THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

50th Anniversary
Department of Computing
電子計算學系

Pioneering Possibilities Powering Potentials

Vision

The Department is determined to assert its position being the leader in interdisciplinary research and education in computing, generating worldwide impact and benefit to mankind.

Mission

The Department's mission is communicated in three dimensions.

The Department will endeavour

1. To nurture graduates who will become leaders and professionals with a global outlook, ready to serve in the society of tomorrow with advanced knowledge and skills in computing related areas
2. To conduct world-class research and commit to interdisciplinary collaboration, expanding the horizon of knowledge discovery and technology advancement
3. To contribute and deliver professional services to the community at large with strong partnership and collaboration

Departmental Academic Advisor (DAA)

Prof. SHA Lui

Donald B. Gillies Chair Professor of Computer Science, The Grainger College of Engineering, University of Illinois at Urbana Champaign, USA

Departmental Advisory Committee (DAC)

Chairman

Dr HUANG Xuedong

Chief Technology Officer, Zoom

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Director, Shenzhen FUSQUARE Technology Ltd.

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Professor, Dept of Electrical and Computer Engineering, University of Toronto, Canada

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Vice President, Alibaba Group, China

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Dean, Faculty of Engineering,
The Hong Kong Polytechnic University

Prof. LI Qing

Chair Professor and Head, Department of Computing,
The Hong Kong Polytechnic University

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Professor and Associate Head (Research & Development), Department of Computing,
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Associate Professor and Associate Head (Partnership & Collaboration), Department of Computing,
The Hong Kong Polytechnic University

Prof. YIU Man Lung Ken

Professor and Associate Head (Teaching & Learning), Department of Computing,
The Hong Kong Polytechnic University

Message from the Department Head

Join us in celebrating our Golden Jubilee under the theme of

"Pioneering Possibilities. Powering Potentials."

Leveraging 50-Year Transformation of Computer Science

Founded in 1974, the Department of Computing (COMP) marks our 50th anniversary in 2024. Over these past five decades, COMP has been in lock step with the significant growth and revolutionary changes in the field of computer science. As is quite obvious today, the invention of the Internet in the 1960s ultimately allowed us all to connect to the world. Together with the development and proliferation of personal computers, starting in the late 70s and early 80s, redefined the way we work, study, and communicate, in our lives.

Computer science continues to break boundaries even today. Recently, the field of artificial intelligence (AI) has exploded on the scene with significant breakthroughs in natural language processing, image recognition, pattern recognition, and other areas of machine learning, opening up new applications and opportunities for computing. The advent of mobile computing, including tablets and smartphones, has also expedited the speed, agility and amount of data individuals can access anytime, anywhere.

With more devices than ever connected to the internet, the volume of data generated, collected, and analysed has grown exponentially, leading to the advent of the big data era. This, in turn, has given rise to the field of data science, which uses analytics and machine learning to process and extract valuable insights and trends from massive datasets. The development of cloud computing, which enables remote access to computing power and storage, has also opened up new avenues for collaboration, data storage, and application development with an emphasis on cost savings and scalability.

These major revolutionary changes in computer science have transformed our world in countless ways, from revolutionising communication and commerce to powering innovation in fields like healthcare, finance, and transportation. We can confidently expect more growth and opportunities in computer science and other information technologies in the coming years, and the COMP Department will continue to play a crucial role in that growth.

Supporting the Advancement of our City and Country

At COMP, we have also changed rapidly, growing from a modest BA computing studies programme to today's fully fledged course of study encompassing a BSc scheme, and three MSc programmes, plus an MPhil and various PhD programmes. As the head of the COMP Department, I am excited about the roles computer science and information technologies can play in advancing Hong Kong and China's future development and growth.

Emerging technologies like AI, blockchain, and the Internet of Things (IoT) hold tremendous potential to transform industries and society. COMP will remain at the forefront of identifying new opportunities in these fields and exploring how they can be meaningfully applied to realise our university vision and mission.

The expansion of the technology industry is creating a massive demand for skilled professionals. The deep pool of human capital we have nurtured has the potential to produce impactful research as well as inspire new industry leaders and talents in the fields of computer science and information technologies, bolstering our reputation as a key global contributor to the growth of this sector. The fast-paced nature of technology requires us to be agile and highly collaborative. For this reason, we have been proactively cultivating partnerships and promoting cross-disciplinary research to stimulate innovation. These collaborative initiatives ensure that we can work together efficiently to tackle the most daunting challenges and help improve everyone's lives.

Entrepreneurship is a key driver of growth in the technology sector. Supporting innovation and entrepreneurship initiatives helps Hong Kong and China transition away from the manufacturing economies and capitalise on our strengths in science and technology to create high-tech products and companies. These measures will help us harness the opportunities provided by advancements in computer science and information technologies to steer our city and our nation towards a brighter future.

Empowering Next Transformation

In the era of computing, COMP is leading a transformation of the industry by playing a leading role in advanced research in the field of computer science and information technologies, particularly in emerging fields such as AI, machine learning, and IoT solutions. Equipping our students with a solid foundation in computer science and computational thinking will allow them to become innovators, problem-solvers, and creators for the future of technology advancement. We will also actively arrange workshops, training, and boot camps along with seminars on relevant best practices focused on real-world, industry-specific challenges and provide the necessary tools applicable to financial management, healthcare, transportation, and other sectors.

Collaborations with other university departments, general academia and our various industry partners are critical for COMP. This will allow us to work together more closely to share insights, knowledge, and experience, ensuring that our computer science education can meet current and future expectations while exchanging ideas and assisting each other. In fact, COMP plays a key role in developing practical thought leadership, helping businesses navigate today's rapidly changing era of computing by demonstrating a clear understanding of potential risks, opportunities and ethics. We are also designing solutions that optimise the impact of technology, processes, and business models.

In conclusion, we are confident that the COMP Department will continue to lead the industry's transformation by contributing our knowledge and skills to world-class research, education, training, collaboration and thought leadership. We are at the forefront of pioneering unlimited possibilities while bolstering the potential of our talent pool to make a global impact and benefit mankind.

Prof. Jin-Guang Teng

President
The Hong Kong Polytechnic University

This year marks the 50th Anniversary of the Department of Computing (COMP) at PolyU, and I am pleased to extend my heartfelt congratulations on this significant milestone. Since its establishment in 1974 as the first department to offer computing education in Hong Kong, COMP has been a driving force behind Hong Kong's technological transformation. For half a century, it has nurtured generations of professional computing talents who have made valuable contributions to the advancement of our society.

Over the past five decades, COMP has played a vital role in shaping the future of technology and innovation worldwide. Its unwavering pursuit of academic and research excellence has consistently garnered recognition among the world's top 100 institutions by subject. In 2022, PolyU ranked first in CoinDesk's Best Universities for Blockchain globally, out of 240 renowned institutions. This recognition brings honour to our University community, thanks to COMP's contribution to the field.

In a world rapidly reshaped by groundbreaking innovations, our fellow members of COMP remain at the forefront, offering high-quality education and conducting advanced research that creates positive impacts and benefits our society. COMP's impressive track record, highlighted by accolades and over HK$280 million in funding from various Competitive Research Funding Schemes over the past five years, reaffirms its leading position in the technological arenas and embodies PolyU's motto, "To learn and to apply, for the benefit of mankind".

With its new theme and strategy of "Pioneering Possibilities, Powering Potentials", I am confident that COMP will continue to excel and explore new frontiers. Whether in artificial intelligence, cybersecurity, or emerging fields we have yet to imagine, COMP is poised to scale new heights in education and research, contributing to the betterment of Hong Kong, the Nation, and the world.

As we celebrate this golden jubilee, I invite PolyU members and the wider community to join us in supporting COMP's continued journey of innovation and excellence. Together, we can ensure that the next 50 years are even more rewarding than the last.

Ir Prof. H.C. Man

Dean, Faculty of Engineering
The Hong Kong Polytechnic University

It gives me great pleasure to congratulate Department of Computing (COMP) for its 50th anniversary this year.

Since it's establishment in 1974, Department of Computing has been playing a key role in nurturing the future generations, inspiring individuals to pursue academic excellence and develop global outlook. Over the past years, COMP has nurtured over 12,000 graduates. A large number of its alumni are professional talents, industry leaders, business elites, community pioneers, etc, making significant contribution to Hong Kong, the Mainland and the world at large.

Our colleagues of the Department of Computing have carried out world-class research and attained internationally recognized achievements in key areas of computer science, blockchain and information systems. The department has been ranked 31st in the Best Global Universities Subject Rankings by the U.S. News & World Report 2024 and then 87th in the Times Higher Education (THE) World University Subject Rankings 2024. They have also received numerous accolades from prestigious competitions internationally.

With the dedication and commitment of staff, alumni and students from Department of Computing, I trust that Department of Computing will grow continuously and make significant impact globally. Taking this opportunity, I sincerely wish Department of Computing all the best in its future endeavours.

Ir Tony Wong, JP

Commissioner for Digital Policy
The Gorvernment of the Hong Kong Special Administrative Region

I would like to offer my warmest congratulations to the Department of Computing of The Hong Kong Polytechnic University (PolyU) on its 50th Anniversary.

Over the years, the Department of Computing (COMP) at PolyU has played an important role in nurturing innovation and technology (I&T) talent for Hong Kong. COMP offers a wide range of study programmes to groom its students to become competent professionals and contribute to the technology development of Hong Kong, our Country and the World.

Students from COMP have been achieving remarkable success and receiving numerous awards in various major competitions. For example, students won the Group Competition Award and First Prize in the ASC24 Student Supercomputer Challenge, as well as the First Prize in the Cloud Track of the Huawei ICT Competition 2023-2024.

The 50th Anniversary marks a key milestone in COMP's growth. As an alumnus of COMP, I am always proud of what my alma mater has achieved in grooming talent for the society of Hong Kong. In particular, the foundation laid by my education therein has been pivotal in my professional journey, enabling me to contribute to Hong Kong's digital transformation among others.

With the establishment of the Digital Policy Office (DPO), there are even greater opportunities for collaboration than ever before between PolyU COMP and my office. DPO will lead in promoting data-driven, people-centric and outcome-based digital policies, enhancing the Government's efficiency and services, and bringing greater benefits to citizens and business sectors through digital government and smart city development. I am confident that COMP will continue to be a significant contributor to help achieve these goals.

In the years to come, may COMP continue to grow, inspire, and lead in the ever-changing global arena of innovation and technology.

Prof. Kam-fai Wong

Member, Legislative Council of the HKSAR
Associate Dean (External Affairs), Faculty of Engineering,
The Chinese University of Hong Kong

Congratulations on reaching this significant milestone of your 50th Anniversary!

This marks not just five decades of academic excellence but also a half-century of innovation, leadership, and dedication to the field of computing. The department's commitment to fostering a nurturing environment for learning, research, and innovation is truly commendable. Your achievements are a testament to your relentless pursuit of knowledge and your commitment to shaping the leaders of tomorrow.

Congratulations once again on this significant milestone. May the next fifty years be filled with even more growth, breakthroughs, and success.

Dr Rocky CHENG Chung-ngam

CEO
Hong Kong Cyberport Management Company Limited

I extend my sincere congratulations to The Hong Kong Polytechnic University Department of Computing on the momentous occasion of its 50th Anniversary.

Over the past half-century, the Department of Computing has emerged as among the leading academic entities in technology and innovation, thanks to the dedication of its esteemed faculty, industrious students, and accomplished alumni. It has played a crucial role in shaping computing education and research, making significant contributions to scholastic communities both locally and globally.

As we celebrate the Department's pioneering legacy, we acknowledge its commitment to excellence in areas such as artificial intelligence, data science, and software engineering has led to impactful research outcomes. The Department's achievements have garnered international recognition, ranking in the top 100 in various world university rankings for top-notch research and quality education. The Department has also laid instrumental foundations for advancing the digital frontier and cultivating skilled professionals capable of contributing technical expertise to the growth of different industries and trades.

With appreciation for the Department's accomplishments, I am confident that it will continue to expand its remarkable legacy and pursue new possibilities in technology and education. I extend my best wishes to the Department for continued success. Building on collaborations between Cyberport and PolyU in nurturing young innovators, I also look forward to furthering our concerted efforts for shared achievements in the next 50 years.

Dr Lai Hung Ko

Executive Director, Chairman of the Board
Accel Group Holdings Limited

Congratulations on the 50th Anniversary of the Department of Computing

This year marks the 50th Anniversary of the Department of Computing (COMP) at The Hong Kong Polytechnic University, and on behalf of Accel Group Holdings Limited, I am delighted to extend my warmest congratulations on this remarkable milestone. Since its establishment in 1974, COMP has consistently been a leader in driving technological innovation in Hong Kong and beyond, and we are proud to be a partner in this journey.

For half a century, COMP has nurtured generations of computing professionals who have made profound contributions to society. At Accel Group, we have seen firsthand the impact of this excellence through our joint lab on metaverse technology and our collaboration on various cutting-edge research projects. These partnerships are a testament to the synergy between academia and industry, and we are excited about the future possibilities that lie ahead.

