporation Limited)

To provide an improved experience for the content consumer, the newly produced higher resolution videos need to go through encoding and transmission procedures before they can be distributed to a larger scale of consumers to enjoy. The investigation of encoding strategies will include: (1) How to encode the original low resolution video; (2) How to represent the high resolution detail information; (3) How to combine both low resolution video and high resolution detail information.

# External Research Grants Secured in 2021/22

#### Innovation and Technology Fund (ITF) 2021/22

Project Title	Principal Investigator	Funding Awarded
An Innovative Hybrid Intelligence Web System for the Hong Kong Stock Market	Dr Henry Chan	HK\$995,900

### Hong Kong Scholars Program 2021/22

Project Title	Principal Investigator	Funding Awarded
Distributed Intelligence Framework for Collaborative Edge Computing	Prof. Cao Jiannong	HK\$378,000
Knowledge Reasoning in Natural Language Processing	Prof. Maggie Li	HK\$378,000

# **Distinguished Seminar Series on Data Science & Artificial Intelligence**

Co-organised with the PolyU Research Centre on Data Science and Artificial Intelligence (RC-DSAI), we have launched a Distinguished Seminar Series on Data Science and Artificial Intelligence since March 2021. World-renowned scholars were invited to share the latest technological development of data science and artificial intelligence with us.



Prof. Han Jiawei Michael Aiken Chair Professor Department of Computer Science



Prof. Beng Chin Ooi Chair Professor Department of Computer Science National University of Singapore Singapore



Prof. Li Baochun Professor Department of Electrical & Compute University of Toronto Canada







Prof. Wu Dapeng Professor Department of Electrical & Compute University of Florida USA



Prof. Chen Lei Chair Professor Department of Computer Science & Hong Kong University of Science and Hong Kong

npaign	8 July 2021 "Embedding and Language Modeling for Effective Text Mining"
	16 July 2021 "What can AI do for End-to-End Data Analytics?"
er Engineering	27 July 2021 "Four Guiding Principles towards Designing Good Real-World Systems"
	16 August 2021 "Exploring Interpretability and Marketplaces in Trustworthy Data Science"
er Engineering	31 August 2021 "Challenges in Al Security"
Engineering I Technology	14 September 2021 "Data Management for Effective and Efficient Deep Learning"

# **EVENT HIGHLIGHTS**



# **Blockchain Technology Training Programme for OGCIO**

COMP and Knowledge Transfer and Entrepreneurship Office (KTEO) jointly organised a training programme on blockchain technology for the Office of the Government Chief Information Officer (OGCIO) from June 2019 to May 2021. Dr Daniel Luo, our Associate Professor, and Dr Dennis Liu, our Teaching Fellow, were two of the workshop trainers. Over 1,500 trainees were benefited from this two-year programme.

The blockchain training programme included a series of one-day core classes and two-day advanced courses, targeting all analysts and programmers of OGCIO. We held 24 sessions of the introductory class and five sessions of hands-on training in total.

The one-day class provided the participants with an overview of technological development and market trends of blockchain technology, as well as good practices for planning and managing blockchain projects. The trainers introduced the basic concept and growth of blockchain in today's environment and context and shared some local and global real cases from the private and public sectors. The two-day training focused on the technical handson exercises with various real-world case studies and other interesting examples to deepen trainees knowledge and extend their skills in blockchain technology. Overall, the participants understood the importance and value of blockchain technology and they became aware of incorporating blockchain into their future project planning.



## IFTA FinTech Achievement Awards 2020 -**PolyU Campus Sharing**



On 23 September 2021. COMP and the (IFTA) co-organised an online webinar for PolyU students and COMP alumni.

has invited the awardees of IFTA FinTech including ePayment, Blockchain, Career on

# PolyU Two-day University Experience Programme 2021

On 3 – 4 August, the Faculty of Engineering (FENG) organised the Two-day University Experience (TUE) Programme online under the theme of "From Physics and ICT to Engineering", aiming at Secondary 4 to 5 students who are taking Science, ICT, or M1/M2 subjects.

FENG arranged a series of thematic online lectures and guizzes on seven fields of engineering during these two days. Dr Henry Chan, our Associate Professor and Associate Head, represented FENG to officiate the opening of TUE and welcomed the attendees.