As a company committed to advancing engineering and technology solutions, Accel Group has been privileged to work closely with COMP. The department's research in emerging fields such as artificial intelligence, cybersecurity, and metaverse technology aligns with our own vision of harnessing innovation to shape the future. COMP's global recognition and its ongoing success are a source of inspiration, and we are confident that the next 50 years will be even more transformative.

With COMP's forward-looking vision, "Pioneering Possibilities, Powering Potentials," we look forward to continued collaboration as we explore new frontiers together. Our joint efforts in research and development will not only benefit our respective fields but will also contribute to the broader technological advancement of Hong Kong and the world.

Once again, congratulations to the Department of Computing on this golden jubilee. We wish you continued success and look forward to building upon our partnership in the years to come.

Content

Milestones

1974

- Department of Computing Science was established.
- Mr G. P. Mead was the first Head of Department.

Computing Science With the arrival of its new Head of Department, Mr. G. P. Mead, the Department of Computing Science was established in November 1974. Courses of instruction were planned and will be offered for the first time in September 1975. These include two courses which lead to the awards of the Higher Diploma in Systems Analysis and of the Certificate in Computer Programming. In addition, the Department has a commitment to service every other department in the Polytechnic in a variety of aspects of computer usage. The Department's own courses will consist initially of 72 students, while a total of approximately 2,500 students throughout the Polytechnic will have some exposure to computing science education during 1975–76.

>> 1975

- Higher Diploma course in Systems Analysis and Certificate course in Computer Programming – First programmes in the Department.

1979 <<

- The Department was renamed to the Department of Computing Studies.

Department of Computing Studies With the approval of the Council of the Polytechnic on 23 March 1979, the Department of Computing Studies was retitled the Department of Computing Studies. The revised title is a more appropriate description of the scope of the work of the Department which is concerned mainly with courses in the field of commercial data processing rather than scientifically oriented computing.

1983

- Bachelor of Arts (Hons) in Computing Studies - First Bachelor's Degree in the Department.
- Mr D.V. Gulati was appointed as Head of the Department.

Department of Computing Studies
The Department of Computing Studies launched its BA(Hons) degree course in Computing Studies in 1983/84. The response for admission to this course was overwhelming: over 1,100 applications were received for 40 places. In addition, the Department continued to offer three other programmes, namely, the Diploma in Computing Studies, the Higher Diploma in Systems Analysis and the Higher Diploma in Computing Studies. As usual, these courses also attracted many applicants.

1988

- Master of Science in Information Systems - First Master's Degree programme in computing in Hong Kong.

>> 1991

- The Department was renamed the Department of Computing.
- First full-time MPhil student was admitted.

Milestones

1992

- Prof. Daniel Yeung was appointed as Head.

>> 1994

- Department was relocated from Main Building to Mong Man Wai Building.

1996

- First PhD student graduated.

1999

- Prof. Tharam Singh Dillon was appointed as Acting Head.
- Department was transferred to the Faculty of Engineering.

2001

- Prof. Keith Chan was appointed as Acting Head. He was appointed as Head in the following year.
- Launch of the First Double Degree - BSc (Hons) in Computing and BA (Hons) in Management.
- Department's first spin-off company was established.

2006

- The first offshore Service-Learning subject in Hubei was introduced.

2008

- Prof. David Zhang was appointed as Head.

2010

- First international Service-Learning subject in Cambodia was introduced.

2011

- Prof. Jiannong Cao was appointed as Head.

2014

- Department's 10,000th graduate since the establishment of the Department.
- The inaugural Distinguished Alumni Award was launched.

2017

- Prof. Qin Lu was appointed as Interim Head.

2019

- Prof. Qing Li was appointed as Head.
- Offered first programmes in Hong Kong combining FinTech and AI.

2022

- Hong Kong's first Master of Science in Blockchain Technology launched.
- PolyU is recognised as CoinDesk's Best University for Blockchain in 2022.

2024

- Department celebrates its 50th anniversary of establishment.

50th Anniversary Department of Computing 電子計算學系

Remarkable Achievement

After 50 years of success, COMP today plays a strong role in performing world-class research and nurturing professional talents to support the advancement of society. Our consistent level of excellence is well-recognised internationally as evidenced by our high standing in world university rankings, including 31st position in Computer Science in the "Best Global Universities Rankings" by the U.S. News & World Report 2024, and 34th in Computer Science & Engineering in the "Global Ranking of Academic Subjects (GRAS) 2023." COMP is also ranked 87th in Computer Science in the "Times Higher Education (THE) World University Rankings 2024", and 88th in Computer Science and Information Systems in the "QS World University Subject Rankings 2024."

31 U.S.News & World Report
Best Global Universities Rankings by the U.S. News & World Report 2024
Computer Science

34 SHANGHAI RANKING
Global Ranking of Academic Subject (GRAS) 2023
Computer Science & Engineering

87 THE TIMES HIGHER EDUCATION WORLD UNIVERSITY RANKINGS
Times Higher Education (THE) World University Rankings 2024
Computer Science

88 QS WORLD UNIVERSITY RANKINGS
QS World University Subject Rankings 2024
Computer Science & Information Systems

CoinDesk
1st *Best University for Blockchain* *2022*

Moreover, among more than 240 universities and institutions around the world, PolyU was recognised as 'Best University for Blockchain' in 2022, for our scholarly impact, campus blockchain offerings and academic reputation by CoinDesk, the global leader in news and information on cryptocurrency, digital assets and the future of money. COMP was also the first in Hong Kong to offer an MSc programme in blockchain technology and established the first research centre for blockchain technology, which focuses on comprehensive blockchain techniques and cross-disciplinary research.

In line with our dedication to undertaking high quality research, COMP has been regularly publishing important research papers since our establishment. In fact, during the past five years*, over 620 papers have been presented at academic conferences and more than 780 papers have been published in peer-reviewed journals. In addition, over 160 research projects have successfully competed for various prestigious external grants, securing a total of more than HK$280 million in research funding. The application and approval processes to fund teaching and learning are rigorous, and only the most competitive projects eventually succeed in securing grants. This is a clear testament to the expertise and capabilities of our dedicated faculty members and research teams.

Academic Conferences **620+** Paper

Peer-reviewed Journals **780+** Paper

Prestigious External Grants **160+** Projects

Research Funding HKD **$280+** Million

Moreover, in just the past five years alone, the scholars and students of COMP have won hundreds of awards and recognitions, including 30 Best Paper Awards, as well as 50 international, 31 national or regional, and 25 local awards.

In terms of practical knowledge application, COMP is proud of serving as a key incubator for aspiring entrepreneurs and startups that can effectively transfer their research excellence into real-world solutions for the benefit of society. In fact, many PolyU-nurtured startups have achieved remarkable results with their pioneering inventions.

*From Year 2019/20 to 2023/24

Remarkable Achievement

External Award

Academic Year	Title of Award	Name of Exhibition / Awarding Organisation	Awardees	Project Name / Product / Other Information
2023/24	High Throughput Signature Verification	Zprize	AU Man Ho Allen, LU Xingye, LIU Mengling (PhD), HENG Yang (PhD)	
2023/24	Laureates of BOCHK Science and Technology Innovation Prize 2023 in FinTech	Hong Kong Alliance of Technology and Innovation	AU Man Ho Allen	
2023/24	Laureates of BOCHK Science and Technology Innovation Prize 2023 in FinTech	Hong Kong Alliance of Technology and Innovation	LUO Xiapu Daniel	
2022/23	Plonk-DIZK GPU Acceleration	Zprize	AU Man Ho Allen, LU Xingye, LIU Mengling (PhD)	
2022/23	Gold Medal	48th International Exhibition of Inventions Geneva	GUO Song, XU Zhenda Jackal (PhD)	Advanced Intelligent System for Radiation-free Scoliosis and Posture Evaluation
2022/23	Silver Medal	48th International Exhibition of Inventions Geneva	CAO Jiannong	PolyPi: Edge-AI Empowered Robot for Autonomous In-pipe Inspection
2022/23	Silver Medal	48th International Exhibition of Inventions Geneva	CHEN Changwen (Co-PI)	System for Evaluation and Triage for Healthy Knee
2022/23	Test of Time Award	ACM Conference on Embedded Networked Sensor Systems (SenSys) 2022	ZHENG Yuanqing Collaborators: ZHOU Pengfei, LI Zhenjiang, LI Mo, SHEN Guobin	IODetector: A Generic Service for Indoor Outdoor Detection
2022/23	2022 IEEE Education Society William E. Sayle II Award for Achievement in Education	IEEE Education Society (EdSoc)	CHAN Chun Bun Henry	For contributions to computing education and to the development of the TALE conference
2022/23	Best Party Game Fast Track Quota for Cyberport Creative Micro Fund	Global Game Jam Hong Kong 2023	SIN Ping Tat Zackary, CHER Chun Ho, CHEN Qi, TAI Sai Kin	Storeverse: Discover Together for the Cause
2022/23	Best Reviewer Awards	ACM Conference on Computer and Communications Security (CCS) 2023	LUO Xiapu Daniel	
2022/23	Pedagogical Innovation Commendation	Teaching and Learning Innovation Expo 2022, CUHK	NG Hiu Fung Peter	Blended Learning in Metaverse (Strategy, Implementation, and Evaluation)
2022/23	2022 年大灣區 STEM 卓越獎（香港區）十佳老師	Hong Kong New Emerging Technology Education Association (hknetea)	NG Hiu Fung Peter	

External Award

Academic Year	Title of Award	Name of Exhibition / Awarding Organisation	Awardees	Project Name / Product / Other Information
2021/22	ACM SIGMOD Research Highlight Award 2022	Association for Computing Machinery	SHI Jieming	No PANE, No Gain: Scaling Attributed Network Embedding in a Single Server
2021/22	2020 CCF-Tencent Rhino-Bird Fund - Cooperation Award	China Computer Federation (CCF) & Tencent Inc.	LI Jing	Comment-Aware Weakly-Supervised Classification for Social Media Texts
2021/22	2020 CCF-Tencent Rhino-Bird Fund - Excellence Award	China Computer Federation (CCF) & Tencent Inc.	XUE Lei	Deep Program Synthesis Based Hardened Code Analysis
2020/21	Gold Medal	4th China (Shanghai) International Exhibition of Invention and Innovation 2021	CAO Jiannong	BigARM: Big Data-driven Airport Resource Management Engine and Application Tools
2020/21	Gold Medal	4th China (Shanghai) International Exhibition of Invention and Innovation 2021	CAO Jiannong	Low-cost Acoustic-based Liquid Fraud Detection
2020/21	Silver Medal	4th China (Shanghai) International Exhibition of Invention and Innovation 2021	CAO Jiannong	Autonomous Cooperative Multi-robot System: A Fully Distributed Approach
2020/21	Pilot fund 'Science communication by scientists: Appreciated!' (one of the 90 awardees)	The Royal Netherlands Academy of Arts and Sciences (Dutch: Koninklijke Nederlandse Akademie van Wetenschappen, abbreviated: KNAW)	HOORN Johan	Social Robots Serving Society
2020/21	Huibregtsen Prize 2020	The Evening of Science & Society Foundation	HOORN Johan	'Alice'
2020/21	IEEE TCCLD Research Innovation Award	IEEE Computer Society Technical Committee on Cloud Computing (TCCLD)	CAO Jiannong	
2019/20	2020 SIGBED Early Career Researcher Award	ACM SIGBED (Special Interest Group on Embedded Systems)	GUAN Nan	
2019/20	IEEE Transactions on Cloud Computing Editorial Excellence and Eminence Award	IEEE Transactions on Cloud Computing	GUO Song	
2019/20	Second Prize	ACM MM 2019 Multimedia Grand Challenge of AI Meets Beauty	LI Qing	Cross-domain Beauty Item Retrieval via Unsupervised Embedding Learning
2019/20	Highly Commended Team Award, ALT Learning Technologist of the Year Awards 2019	Association for Learning Technology (ALT) Annual Conference 2019	LI Ping	AIE-AR Team
2019/20	Gold Medal	2nd Asia Exhibition of Inventions Hong Kong (AEI) by The Hong Kong Exporters' Association (HKEA)	WANG Dan	Smart Air-conditioning Platform (SAP) for Optimizing Thermal Comfort & Energy Consumption in Buildings
2019/20	2019 Smart Medical Challenge First Prize	Shanghai Jiao Tong University and Weining Health Technology Group Co., Ltd.	GUO Song	脊大夫無創傷脊柱三維評估系統

Award List from Year 2019/20 to 2023/24. Due to limited space, the award list is not exclusive.

Best Paper and Poster

Academic Year	Award	Paper	Conference/ Journal/ Organisation	Authors / Awardees
2023/24	Distinguished Paper Award	Attention! Your Copied Data is Under Monitoring: A Systematic Study of Clipboard Usage in Android Apps	46th IEEE/ACM International Conference on Software Engineering (ICSE 2024)	CHENG Yongliang, TANG Ruoqin, ZUO Chaoshun, ZHANG Xiaokuan, XUE Lei, LUO Xiapu, ZHAO Qingchuan
2023/24	Best Paper Award (Runner-up)	NeRF2: Neural Radio-Frequency Radiance Fields	The 29th Annual International Conference On Mobile Computing And Networking (MobiCom 23)	ZHAO Xiaopeng (PhD), AN Zhenlin, PAN Qingrui (PhD), YANG Lei
2023/24	Graduate Award (Student Research Competition)	Radio Frequency Neural Networks for Wireless Sensing	The 29th Annual International Conference On Mobile Computing And Networking (MobiCom 23)	TONG Jingyu (PhD), AN Zhenlin, ZHAO Xiaopeng (PhD), LIAO Sicong (PhD), YANG Lei
2023/24	Best Paper Award	Revisiting Backscatter Frequency Drifts for Fingerprinting RFIDs: A Perspective of Frequency Resolution	2023 20th Annual IEEE International Conference on Sensing, Communication, and Networking (SECON2023)	PAN Qingrui, AN Zhenlin, ZHAO Xiaopeng, YANG Lei
2023/24	Best Paper Award	Service-Oriented Resource Allocation in SDN Enabled LEO Satellite Networks	IEEE International Symposium on Personal, Indoor and Mobile Radio Communications	HE Jingchao, CHENG Nan, YIN Zhisheng, ZHOU Haibo, XU Wenchao, PENG Haixia, ZHOU Conghao, ZHANG Ruqian
2023/24	Outstanding Paper Award	Evolutionary Transfer Optimization – A New Frontier in Evolutionary Computation Research	2024 IEEE Computational Intelligence Magazine	TAN Kay Chen, FENG Liang, JIANG Min
2022/23	Best Paper Award	NeRFahedron: A Primitive for Animatable Neural Rendering with Interactive Speed	ACM SIGGRAPH Symposium	SIN P.T. Zackary, NG H.F. Peter, LEONG Hong Va
2022/23	Outstanding Paper Award	Bounding the Response Time of DAG Tasks Using Long Paths	IEEE Real-Time Systems Symposium (RTSS) 2022	HE Qingqiang (PhD), GUAN Nan, LYU Mingsong, JIANG Xu , CHANG Wanli
2022/23	Best Paper Award	Curvable Image Markers: Towards a Trackable Marker for Every Surface	20th International Conference on Advances in Mobile Computing & Multimedia Intelligence (MoMM2022)	SIN P.T. Zackary (PhD), NG H.F. Peter , LEONG Hong Va
2022/23	Best Paper Award	Resource Allocation of E2E Slices in Softwarized UAVs-Assisted 6G Terrestrial Networks	14th International Conference on Wireless Communications and Signal Processing (WCSP 2022)	CAO Haotong, WANG Xiaoming, JIANG Rui, LIU Ting, XUE Lei, LUO Xiapu Daniel
2022/23	Best Paper Award	Intelligent Instructional Design via Interactive Knowledge Graph Editing	21th International Conference on Web-Based Learning (ICWL 2022)	CHAN C.K. Jerry, WANG Yaowei (PhD), LI Qing, George BACIU, CAO Jiannong, HUANG Xiao, LI Chen Richard, NG Hiu Fung Peter
2022/23	ACM SIGSOFT Distinguished Paper award	NCScope: Hardware-Assisted Analyzer for Native Code in Android Apps	The 31st ACM SIGSOFT International Symposium on Software Testing and Analysis	ZHOU Hao (PhD), WU Shuohan (PhD), LUO Xiapu, WANG Ting, ZHOU Yajin, ZHANG Chao, CAI Haipeng
2021/22	Best Paper Award	A Deep Reinforcement Learning Based Offloading Game in Edge Computing	IEEE Transactions on Computers	Y. ZHAN, GUO Song, P. LI and J. ZHANG
2021/22	Best Demo Award	PARROT: An Adaptive Online Shopping Guidance System	The 5th APWeb-WAIM International Joint Conference on Web and Big Data (APWeb-WAIM 2021)	DA Ren (PhD), CAI Yi, ZHONG Zhicheng, WU Zhiwei, LI Weizhao, LI Qing
2021/22	Best Student Paper Award	Difficulty-controllable Visual Question Generation	The 5th APWeb-WAIM International Joint Conference on Web and Big Data (APWeb-WAIM 2021)	CHEN Feng, XIE Jiayuan, CAI Yi, WANG Tao, LI Qing

**COMP Authors / COMP Awardees are displayed in blue*

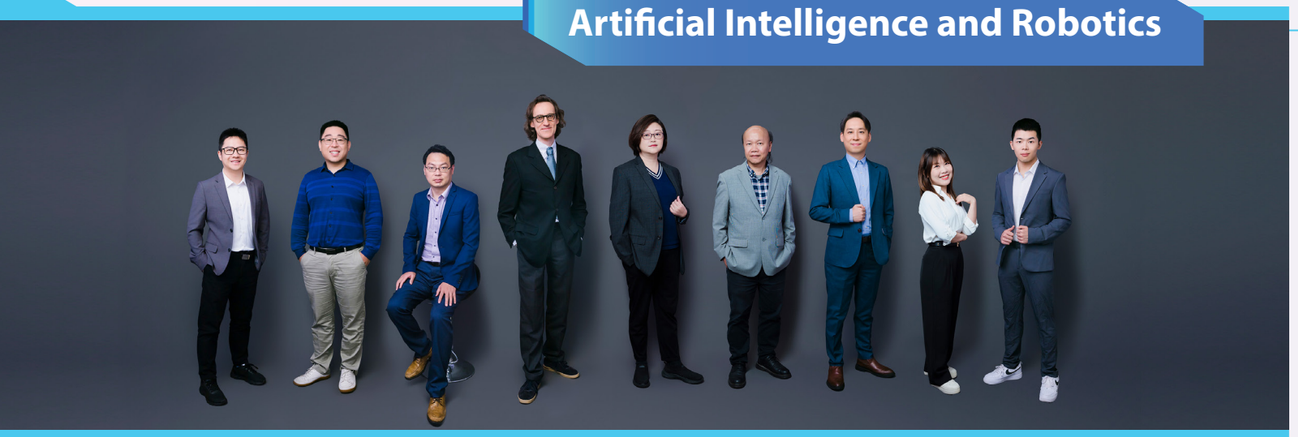
Best Paper and Poster

Academic Year	Award	Paper	Conference/ Journal/ Organisation	Authors / Awardees
2021/22	Best Paper Award	Scaling Attributed Network Embedding to Massive Graphs	47th International Conference on Very Large Data Bases (VLDB 2021)	YANG Renchi, SHI Jieming, XIAO Xiaokui, YANG Yin, LIU Juncheng, Sourav S BHOWMICK
2021/22	Best Paper Award	PolyChain: a Generic Blockchain as a Service Platform	2021 International Conference on Blockchain and Trustworthy Systems (BlockSys'2021)	JIANG Shan, CAO Jiannong, ZHU Juncen, CAO Yinfeng
2020/21	ACM SIGSOFT Distinguished Paper Award	ATVHunter: Reliable Version Detection of Third-Party Libraries for Vulnerability Identification in Android Apps	The 43rd International Conference on Software Engineering (ICSE 2021)	ZHAN Xian (PhD), FAN Lingling, CHEN Sen, WU Feng, LIU Tianming, LUO Xiapu, LIU Yang
2020/21	Best Track Paper Award	An Online Pricing Strategy of EV Charging and Data Caching in Highway Service Stations	The 16th International Conference on Mobility, Sensing and Networking (MSN 2020)	SU Zhou, LIN Tianxin, XU Qichao, CHEN Nan, YU Shui, GUO Song
2020/21	Best Paper Award	EmoChannelAttn: Exploring Emotional Construction Towards Multi-Class Emotion Classification	The 2020 IEEE/WIC/ACM International Joint Conference on Web Intelligence and Intelligent Agent Technology (WI-IAT'20)	LI Zongxi, CHEN Xinhong, XIE Haoran, LI Qing, TAO Xiaohui
2020/21	Best Paper Award (Bioinformatics)	Better Link Prediction for Protein-Protein Interaction Networks	The 20th IEEE International Conference on BioInformatics And BioEngineering (IEEE BIBE 2020)	YUEN Ho Yin, JANSSON Jesper
2020/21	Andrew P. Sage Best Transactions Paper Award	A Generic Deep-Learning-Based Approach for Automated Surface Inspection, IEEE Transactions on Cybernetics, vol. 48, no. 3, pp. 929-940, 2018.	IEEE Transactions on Cybernetics	REN R., HUNG T. and TAN Kay Chen
2020/21	Best Paper Award	Efficient Feasibility Analysis for Graph-based Real-Time Task Systems	ACM SIGBED International Conference on Embedded Software (EMSOFT 2020)	SUN Jinghao, SHI Rongxiao, WANG Kexuan, GUAN Nan and GUO Zhishan
2019/20	Best Paper Award Runner Up	SkyChain: A Deep Reinforcement Learning-Empowered Dynamic Blockchain Sharding System	49th International Conference on Parallel Processing (ICPP 2020)	ZHANG Jianting, HONG Zicong (PhD), QIU Xiaoyu, ZHAN Yufeng, GUO Song, CHEN Wuhui
2019/20	INFOCOM 2020 Student Conference Award (previously named Student Travel Award)	Guardian: Evaluating Trust in Online Social Networks with Graph Convolutional Networks	IEEE International Conference on Computer Communications (INFOCOM 2020)	LIN Wanyu, GAO Zhaolin, LI Baochun
2019/20	Best Paper Award	Push the Limit of Acoustic Gesture Recognition	IEEE International Conference on Computer Communications (INFOCOM 2020)	WANG Yanwen, SHEN Jiaxing, and ZHENG Yuanqing
2019/20	Best Paper Award	RFCamera: Identifying RFIDs in Pixel Dimensions	International Conference on Sensing, Communication and Networking (SECON 2020)	LIN Qiongzheng, YANG Lei, AN Zhenlin (PhD), GUO Yi, LI Ping
2019/20	Best Presentation Award	Vision Based Daily Routine Recognition for Healthcare with Transfer Learning	International Conference on Digital Health and Care (ICDHC 2020)	YU X. B. Bruce (PhD), LIU Yan Fiona, CHAN C. C. Keith
2019/20	Outstanding Paper Award	Mixed-Criticality Multicore Scheduling of Real-Time Gang Task Systems	The 40th IEEE Real-Time Systems Symposium (RTSS 2019)	GUAN Nan, Ashik Ahmed BHUIYAN, YANG Kecheng, Samsil AREFIN, Abusayeed SAIFULLAH, and GUO Zhishan
2019/20	Best Paper Award	Virtual Laboratory: Facilitating Teaching and Learning in Cybersecurity for Students with Diverse Disciplines	8th IEEE Conference on Engineering, Technology, and Education (TALE)	LIU Y. W.Dennis, LEUNG C. Y. Alven, AU Man Ho, LUO Xiapu, CHIU Pit Ho Patrio, IM Siu Wo Tarloff and LAM W. M. Winnie

**COMP Authors / COMP Awardees are displayed in blue*

Award List from Year 2019/20 to 2023/24. Due to limited space, the award list is not exclusive.

Artificial Intelligence and Robotics



Dr XU Wenchao | Dr WU Jibin | Dr LI Ping | Prof. HOORN Johan | Dr LIU Yan Fiona | Dr CHUNG Fu Lai Korris | Dr NG Hiu Fung Peter | Dr LIN Wanyu | Dr WU Yujie

The research group of Artificial Intelligence and Robotics brings together the collective efforts from diverse areas of expertise to deliver high impact research. Starting from the research foundations of learning theory and control theory, our group works on various kinds of machine learning models, such as deep learning and transfer learning models, and applies these in the design of robots. Moreover, our group works on social robotics, affective computing, and artificial creativity as well.

Excellent Research Projects

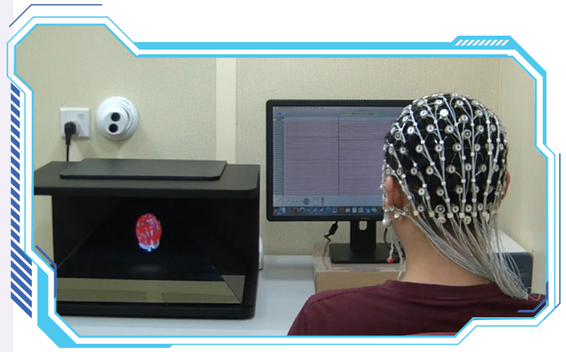
Prof. HOORN Johan

Social Robots with Embedded Large Language Models Releasing Stress among the Hong Kong Population

We have proposed training social robots with Embedded Large Language Models (LLMs) on localised, cultural, and personal data to provide customised mental care to those who remain undetected by the official medical care system. Human-like social robots have shown to be natural interaction partners, assisting with information search, improving health and mental well-being, and supporting educational tasks. This is achieved by developing training protocols, logic-symbolic AI, and design guidelines for novel methods and functionality, which are then tested on-site by local communities. This project with wide-ranging application potential has won over HK$40 million funding from the Research Grants Council's Theme-based Research Scheme 2024/25.