To begin the COMP's session, Dr Chan introduced some basic computing concepts with an interactive game to arouse students' interest. Dr Peter Ng, our Teaching Fellow, delivered a mini-lecture on "Game Technologies" directly afterwards. Students were able to grasp the idea of game development and computer vision including Virtual Reality (VR) and Augmented Reality (AR). To further illustrate the know-how, they were taken on a virtual tour of our VR and Game Lab. Dr Ng also

demonstrated a machine learning project





# **Junior Research Mentoring Programme 2021**

The Global Engagement Office (GEO) launched the Junior Research Mentoring Programme 2021 in the last summer. Students from secondary schools were invited to join this first of its kind educational programme organised by PolyU. Two mentees who

participated in the research project "Twins in graphs" led by Dr Cao Yixin visited us on 16 August 2021.

A graph is a structure to denote a set of objects and their relationship; for example, Facebook is nothing but a huge graph of people. The objects are denoted by vertices, and in the simplest case, we use an edge between to vertices to denote that they are "related." By twins we mean a pair of vertices that have precisely the same relationships. This project is about the most efficient ways to detect twins in massive graphs.





# **ALUMNI** CORNER



# Call for Nominations: Outstanding Alumni Award of Department of **Computing 2022**

The year 2022 marks the 85th Anniversary of PolyU. New features are introduced to the Outstanding PolyU Alumni Award (OPAA) including adding awards at department and faculty levels, to recognise our distinguished alumni's diverse accomplishments and contributions to the community and their alma mater.

There are four achievement categories, namely "Professional Achievement", "Entrepreneurial Achievement", "Scholarly Achievement" and "Community Service Achievement". Selection is based on the nominee's accomplishments in his/ her personal achievements in the field, contributions to the community, and support and contributions to PolyU. Special recognition to young alumni awardees in the award category is added. A candidate who is aged under 40 by the end of the award year can be considered under the **Outstanding PolyU** Young Alumni stream.

## Eligibility

The nominated candidate must be a bona fide graduate who has successfully completed the full-time or part-time programme offered by PolyU (or its forerunners: Hong Kong Government Trade School, Hong Kong Technical College, Hong Kong Polytechnic; and its constituent units: School of Professional Education & Executive Development and Hong Kong Community College) which led to academic award accredited by the respective Institution.

The proposer can be a PolyU graduate, Honorary Graduate, University Fellow, PolyU staff, current PolyU Council and Court member and current Advisory Committee member. There is no limit to the number of nominations to be submitted by each proposer. However, the proposer cannot be the candidate himself/ herself or a direct relative of the candidate.

#### Nomination and Selection Schedule



We are now inviting nominations for the Outstanding Alumni Award of Department of Computing 2022. Please visit COMP website to download the Nomination Form and return it to comp.marketing@polyu.edu.hk with al required supplementary documents on or before 31 October 2021. Selection for the Department Award will be conducted by end of 2021.



# **Computing Alumni Association** (CAA) Movie Night

COMP students and alumni gathered on 12 August to enjoy a comedic movie "Free Guy" together at Grand Kornhill Cinema.

Though under the pandemic, it attained a full house attendance with appropriate precautionary measures and all had fun with their friends.



## New Academic Staff



Dr Divva Saxena as Research Assistant Professor

## **New Adjunct Professors**





Professor of National Laboratory of Pattern Recognition; Director of Center for Biometrics and Security Research (CBSR), Institute of Automation, Chinese Academy of Sciences. China

# **New COMP Website**

To give the public a personalised user experience, we have moved to a new website that features many enhanced functions including mobile responsive layout, easy to locate details about specific topics, and consistent navigation within PolyU. Come and visit our new website now!







comp.enquiry@polyu.edu.hk

# DEPARTMENT **UPDATES**



Dr Yu Le as Research Assistant Professor



#### Prof. Zhang Zhaoxiang

Executive Director of Centre for Artificial Intelligence and Robotics, Hong Kong Institute of Science & Innovation, Chinese Academy of Sciences; Professor of National Laboratory of Pattern Recognition. Institute of Automation. Chinese Academy of Sciences, China





## Department of Computing

The Hong Kong Polytechnic University Hung Hom, Kowloon, Hong Kong

www.polyu.edu.hk/comp