Dr LIU Yan Fiona

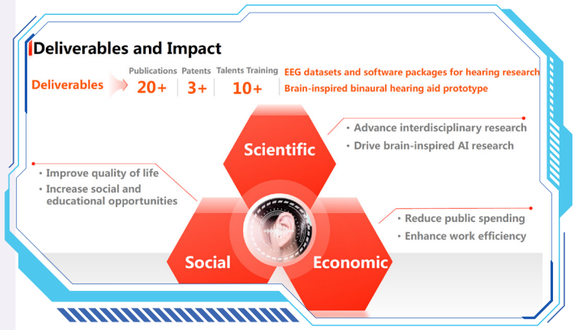
What Strike the String of Your Heart? Music Therapy for Anxiety by Machine-composed Music



Music can evoke strong emotions and most people suffering from mental disorders can benefit from music listening. This project utilise brain wave analysis techniques to find the intrinsic relations between music and emotions. Moreover, the generative AI techniques are developed to generate music according to the needs of emotion regulation for individual user and the needs of specific stage of the treatment. AI-powered music therapy provides a safe, convenient, and low-cost emotion regulation approach, which shows the great social value and commercial potentials. This project won $1M million funding from PolyU internal research funding.

Dr WU Jibin

When Audio Denoising Meets Spiking Neural Network



This research develops a brain-like artificial auditory system that can emulate its biological counterpart across functional, structural, and mechanistic levels. It's essentially a neural-steered target speaker extraction system that replicates the selective auditory attention capability of humans. It also serves as a neural network-based model for binaural speech enhancement that can mitigate the distortion of binaural cues caused by traditional beam-forming algorithms. This project, in collaboration with CUHK, HKU and HKUST, won the "Best Paper Award" at the 2024 IEEE Conference on Artificial Intelligence, was selected as "Champion" of the Intel Neuromorphic Deep Noise Suppression Challenge in 2023 and won over HK$6 million funding from the Research Grants Council.

Cyber Security and Privacy

Dr ZHOU Hao | Dr LI Zecheng | Dr ZHENG Yuanqing | Prof. LUO Xiapu Daniel | Prof. AU Man Ho Allen | Prof. XIAO Bin | Dr GAO Shang Jason | Dr LU Xingye

Cyber Security and Privacy address a wide range of security and privacy issues that have profound impact on securing the cyberspace. Researchers in the group have expertise in areas such as the financial technology, blockchain, post-quantum computing security, mobile applications, Internet of Things (IoT), and the underlying Internet infrastructure. They have close relationship with industries and have successfully transferred our knowledge to solve security and privacy problems in the real world. They are very successful in attracting big external grants, such as HK RGC GRF, ITF, NSFC and funding from companies, e.g., Huawei.

Excellent Research Projects

Prof. AU Man Ho Allen

Zero-Knowledge Proof Advancement

Our research advances zero-knowledge proofs (ZKPs), a technology that promises significant privacy and efficiency improvements for Web3 applications. In real world terms, our research reduces the computational costs of computing ZKP for the validity of digital signatures by more than 87%, making computations possible on a regular laptop. This advancement allows a user, for example, to authenticate to a server without the need to transmit any sensitive information, nor the need for a server to store that information. This represents a truly novel approach to protect user privacy. Our ZKP project took top honours in the High Throughput Signature Verification category at the ZPRIZE competition.

Prof. LUO Xiapu Daniel

Innovative Approaches for Safeguarding Blockchain Ecosystems

We have played a crucial role in advancing the security of blockchain ecosystems. In particular, We have developed innovative methodologies and practical tools for identifying vulnerabilities within blockchain ecosystems. Our efforts have led to the discovery of numerous severe vulnerabilities, which have been both confirmed by developers and recognized through bug bounties. We have also devised novel strategies to detect and counteract various malicious attacks in blockchain ecosystems. Our pioneering research has earned us over 10 Best Paper or Distinguished Paper awards at leading conferences.

Prof. XIAO Bin

Enhancing Web3 privacy infrastructure

Web3 is the next generation of the internet, leveraging blockchain and smart contracts for user data control. Privacy is crucial with users managing their data. Our research focuses on enhancing Web3 privacy infrastructure, including:

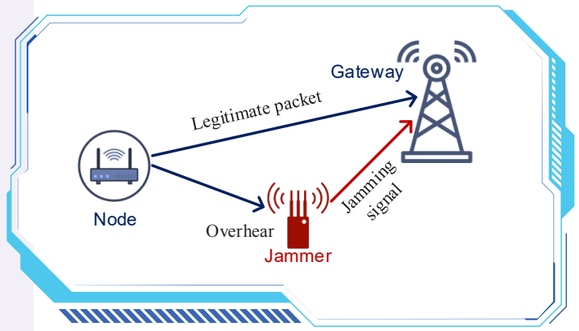
(1) efficient privacy computing primitives with new cryptography primitives for Sigma protocols and incremental verifiable computation

(2) secure private data management, incorporating new techniques for decentralised identity and dynamic key management

(3) effective smart contract security measures with static analysis, machine learning, and trusted hardware for decentralised applications

Dr Zheng Yuanqing

Towards A Scalable and Secure LPWAN: A Collaborative Edge Computing Framework



LoRaWAN forms a one-hop star topology where LoRa nodes send data via a one-hop, up-link transmission to a LoRa gateway. If the LoRa gateway is jammed by attackers, the gateway may fail to receive any data from any of the nodes in the network. To protect the LoRa PHY from such attacks, we have developed a new protection method that can separate LoRa chirps from jamming chirps by leveraging their differences in received signal strength within the power domain.

Data Science, Information Retrieval and Human Computer Interaction

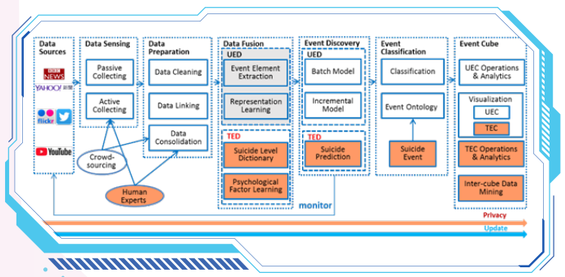
Dr ZHOU Alexander | Dr LI Haoyang | Dr ZHOU Kai | Dr SHI Jieming | Dr FAN Wenqi | Prof. YIU Man Lung Ken | Prof. LI Qing | Prof. YANG Hongxia | Dr NGAI Grace | Dr HUANG Xiao | Dr ZHANG Chen Jason | Dr JIN Fengmei

The researchers in the group understand the urgent need to develop innovative technologies and tools for processing large amount of heterogeneous multisource multimodal data. Their investigations cover parallel databases as services, data accountability and service outsourcing, data and communicative behaviours in online social networks and media, effective search engine indexing, and transfer-learning methods on recognizing human affects and cognitive implications, inclusive of brain informatics and intelligent human-computer interfaces.

Excellent Research Projects

Prof. LI Qing

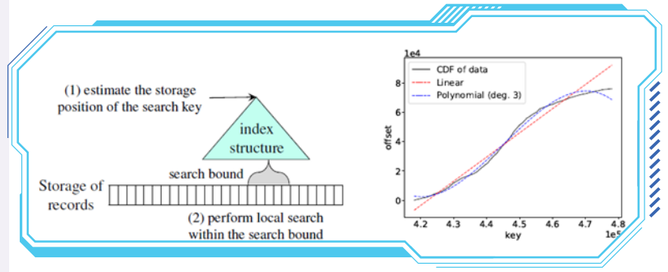
Multi-sourced Event Detection and Multi-Dimensional Analysis based on Event Cube



This research project, supported by CityU, CUHK and HKUST, is targeted at suicide detection in Hong Kong youngsters. It provides insights into real-world event detection and prediction, underlying the new paradigm of big data event cube. Research issues involve linguistic biases and subtle cues when dealing with a limited amount of quality information embedded within massive collections of social media data. Various machine-learning approaches have also been adopted for suicidal ideation and risk detection while psychology researchers offer assistance by better identifying the causality between various factors and suicidal triggers. This project has won over HK$5 million funding from the Research Grants Council.

Prof. YIU Man Lung Ken

Advancing Learned Index Structures for Databases via Non-linear Functions



Index structures are crucial for enabling efficient searching and data analytics in databases. Learned index structures have demonstrated advantages over traditional indexes, consuming less storage space and offering faster search capabilities. This project aims to further improve learned index structures by exploiting non-linear functions. By developing novel learned index designs powered by non-linear methods, the expectation is to achieve even greater speed and space efficiency. The outcomes will directly benefit end-users with faster response times, while service providers will see reduced costs and resource requirements. Supported by over $1M funding from Research Grant Council, this project will push the boundaries of learned index structures and deliver transformative advancements for database technologies.

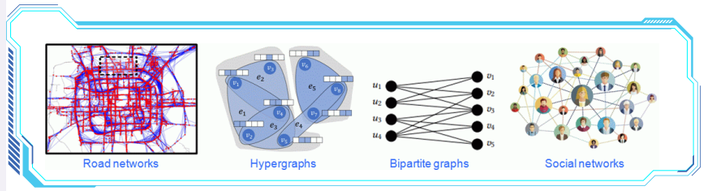
Dr HUANG Xiao

Error-Aware and Contrastive Knowledge Graph Learning

Various intelligent systems, such as search engines, recommender systems, and conversational agents, use knowledge graphs (KGs) as essential components in their operations. Errors in KGs significantly affect these KG-based systems. This particular project investigates error-aware KG learning techniques to eliminate the impact of any errors. A widely applicable framework that can integrate off-the-shelf KG-embedding models to make them error-aware will be developed to enhance prediction performance and provide more accurate results to the public.

Dr SHI Jieming

GPU-based Approximate Query Processing of High-Order Proximities on Billion-Scale Graphs



Querying efficiently on gigantic graphs is highly useful. This project develops new approximate techniques with accuracy guarantees for high-order proximity queries on large-scale graphs. It extends parallel solutions with compact indexing schemes and load-balancing techniques to GPU, exploiting advanced GPU features. Batch processing with high throughput and dynamic graph handling is explored to enhance the power and utility of the solutions, which will be implemented and extensive evaluations conducted on real-world data, such as road networks, social networks, hypergraphs, etc.

Fundamentals & Software

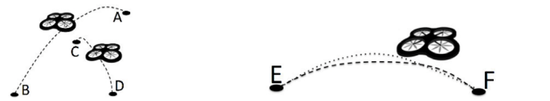
Dr ZHANG Zhaorui | Dr LI Bo | Dr CAO Yixin | Dr WANG Qixin | Dr PEI Yu Max | Dr LYU Mingsong

Fundamentals and Software focuses on theories, methodologies, and tools for safety-critical, high-performance, complex software and related systems. The group addresses key challenges on the theory of computing, software engineering, and cyber-physical systems. Research topics include algorithms, complexity theory, real-time scheduling, verification, debugging, fault tolerance, and how to tackle associated problems in a cross-cyber-physical domain context.

Excellent Research Projects

Dr WANG Qixin

Designing Oracles for Control-CPS Software Bug Localisation



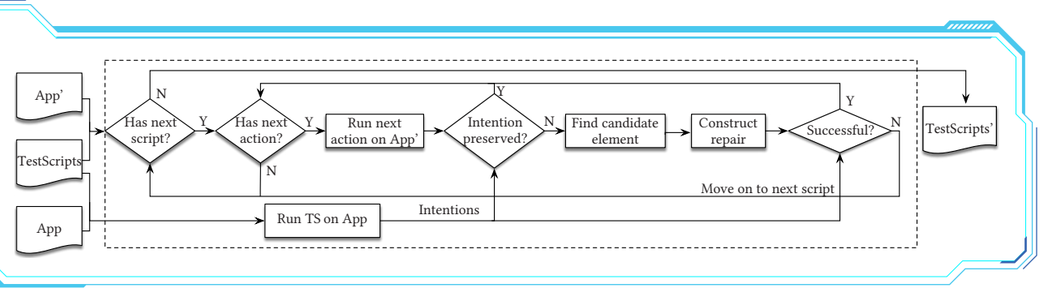
(a) Is/are arc A→ B or C→D correct? (b) Is/are the dotted or the dashed curve correct?

Fig. 1: Control-CPS oracle problem is hard, e.g. in quadcopter autopilot, how to tell which physical trajectories are correct?

Testing and debugging are critical for any software systems, but millions of test case execution traces labelled 'correct' or 'wrong' are still needed. Manually labelling them is virtually impossible. For this reason, an automatic labelling algorithm, aka oracle, is essential. However, the design of oracles is widely understood to be a particularly difficult problem for regular software and even harder for control-CPS, where complex software is used to control physical machineries. This project is among the first to explore the oracle problem as it relates to controlling CPSs. Its output lays the foundations for future control-CPS oracle research, as well as future control-CPS testing and debugging research.

Dr PEI Yu Max

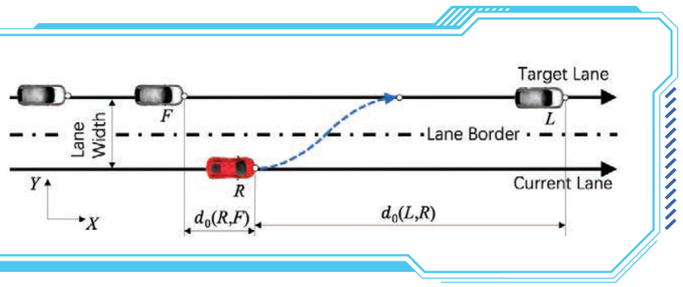
GUI-Guided Test Script Repair for Mobile Apps



Graphical User Interface (GUI) test scripts are widely used for testing mobile apps. However, these test scripts are sensitive and often become obsolete when the GUI changes. Given this challenge, in close collaboration with researchers from Nanjing University, we have developed several novel techniques that extract the intention, or the intended behaviour of the GUI test scripts and then utilise that intention information to guide the automatic repair of obsolete GUI test scripts. When applied to real-world industry-level mobile apps, our techniques enable substantially higher numbers of test scripts to run correctly than existing approaches.

Dr WANG Qixin

A Template-based Design Methodology for Safety-Guaranteed Cyber-Physical Systems



Cyber-Physical Systems (CPS) are the results of the inevitable integration of computers with physical domain applications, such as smart medical operations, smart driving, and robotics. This project aims to investigate an analytical approach comprising three components. First, it proposes generic design templates for typical safety-critical CPSs. Second, it proposes a workflow to expand the templates into detailed designs. Third, with overall complexity under control, it creates a synergy with the model-checking approach as well as the empirical/statistical approach. Collectively termed the "Template-based Design Methodology," the feasibility of this approach has been corroborated by several pilot case studies we have published.

Networking & Mobile Computing

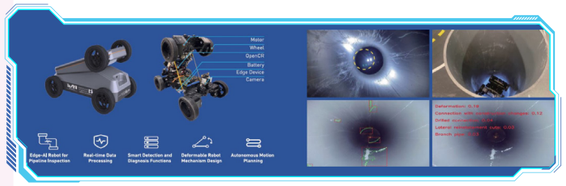
Dr SAXENA Divya | Dr GUO Jingcai | Dr YANG Lei Ray | Prof. WANG Dan | Prof. CAO Jiannong | Dr CHAN Chun Bun Henry | Dr LOU Wei | Dr XIA Xianjin

Networking and Mobile Computing is concerned with designing efficient communications protocols and architectures for exchanging data among computers and mobile devices, enabling a wide range of networked applications with enhanced real-world experience of network and mobile users. Research areas investigated by the group faculty include but are not limited to edge computing, smart sensing and networking, pervasive and mobile computing, Internet of Things, and network measurement.

Excellent Research Projects

Prof. CAO Jiannong

Edge AI-Empowered Smart Devices and Robotics for AIoT Applications

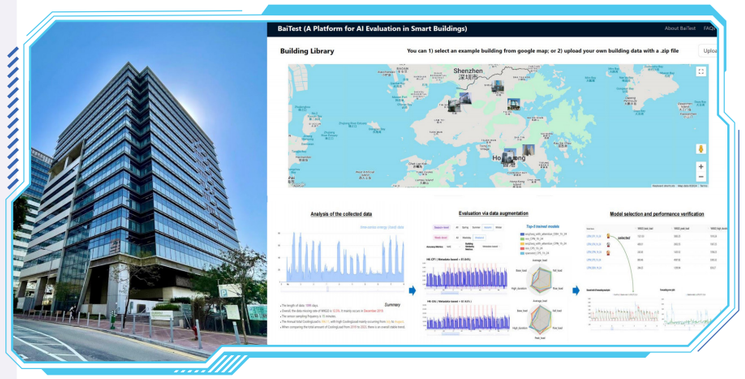


We propose a Collaborative Edge Computing Framework (CECF) for advanced smart city applications requiring ultra-low latency, large-scale deployment, and dynamic access. CECF aims to build future ubiquitous computing infrastructure by connecting and managing numerous edge nodes, enabling them to share resources and collaborate on tasks. We will address issues like scalable resource management, resource heterogeneity, large-scale task scheduling, and user-friendly application support. Specifically, we will develop a distributed resource management system for efficient resource sharing, design a high-performance task scheduling algorithm for large-scale edge nodes, and create a general programming model and runtime support for high-performance edge AI model training and inference. To evaluate CECF, we will implement it with a GIS-enabled intelligent transportation application in collaboration with industry partners like HKSTP, Huawei, Alibaba, and Esri.

This project identifies critical scientific challenges and develops innovative solutions, including new methods, algorithms, and a real-world testbed. It aims to establish HK with next-generation computing infrastructure, backed by a team of experienced researchers, ensuring its success.

Prof. WANG Dan

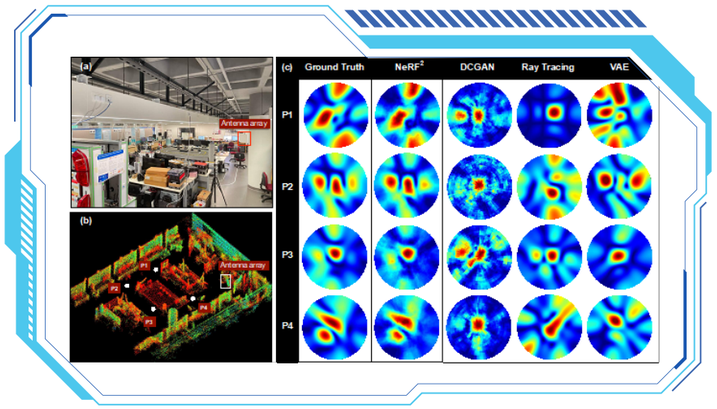
BaiTest: A Platform for AI Evaluation in Smart Buildings



Machine learning (ML) models have been widely developed for building HVAC systems. Intrinsically, there has been a lack of a methodology related to building ML model evaluation. In this project, we proposed a BaiTest (Building AI Test), a new evaluation methodology for ML modelling in buildings with an evaluation platform to realise our methodology. With AI forecasting models provided by the Electrical & Mechanical Services Department of the HKSAR Government, a BaiTest can be used by building operators and AI developers to compare and select appropriate ML models through interactive visualisation services.

Dr YANG Lei Ray

NeRF2: Neural Radio-Frequency Radiance Fields



Over 150 years after James Clerk Maxwell's discoveries in electromagnetism, challenges still exist in predicting how radio signals travel through complex environments. Our research introduces the Neural Radio-Frequency Radiance Field (NeRF2), a breakthrough model that simplifies understanding of radio signal paths, even in cluttered settings. This tool could eventually enhance technologies like indoor localisation and 5G networks, making connections faster and more reliable. Our work won "Best Paper Award - Runner-up" at ACM MobiCom 2023.

Vision, Language & Graphics

Dr SIN Ping Tat Zackary
Dr YANG Bo
Dr LI Chen Richard
Prof. ZHANG Lei John
Prof. CHEN Changwen
Prof. LI Wenjie Maggie
Dr LI Jing Amelia
Dr HE Chenhang
Dr YONG Hongwei

The VLG group (Vision, Language and Graphics) has been dedicated to AI driven solutions to both fundamental research and innovative technology development in the areas of computer vision, speech and multimedia. Specifically, the work done by our group expands on smart biometric sensing, robust multimedia information management and understanding, information visualization, and interactive natural language processing with applications to smart city development and health care.

Excellent Research Projects

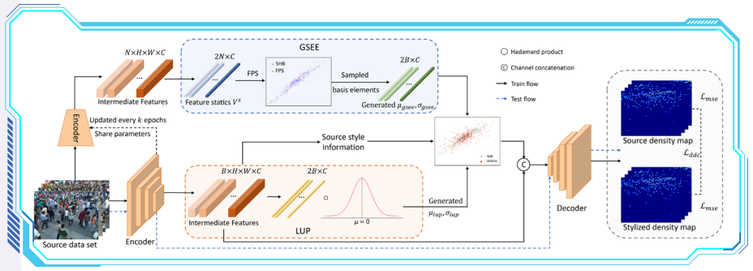
Dr LI Jing Amelia

AI-Care: A Multi-modal Financial Assistant for the Visually Impaired

AI-Care, funded by the ITF and industry partners, is a financial assistant designed to help the nearly 175 thousand visually impaired (VI) people in Hong Kong. Using advanced multi-modal AI capabilities, AI-Care provides VI users with affordable, intelligent, and hands-on assistance for daily payment tasks. Through the joint efforts of academia and industry, AI-Care enables VI users to manage daily tasks independently, which enhances their quality of life and promotes their inclusivity in society.

Prof. CHEN Changwen

Domain-Agnostic Crowd Counting via Uncertainty-Guided Style Diversity Augmentation



Domain shift is challenging crowd counting algorithms in new areas. Existing methods using target domain images are impractical due to difficulties in image acquisition and extra training time. We have proposed the Uncertainty-Guided Style Diversity Augmentation (UGSDA) method to solve this problem by training models on source domain images alone. UGSDA generates diverse, realistic samples using global styling, local uncertainty perturbations, and density distribution consistency. This contributes significantly to the application of object counting in different scenarios.

Prof. CHEN Changwen

E.T. Chat: Event-level and Time-sensitive Video-Language Understanding Systems

Existing video understanding systems are specially designed for short and single-event videos, but come with substantial drawbacks in multi-event video understanding. In this project, we provide a comprehensive solution for event-level and time-sensitive video-language understanding. It comprises these three contributions:

1) E.T. Bench - a first-ever, high-quality benchmark for open-ended, event-level video understanding
2) E.T. Chat - a novel MLLM reformulating timestamp prediction as an embedding matching problem
3) E.T. 164K - a large-scale instruction-tuning dataset supporting event- and time-aware training

Prof. CHEN Changwen

OvSGTR: Fully Open-Vocabulary Scene Graph Generation

Scene Graph Generation (SGG) offers a structure representation of visual data, which is critical in many vision applications. In this project, we advance the SGG task from a closed set to a fully open-vocabulary setting based on the node and edge properties, categorizing SGG scenarios into four distinct settings including Closed-SGG, OvD-SGG, OvR-SGG, and OvD+R-SGG. Towards fully open vocabulary SGG, we design a unified framework named OvSGTR with transformers. The proposed framework learns to align visual features and concept information with not only base objects, but also relation categories and generalize on both novel object and relation categories.

Transformative Education in Computing: Nurturing Talent with CARES

Albert Einstein once remarked - "Education is not the learning of facts but the training of minds to think." This insightful piece of wisdom captures the essence of transformative education, particularly in the field of computing. The primary objective of education should extend beyond the mere dissemination of information; it should aim to develop critical thinking, problem-solving, and decision-making abilities.

The educational philosophy of COMP comprises four pillars — *Career, Application, Research, and Entrepreneurship*. It exemplifies our dedication to fostering well-rounded individuals who are equipped to excel in various domains, a reflection of our care for students. This philosophy not only emphasises knowledge acquisition but also underscores our commitment to the comprehensive development of our students.

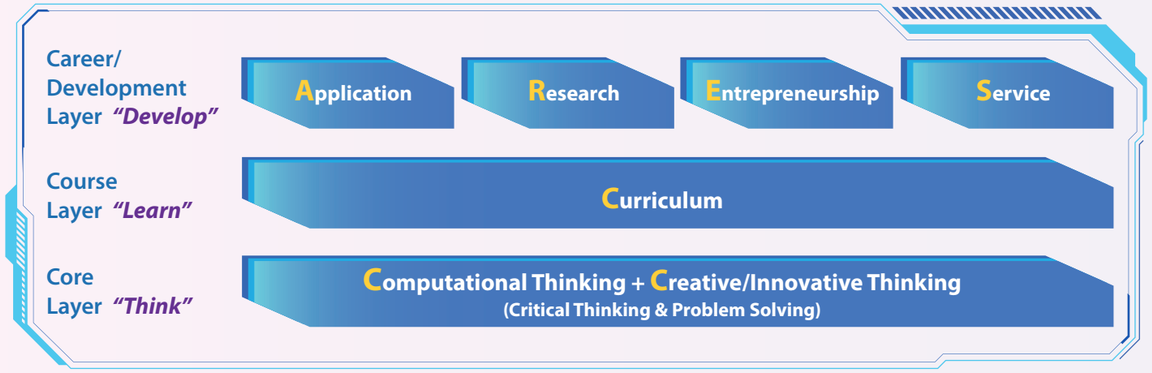


Fig. 1: CARES Model: Computing for Application, Research, Entrepreneurship and Service

From a wider perspective, our educational approach is exemplified by the CARES model shown in Fig. 1. This model comprises an innovative 3-layer framework with the core layer ("Think"), the course layer ("Learn"), and the career/development layer ("Develop").

The core layer of the CARES model cultivates two essential thinking skills: computational and creative to shape students' futures. Computational thinking involves solving problems logically, incorporating skills like algorithmic thinking and abstraction. Creative thinking focuses on generating new and innovative ideas.

The course layer of the CARES model centres on the curriculum or programmes related to knowledge and skills for computing education. Our unique 4-year undergraduate programmes comprise a common fundamental year, a broadening year, a strengthening year and a specialising year. Students can select suitable programmes at the end of the first year, followed by an internship option in their 3rd year to gain eight months of full-time work experience while studying in the evening.

The career/development layer of the CARES model has four major areas: Application, Research, Entrepreneurship, and Service, representing potential career trajectories for students post-graduation. Application involves applying computing knowledge in specific domains, such as working as a software developer. Research focuses on advancing knowledge through investigation, including pursuing a PhD or conducting research. Entrepreneurship focuses on opening a business or joining a startup as well as leveraging computing skills to develop innovative products or services. Service involves the use of computing knowledge to benefit society, such as working for an NGO to develop software for individuals with disabilities.

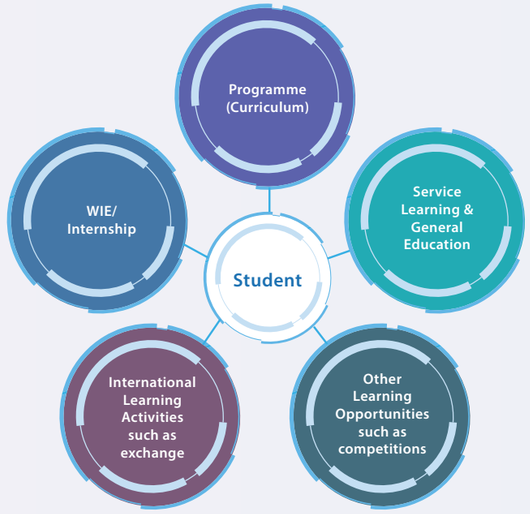


Fig. 2: Student-centred Model with Integrative Learning Elements (SMILE)

To promote holistic student learning, COMP also embraces the SMILE model (Student-centred Model with Integrated Learning Elements)

Five key learning elements include:

1. **Programme or Curriculum**: A comprehensive, up-to-date curriculum that covers essential computing knowledge and skills.
2. **Work Integrated Education (WIE) / Internship for Experiential Learning**: Provides opportunities for students to gain practical experience through internships, allowing them to apply their knowledge in real-world settings.
3. **Service Learning and General Education**: Initiatives that support a multi-faceted education and encourage use of skills for the betterment of society.
4. **International Learning**: Allows students to participate in exchange programmes and other international learning experiences to broaden their perspectives and enhance their global outlook.
5. **Other Learning Opportunities**: To encourage and guide students to participate in other learning activities such as competitions, which help develop their skills, gain greater recognition, and build confidence.

COMP has been providing transformative education through our unique philosophy and programmes over the past 50 years. Our holistic learning approach encourages students to:

- **Learn with your brain**: Think critically, innovatively, and creatively.
- **Learn with your eyes**: Read and see new things and technologies.
- **Learn with your ears**: Listen to advice and comments.
- **Learn with your hands**: Develop and build computing systems, applications, and more.
- **Learn with your feet**: Go overseas, live, and work in new places.
- **Learn with your heart**: Learn to serve and serve to learn.

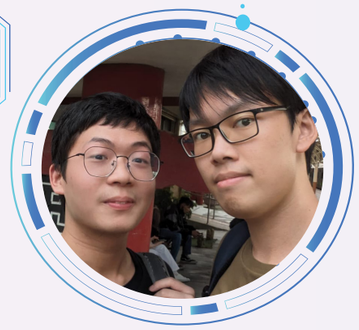
While the above mainly covers undergraduate education, COMP also provides postgraduate education following a similar education approach. We are fully committed to continuing our transformative education to nurture talent in the years to come.

Innovators and Achievers: Student Achievement

The Department has been offering comprehensive programmes designed to nurture students with the theoretical underpinnings of scientific concepts and cutting-edge skills. This together with holistic developments on campus and beyond, empower them to thrive in their future career paths, academic studies or other personal pursuits.

Student Sharing

YEUNG Cheuk Hin Hugo



Studying at PolyU COMP has been instrumental in shaping my career path and opening doors to further studies. The subjects offered by COMP provide a great balance between theoretical knowledge and hands-on experience in fields such as programming algorithms, databases, and software engineering. This solid educational background has equipped me with the necessary skills to excel in the industry after graduation. The most inspiring experience would be the coding competitions hosted by COMP. Not only did it help to enhance my technical skills but it also fostered my problem-solving abilities.

The theme of COMP's 50th anniversary, "Pioneering Possibilities. Powering Potentials," resonates with the current development of AI technology. The bloom of AI is revolutionising every industry, and COMP provides courses that empower individuals to realise their potential and help shape the future of computing.

ZHANG Caiqi

After obtaining my bachelor degree from PolyU, I pursued an MPhil degree at the University of Cambridge. I am currently continuing my PhD studies at Cambridge, focusing on Artificial Intelligence and Large Language Models. My studies at COMP provided me with a solid foundation in computer science through various courses and research opportunities, which sparked my interest in language processing and cognitive science.

To me, "Pioneering Possibilities, Powering Potentials" signifies that everyone possesses limitless possibilities and potential. My personal journey is a testament to this, as I transitioned from a student without a CS background to someone deeply involved in the AI community.

Frank XIANG

In my first year studying at PolyU COMP, I have learned a tremendous amount. Before enrolling, I had some experience with competitive programming in middle school, but I did not fully grasp the comprehensive scope of computer science. Once in the classroom at COMP, I was impressed by the dedication of the teaching and academic staff, who consistently went above and beyond to ensure that we mastered the concepts. Whenever I had questions, they promptly responded.

The most inspiring experience was participating in the International Collegiate Programming Contest (ICPC). Many fellow students who were also interested in participating reached out to me, and we took the initiative to form a team. To our delight, Dr Li Bo discovered our initiative and offered to coach us. I am deeply grateful for the support provided by the professors and the Department as a whole, which has been instrumental in my growth and development during this formative year.

Student Award

Academic Year	Award	Name of Exhibition / Competition	Organiser / Awarding Organisation	Awardees
2023/24	Champion Award	Final Year Proiect Competition 2023-2024	IEEE (Hong Kong) Computational Intelligence Chapter	JIANG Yivang
2023/24	Merit Award	Final Year Proiect Competition 2023-2024	IEEE (Hong Kong) Computational Intelligence Chapter	YANG Zhanpeng
2023/24	Group Competition Award First Prize	ASC24 Student Supercomputer Challenge	Asia Supercomputer Community (ASC)	ZHANG Haolin, BAO Yucheng, CHEN Junru, SUN Hansong, ZHAO Qingsen
2023/24	Champion (DIV-2 track) Overall Champion	2024 Programming Contest of the Chinese University of Hong Kong, Shenzhen	Chinese University of Hong Kong, Shenzhen (CUHK-Shenzhen)	XIANG Yufan
2023/24	Bronze Medal	Huawei Cup The 2023 ICPC Asia-East Continent Final Contest	ICPC Foundation	XIANG Yufan, SUN Hansong, XU Le
2023/24	First Prize	Huawei ICT Competition 2023-2024 HKSAR	Huawei	XIANG Muze, FANG Jifei, Nurdaulet NAZARBAY, Instructor: CAO Mingpei
2023/24	Silver Medal	The 2023 ICPC Asia Macau Regional Contest	ICPC Foundation	XIANG Yufan , CHEN Junru , FU Guanhe
2023/24	Bronze Medal	The 2023 ICPC Asia Shenyang Regional Contest	ICPC Foundation	SUN Hansong, YAN Zhangyan, XU Le
2023/24	Track 1 Winner	Intel Neuromorphic Deep Noise Suppression Challenge	Intel	HAO Xiang, MA Chenxiang

Innovators and Achievers: Student Achievement

Student Award

Academic Year	Award	Name of Exhibition / Competition	Organiser / Awarding Organisation	Awardees	Project Name / Product / Other Information
2023/24	Silver Medal	The 2023 ICPC Asia Xi'an Regional Contest	ICPC Foundation	XIANG Yufan, CHEN Junru, ZHANG Haolin	
2023/24	Bronze Medal	The 2023 ICPC Asia Xi'an Regional Contest	ICPC Foundation	FU Guanhe, LI Yifeng, SUN Hansong	
2022/23	Best Mixed Reality Game	Global Game Jam Hong Kong 2023	Global Game Jam	MA Yujun, DIK Nga-Yin	Green Deck Simulation Game Design
2022/23	2nd Runner-up (Chinachem Group)	HKGCC Business Case Competition 2022	Hong Kong General Chamber of Commerce (HKGCC)	AU Lok To, YU Man Fai	Ninaland
2022/23	Outstanding UI/UX design	Cathay Hackathon 2022	Cathay Pacific	YU Man Fai, CHAN Chi Wui, KWON Hee Jun, KWONG Fai, Wan	Tripify
2022/23	Tertiary Track Award & Fintech Runner-Up & Award of Merit	Greater Bay Area Blockchain Olympiad 2022	The Hong Kong Blockchain Society	YU Tzu Yin Claire, LO Yan Suet Harriet	Blockarian – B-Safe
2022/23	Award of Merit	Greater Bay Area Blockchain Olympiad 2022	The Hong Kong Blockchain Society	LIU Mingci Daisy, WANG Zhuchen Sunny, MA Siqi Mars, WONG Hung Ying Ottilia, CHAN Tsz-hin Frankie	Innotar
2022/23	FIRST RUNNER-UP	Final Year Project Competition 2021 – 2022	IEEE (Hong Kong) Computational Intelligence Chapter	Sweta DAS	Affective Awareness Agents in Virtual Reality
2021/22	Best Engagement Game	Global Game Jam Hong Kong 2022	Global Game Jam	WU Chun Hung, SIN Ping Tat Zachary, TAI Kai Sin, CHEN Qi	Project: Human Nature
2021/22	Best AR Game	Global Game Jam Hong Kong 2022	Global Game Jam	BENEDICT Nicholas, COA Michael, HADI Nelsen, LIU Zihang	Project: Mono
2021/22	Second Runner Up under the track of Silvercard	T2 – INNOVATIVE THINKING WORKSHOPS & IDEA PITCHING	Hong Kong Science Park	SOU Ho Kong, IP Pui Tung, CHEUNG Yuen Ching	Project: WalkStreet Safe
2021/22	優異獎	2021前海粵港澳青年創新創業大賽香港區比賽(大專組)	前海管理局	SOU Ho Kong	Project: Finative
2021/22	Student Innovation Grand Award & Student Innovation (Tertiary or above) Gold Award	Hong Kong ICT Awards 2021	Office of the Government Chief Information Officer, HKSAR	XU Zhenda	Project: Dr Body-Scan
2021/22	Most Innovative Award (Open Stream)	New World Innovation Challenge 2021	New World Development	NG Wang Hei Romeo	Team: Team Avant

Award List from Year 2019/20 to 2023/24. Due to limited space, the award list is not exclusive.

State-of-the-art Facilities

COMP has made significant, high impact research contributions in order to stay abreast with knowledge advancements and global developments in computing and information technology as well as facilitating technology transfer. We are fully engaged in an extensive spectrum of six research areas, including: artificial intelligence and robotics; cyber security and privacy; data science, information retrieval and human computer interaction; fundamentals and software; networking and mobile computing; as well as vision, language and graphics. Our mission and ambition is fully supported by our six advanced research centres and laboratories as well as a series of teaching laboratories, all equipped with state-of-the-art hardware and software.

Advanced Research Centres & Labs

- Centre for Large AI Models (CLAIM)
- FinTech and Cyber Security Lab (FCSL)
- Internet and Mobile Computing Lab (IMCL)
- Research Centre for Data Science and Artificial Intelligence (RC-DSAI)
- Research Centre of Blockchain Technology (RCBT)
- University Research Facility in Big Data Analytics (UBDA)

Teaching Facilities

- Integrated Computing Lab

- Embedded Computing Lab

- Virtual Reality & Game Lab

- Case Study Room
- Capstone Project Lab

Innovators and Achievers: Alumni Achievement

At PolyU COMP, we proudly recognise our alumni and the unwavering commitment to excellence they have shown, not only for their exemplary professional, entrepreneurial, or scholarly achievements across different fields and institutions, but also for their active support of our alma mater, as well as their impactful contributions to COMP, PolyU, and the community at large. Our alumni network is replete with individuals who have distinguished themselves through their remarkable development, pioneering efforts, and innovative accomplishments, all of which significantly inspiring the next generations of COMP students.

Mr Andy Wan

Outstanding Alumni Awardee of PolyU COMP 2022

Former Director of Transformation & Delivery
COIO office, AXA Hong Kong

I am currently based in the UK, having moved here two years ago after serving as the Director of Transformation & Delivery in the COIO office at AXA. I have over 20 years of experience in the financial services industry, working across technology and operations, from a programmer to a management team member. In the past 10 years, I was responsible for establishing holistic transformation strategies, leveraging technology to streamline operations, enhance automation, and create exceptional customer experiences through digitalisation.

My time at PolyU's COMP department was instrumental in shaping my professional journey. The department's focus on practicality, particularly through hands-on projects like the Final Year Project, provided invaluable experience in tackling real-world challenges creatively. Beyond technical skills, PolyU and its professors taught us crucial soft skills, including how to approach and manage problems effectively. This blend of technical and strategic insights, along with the guidance from exceptional professors and tutors who acted as mentors, prepared me well for the professional world.

The 50th-anniversary theme, "Pioneering Possibilities. Powering Potentials," resonates deeply with me. In a world rapidly transformed by technological advancements, embracing change and harnessing the potential of AI and digital innovations is vital. However, it's equally important to balance these advancements with ethical considerations, ensuring technology serves humanity responsibly. This mindset continues to guide my career and reflects the values instilled in me during my time at PolyU.

Dr Darron Sun

Outstanding Alumni Awardee of PolyU Faculty of Engineering 2022
Awardee of COMP Alumni Award 2019

Head of Information Technology, Hong Kong Housing Society (HKHS)

As the Head of Information Technology at the Hong Kong Housing Society (HKHS), I am responsible for overseeing strategic technology initiatives and driving the organisation's digital solutions efforts. In this role, I have significantly contributed to enhancing HKHS's organisational performance and leading its digital transformation journey.

My professional journey has been shaped by my decision to pursue a Master's degree in Information Systems at COMP. This program provided me with the opportunity to update my technical knowledge after several years of working in the field. Moreover, the diverse background of my classmates, who came from various industries such as banking, marketing, and real estate, broadened my understanding of different sectors and allowed me to collaborate effectively on group projects.

I was fortunate to be taught by Dr Henry Chan, whose passion for teaching was evident, and we have then become the close partners in organizing COMP alumni activities.

The 50th anniversary theme of COMP, "Pioneering Possibilities. Powering Potentials," resonates with me as it reflects the institution's dedication to innovation, discovery, and empowering both students and alumni communities to reach their full potential and create a better future. This aligns with my own experiences and the impact COMP has had on my professional development and career trajectory.

Dr Abraham Lam

Outstanding Young Alumni Awardee of PolyU Faculty of Engineering 2022
Awardee of COMP Alumni Award 2019

CEO of MEGA Automation Ltd and Shenzhen FUSQUARE Technology Ltd.

As the Co-Founder and CEO of a smart building tech startup, I oversee both business development and technological advancements, driving the creation of innovative solutions for smart buildings.

My studies in COMP provided me with a solid foundation in information technologies and research methodologies. The practical projects COMP offered and hands-on experience I gained during my undergraduate courses were crucial in honing my technical skills and problem-solving abilities. The emphasis on hybrid learning and industrial engagement cultivated a mindset that was conducive to innovation and entrepreneurship.

One of my most inspiring experiences in COMP was my final year project, which ignited my passion for research and paved the way for my PhD studies. At the same time, I launched my first startup, allowing me to apply my research to real-world challenges and creating an unforgettable experience.

As COMP celebrates its 50th anniversary with the theme "Pioneering Possibilities. Powering Potentials," I see this as a powerful embodiment of innovation. It signifies how COMP nurtures pioneers who explore new horizons and leverage technology to unlock limitless opportunities for individuals and communities.

Dr Albert YIP

Outstanding Alumni Awardee of PolyU COMP 2023
Board chairman of the Syndicate Capital Group

As board chairman of the Syndicate Capital Group, I provide leadership to top management personnel and senior executives, leading the charge on big-picture decisions and setting the tone for our corporate culture. Today, my own investment conglomerate has been recognised as both the Investor Champion and Corporate Champion of Global Fast Track, supporting fintech, CBDC and other HKSAR government-related initiatives.

My COMP studies served as an important catalyst for my future career path, helping to refine my thinking processes and leveraging my computing knowledge to accelerate overall company growth. As a result, I won the Outstanding Entreneurship Alumni Award, and was the first honouree in Asia, nominated by PolyU, to receive the WACE Award. As my way of giving back to the Department, I have established the Syndicate Lab Alliances Scholarship for COMP students to help foster talent development.

COMP's 50th anniversary is indeed a remarkable milestone achievement. Over the years, the Department has become a community builder and launch pad for young talents in the technology sector. I am also deeply proud and excited by PolyU being ranked globally as the No.1 university for blockchain.

Mr Sky Tang

Outstanding Young Alumni Awardee of PolyU COMP 2023
Founder of Conceptfound Technology International (HK) Limited

As the founder of a startup group with a presence in Hong Kong, Dongguan, and Zhuhai, I am deeply grateful for my studies in the Department. The education I received there provided me with a strong foundation in various innovative technologies and nurtured my passion for the IT industry. Furthermore, the WIE internship programme offered invaluable work experience that proved instrumental in shaping my career path.

Among the many memorable experiences during my studies, my initial encounter with programming stands out. Starting from having no prior knowledge, the journey of successfully completing my first project brought immense satisfaction and ignited in me a deep appreciation for learning and exploration.

The 50th anniversary theme resonates deeply within me. It encapsulates the Department's remarkable journey over the past five decades and serves as a constant source of inspiration for me to reach new heights in my entrepreneurial endeavors. I am confident that the knowledge and skills I gained at the Department will empower me to continue innovating and making a meaningful contribution to society.

Mr Vincent Ma

Outstanding Alumni Awardee of PolyU Faculty of Engineering 2024
Outstanding Alumni Awardee of PolyU COMP 2024
CEO of Hong Kong-Shenzhen Innovation and Technology Park Limited

I am the CEO of Hong Kong-Shenzhen Innovation and Technology Park (HSITP). We are building the new I&T Park at the Lok Ma Chau Loop with a vibrant ecosystem to attract Mainland and overseas technology enterprises. HSITP is also a part of the Hetao SZ-HK I&T Zone, as put forward by the 14th Five- Year Plan, for trial implementation of cross-boundary policy in an innovative, exclusive, and designated manner.

My studies in the Department gave me a head start in my career, preparing me with the appropriate skills and knowledge as well as the right mindset. The training provided welcome advantages that have had a lifetime impact. Moreover, the emphasis on technology applications to address real life problems and support continuous industry growth is the most inspiring aspect, serving as a key sustainable skill to support us to thrive in an I&T career.

The 50th anniversary theme means a sense of forward-thinking, innovation, and growth, while fostering a culture of continuous innovation and development. It is important to keep learning and evolving, and being at the forefront of discovery and creation of new possibilities to achieve fullest potentials.

Ms Bianca Ho

Outstanding Young Alumni Awardee of PolyU COMP 2024
Director of Information Technology (Global) at Swire Hotels Group

As the Director of IT at Swire Hotels Group, I lead a global IT team that ensures smooth 24/7 operations and drives digital transformation in our rapidly growing hotel group. I also serve as a trusted IT advisor, speaker and judge within Swire Group as well as throughout the industry.

My studies in the Department provided me with a solid foundation, not only in terms of technical skills but also for problem-solving and critical thinking which have honed my analytical abilities and boosted my confidence. It also introduced us to cutting-edge technology which I leverage to help benefit my company.

The professors encouraged all of us to enter competitions and start our own ventures which was truly inspiring. This early exposure allowed me to better understand the world's needs. I visited Li Ka-Shing's startups in Tel Aviv, and joined exchange programmes at Lund University, Stanford University, and Peking University. All of these experiences equipped me with a global outlook on technology and entrepreneurship.

The 50th anniversary theme reflects the power of computer science to unlock potential, drive industry advancements, and re-shape society. It has motivated me to contribute more to this dynamic and ever-evolving field.

Societal Impact and Community Engagement

With a steadfast commitment to social responsibility, the Department of Computing (COMP) has consistently harnessed its academic expertise to benefit the wider community, propelling Hong Kong's overall digital advancement. As COMP embarks on its next chapter, it remains resolute in its mission to push the boundaries of innovation, nurture socially conscious tech talents, and drive sustainable progress that betters the everyone's lives of the community. Through research and education, and by engaging with partners and the community at large, COMP has been successful in addressing environmental, social and governance (ESG) concerns, while also preparing students to become responsible future leaders.

Fostering STEM education among younger generations

Computer education is essential for younger generation to expand their horizon in the advancement of information technology, as well as nurture their interests and innate creativities.

For many years, COMP has engaged in a variety of events to foster STEM education among secondary school students. In active collaboration with various institutions, COMP has held a number of activities for local secondary students such as "Computer App Programming Day" and "Senior Secondary Python Programming Contest" that aimed at developing computational and programming knowledge, as well as enhancing logical thinking skills, nurturing creativity, and building team spirit.

The "Metaverse Creators of Tomorrow" competition was held last year to unleash students' creativity and explore the metaverse. This year, the "Senior Secondary Python Programming Contest" focuses on fostering a desire to learn programming and enhance problem-solving abilities.

Enhanced global academic and professional status

Collaboration among academia, professional institutions and industry in hosting events like seminars and forums can leverage each group's advantages to propel technological advancement forward. COMP has also hosted or co-hosted prestigious international conferences with top-notch global professional organisations, providing excellent platforms that allow researchers and practitioners to share their knowledge and research results in theory, methodology, and various applications of computer science and information technology. These large-scale events have encouraged public discussion on different aspects of the computer science field. In fact, a total of six international conferences were hosted or co-hosted between 2022 and 2024.

Many of our academic staff members involved in different areas of specialisation serve on the editorial boards of various leading journals, with a view to advancing knowledge as well as ensuring high professionalism and expertise. This reflects COMP's leadership role in the field of computer science.

Community service

At COMP, we are devoted to undertaking impactful knowledge-transfer research, where students can apply what they have learned to better serve the community. This process also encourages self-reflection and the development of students as responsible citizens, ultimately providing significant benefits to disadvantaged groups.

For example, Virtual Reality (VR) is not only applied in TV games or for entertainment but is also found in healthcare. Such as the use in occupational training for the mentally retarded persons, as well as helping people of visually impaired manage and organise their finances. Computer-Aided Vicarious Exposure (CAVE) is another important VR tool in relieving the stress and fear young patients experience before undergoing surgery. Besides, a VR application for dementia has been developed that employs a reminiscence therapy approach to detect mild dementia at the early stage of the disease, helping to trigger memories, encourage healthy expression in the elderly, and stay in a positive mood.

Service learning

Service-learning is an educational approach that combines learning objectives with community services in order to provide an active, experiential learning framework while meeting various societal needs. As a university's requirement and a core part of PolyU's undergraduate curriculum, service-learning nurtures students' social responsibilities by integrating academic study with meaningful community service.

COMP is one of the first academic units at PolyU to offer offshore service-learning programs. In collaboration with the Service-Learning and Leadership Office, COMP fully supports and offers various service-learning subjects for students to provide services to communities overseas. These experiences help develop students' skills in teamwork building, cultural responsiveness, ethical practices, and encourage critical reflection on academic learning and civic engagement.

Offering academic expertise for making public policies

Academic advice and research evidence are crucial for making policies which benefit the most in society. Empowered by the government, the industry and public, our scholars have been providing expert opinions to help enhance Hong Kong's global competitiveness. For instance, COMP professors have been working in collaboration with the Hong Kong Monetary Authority (HKMA) on ongoing projects to examine various aspects of central bank digital currency and related digital currencies in Hong Kong. Their aim is to integrate advanced privacy designs that protect consumers' personal identifiable information, plus maintain a balance between privacy and traceability, while also fostering the tokenisation market and attracting talents to Hong Kong.

Our partnership with the HKMA is a testament to COMP's commitment to fostering innovation and technological progression to bolster the digital finance landscape and FinTech innovation in Hong Kong.

Developing tech-driven green solutions

COMP has also contributed to promote awareness and commitment to green action by developing the system of the environmental sustainability campaign - "PolyU GreenCoin", which enables users to live and dine green. It also allows them to take part in selected sustainability activities, and then earn Coins to redeem gifts, e-coupons for use in campus, or other attractive offers, all leading to a carbon neutral PolyU.

Looking Ahead: Future Directions

Despite reaching a prestigious peak, we know that there are still ever higher mountains ahead to climb. Our 50th anniversary is a critical milestone, but not the end of the journey. COMP is already preparing for our next stage of development and transformation.

Embracing complex challenges and opportunities

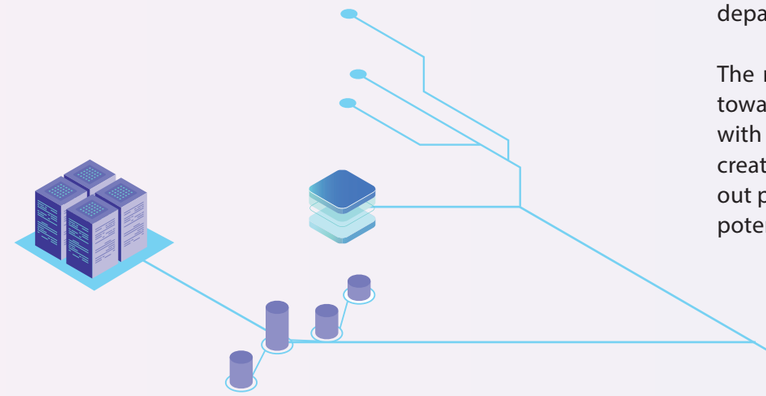
COMP is poised to overcome the disruptive challenges ahead and tap into unexplored opportunities for individuals, businesses, and society to embrace tomorrow's era of computing. Automation is creating the displacement of many routine and repetitive jobs, requiring individuals and businesses to adapt to different models as well as face ethical challenges like privacy and accountability. Conversely, computing is enabling new business operations, improving productivity, efficiency and creativity while also addressing societal issues like climate change and social equity. By applying valuable big data processing, we can create optimised models to substantially improve the quality of life.

Advanced skills in programming, data analysis, and machine learning will become more essential than ever to work with machines and data in the computing era. We believe that educational institutions need to take a proactive approach in training individuals about computing and entrepreneurship to properly prepare them to work with and adapt to new technologies. To this end, cross-discipline collaboration is critical as it helps improve both the understanding and application of computational models and resources in a variety of areas.

Boosting forward-looking research in computer science

To ensure continued growth, COMP will continue to make substantial investments in foundational areas and emerging technologies, focusing on the development of artificial intelligence (AI), algorithms, applications and mitigating bias challenges across a host of domains and applications. In the coming years, the Internet of Things (IoT) is likely to have a significant impact in various applications areas such as healthcare, transportation, energy management and more. Our research will centre on ways to increase efficiency, reduce disparities and lessen environmental impact.

In addition, future research will focus on harnessing the power of emerging and innovative data science techniques and tools for big data processing, decision-making and knowledge management. These will be key research areas in the coming years given advances in quantum computing technology and the growing prevalence of cybersecurity risks. With more and more people accessing the Internet, data collection, social computing and human-computer interaction will be a major direction of research.



To facilitate the advancement of our research achievements, COMP plans to recruit more world-class faculty members with solid and visionary research experience in frontier areas of computer science and information technologies in order to further strengthen our research capacity. Providing research funding, both internally and externally, are always essential to support leading-edge research efforts for both new and established faculty members. Collaborative research involving top-tier academic and industry partners will also be further encouraged, along with the exchange of ideas and knowledge in workshops and trainings, to leverage technology solutions that will benefit our world. Given this scenario, our active participation at international conferences related to our research interests, as well as hosting major, globally recognised conferences and symposiums which bring together academics, researchers, and industrial partners from around the world to exchange knowledge and showcase their latest work. This is all carried out to strengthen COMP's position as an intellectual hub of research, innovation, and industry partnerships in the field of computer science and information technologies.

Creating new academic programmes to nurture future-proof talent

To stay ahead of the STEM industry's evolving needs and maintain an agile workforce for the sector, COMP is taking the initiative to launch new academic programmes over the next few years. Cybersecurity is definitely a key direction to inculcate students with a strong foundation and related technologies to deal with the increasing threats from cyber-attacks. It also complies with various incoming governmental requirements while also strengthening post-pandemic remote infrastructures.

Blockchain is another technological advancement that has the potential to revolutionise the financial industry. To consolidate her competitive edge as an international finance hub, Hong Kong should build a reputation as early adopters. In addition to our MSc programme, we will also introduce an UG programme in blockchain and fintech to address real-world threats by improving security and reducing fraud while also managing financial and non-finance-related transactions more efficiently.

Quantum computing is another rapidly expanding field in computer science with the potential to change many fundamental processes of the computing world. To this end, COMP will collaborate with other departments to develop many new multi-discipline courses.

The rationale behind introducing these new programmes is to align our departmental academic focus towards new emerging fields of computer science to meet the needs of an ever-evolving future. Faced with today's vast range of emerging technologies, we will continue to strive for excellence in order to create opportunities that lead to sustainable and impactful contributions. At the same time we will direct out pioneering efforts toward exploring greater possibilities and empowering our talent to reach their full potential amid today's fast-changing technological landscape.

Ingenious Minds: Best Presentation Awards at COMP 50 Research Student Conference

COMP 50th Anniversary Research Student Conference: Fostering Academic Excellence

The COMP 50th Anniversary Research Student Conference was held on 24 June 2024 in celebration of the Department's impressive milestone and academic excellence. With the aim of promoting collaboration, innovation, and knowledge exchange across various disciplines, this conference was an inspiring platform for research students to showcase their projects while engaging in academic discussions and networking with other peers and professionals. 'Best Presentation Awards' were presented to best oral presentation in the eight parallel sessions to recognise awardees' outstanding performance.

Session 1: Artificial Intelligence and Robotics

Scaling Supervised Local Learning with Augmented Auxiliary Networks

MA Chenxiang Deep neural networks are typically trained using global error signals that backpropagate (BP) end-to-end, which is not only biologically implausible but also suffers from the update locking problem and requires huge memory consumption. Local learning, which updates each layer independently with a gradient-isolated auxiliary network, offers a promising alternative to address the above problems. However, existing local learning methods are confronted with a large accuracy gap with the BP counterpart, particularly for large-scale networks. This is due to the weak coupling between local layers and their subsequent network layers, as there is no gradient communication across layers. To tackle this issue, we put forward an augmented local learning method, dubbed AugLocal. AugLocal constructs each hidden layer's auxiliary network by uniformly selecting a small subset of layers from its subsequent network layers to enhance their synergy. We also propose to linearly reduce the depth of auxiliary networks as the hidden layer goes deeper, ensuring sufficient network capacity while reducing the computational cost of auxiliary networks. Our extensive experiments on four image classification datasets (i.e., CIFAR-10, SVHN, STL-10, and ImageNet) demonstrate that AugLocal can effectively scale up to tens of local layers with a comparable accuracy to BP-trained networks while reducing GPU memory usage by around 40%. The proposed AugLocal method, therefore, opens up a myriad of opportunities for training high-performance deep neural networks on resource-constrained platforms.

Session 2: Cyber Security and Privacy

Optimus: Warming Serverless ML Inference via Inter-Function Model Transformation

HONG Zicong Serverless ML inference is an emerging cloud computing paradigm for low-cost, easy-to-manage inference services. In serverless ML inference, each call is executed in a container; however, the cold start of containers results in long inference delays. Unfortunately, most existing works do not work well because they still need to load models into containers from scratch, which is the bottleneck based on our observations. Therefore, this paper proposes a low-latency serverless ML inference system called Optimus via a new container management scheme. Our key insight is that the loading of a new model can be significantly accelerated when using an existing model with a similar structure in a warm but idle container. We thus develop a novel idea of inter-function model transformation for serverless ML inference, which delves into models within containers at a finer granularity of operations, designs a set of in-container meta-operators for both CNN and transformer model transformation, and develops an efficient scheduling algorithm with linear complexity for a low-cost transformation strategy. Our evaluations on thousands of models show that Optimus reduces inference latency by 24.00%~47.56% in both simulated and real-world workloads compared to state-of-the-art work.

Session 3: Networking and Mobile Computing

Repurposing Optical Mice for Acoustic Eavesdropping

MEI Zhimin Acoustic eavesdropping presents a longstanding challenge in the realm of personal information security and privacy preservation. In this work, we introduce a novel eavesdropping method called JerryAttack, which repurposes an optical mouse as a covert eavesdropping device. Specifically, we transform the mouse's integrated low-resolution but high-fps image sensor into a high-speed camera for visual vibrometry, capable of capturing acoustic vibrations from nearby loudspeakers. Our contributions are threefold: First, we utilize the 'pixel grabber' register as a backdoor to extract the pixel stream from the image sensor. Second, we establish an acoustic-optical side channel that enables effective acoustic eavesdropping. Third, we thoroughly explore two attack scenarios: voice profiling and speech reconstruction. Our findings reveal that the sound recovered through our side channel achieves a mean SNR of 7.3dB, comparable to standard microphone recordings in noisy environments like cafes. Additionally, when combined with a classification neural network, JerryAttack identifies individuals with an overall accuracy of 83.27% across six languages. Moreover, when paired with low-SNR microphone recordings, JerryAttack consistently achieves good intelligibility, with STOI scores exceeding 0.7 in reconstructed results. A demo video can be found at https://tinyurl.com/jerryattack.

Session 4: Data Science, Information Retrieval and Human-Computer Interaction

Efficient and Effective Attributed Networks Clustering via K-Nearest Neighbor Augmentation

LI Yiran Attributed networks containing entity-specific information in node attributes are ubiquitous in modeling social networks, e-commerce, bioinformatics, etc. Their inherent network topology ranges from simple graphs to hypergraphs with high-order interactions and multiplex graphs with separate layers. An important graph mining task is node clustering, aiming to partition the nodes of an attributed network into k disjoint clusters such that intra-cluster nodes are closely connected and share similar attributes, while inter-cluster nodes are far apart and dissimilar. It is highly challenging to capture multi-hop connections via nodes or attributes for effective clustering on multiple types of attributed networks. In this series of research projects, we first present AHCKA as an efficient approach to attributed hypergraph clustering (AHC). AHCKA includes a carefully-crafted K-nearest neighbor augmentation strategy for the optimized exploitation of attribute information on hypergraphs, a joint hypergraph random walk model to devise an effective AHC objective, and an efficient solver with speedup techniques for the objective optimization. The proposed techniques are extensible to various types of attributed networks, and thus, we go on to develop ANCKA as a versatile attributed network clustering framework, capable of attributed graph clustering (AGC), attributed multiplex graph clustering (AMGC), and AHC. Moreover, we devise ANCKA-GPU with algorithmic designs tailored for GPU acceleration to boost efficiency. We have conducted extensive experiments to compare our methods with 15 AHC competitors on 8 attributed hypergraphs, 10 AGC competitors on 6 attributed graphs, and 10 AMGC competitors on 3 attributed multiplex graphs, all demonstrating the superb clustering quality and efficiency of our methods.

Ingenious Minds: Best Presentation Awards at COMP 50 Research Student Conference

Session 5: Networking and Mobile Computing

Revolutionizing LoRa Gateway with XGate: Scalable Concurrent Transmission across Massive Logical Channels

YU Shiming

LoRa is a promising technology that offers ubiquitous lowpower IoT connectivity. With the features of multi-channel communication, orthogonal transmission, and spectrum sharing, LoRaWAN is poised to connect millions of IoT devices across thousands of logical channels. However, current LoRa gateways utilize hardwired Rx chains that cover only a small fraction (<1%) of the logical channels, limiting the potential for massive LoRa communications. This paper presents XGate, a novel gateway design that uses a single Rx chain to concurrently receive packets from all logical channels, fundamentally enabling scalable LoRa transmission and flexible network access. Unlike hardwired Rx chains in the current gateway design, XGate allocates resources including software-controlled Rx chains and demodulators based on the extracted meta information of incoming packets. XGate addresses a series of challenges to efficiently detect incoming packets without prior knowledge of their parameter configurations. Evaluations show that XGate boosts LoRa concurrent transmissions by 8.4× than state-of-the-art.

Session6: Data Science, Information Retrieval and Human-Computer Interaction

KnowGPT: Black-Box Knowledge Injection for Large Language Models

ZHANG Qinggang

Generative Large Language Models (LLMs), such as ChatGPT and GPT-4, offer interactive APIs that can answer common questions at a human-expert level. However, these models often give inaccurate or incorrect responses when faced with questions requiring domain-specific or professional-specific knowledge not covered in their training corpus. Furthermore, many state-of-the-art LLMs are not open-source, making it challenging to inject knowledge with model APIs only. In this work, we introduce KnowGPT, a black-box knowledge injection framework for LLMs in question answering. KnowGPT leverages deep reinforcement learning (RL) to extract relevant knowledge from Knowledge Graphs (KGs) and use Multi-Armed Bandit (MAB) to construct the most suitable prompt for each question. Our extensive experiments on three benchmark datasets showcase that KnowGPT significantly enhances the existing methods. Notably, KnowGPT achieves an average improvement of 23.7% over ChatGPT and an average improvement of 2.9% over GPT-4. Additionally, KnowGPT attains a 91.6% accuracy on the OpenbookQA official leaderboard, which is comparable to human-level performance.

Session 7: Cyber Security and Privacy/ Fundamentals and Software

Leaking Arbitrarily Many Secrets: Any-out-of-Many Proofs and Applications to RingCT Protocols

ZHENG Tianyu

Ring Confidential Transaction (RingCT) protocol is an effective cryptographic component for preserving the privacy of cryptocurrencies. However, existing RingCT protocols are instantiated from one-out-of-many proofs with only one secret, leading to low efficiency and weak anonymity when handling transactions with multiple inputs. Additionally, current partial knowledge proofs with multiple secrets are neither secure nor efficient to be applied in a RingCT protocol.

In this paper, we propose a novel any-out-of-many proof, a logarithmic-sized zero-knowledge proof scheme for showing the knowledge of arbitrarily many secrets from a public list. Unlike other partial knowledge proofs that have to reveal the number of secrets [ACF21], our approach proves the knowledge of multiple secrets without leaking the exact number of them. Furthermore, we improve the efficiency of our method with a generic inner-product transformation to adopt the Bulletproofs compression [BBB+18], which reduces the proof size to 2log_2(N) + 10.

Based on our proposed proof scheme, we further construct a compact RingCT protocol for privacy cryptocurrencies, which can provide a logarithmic-sized communication complexity for transactions with multiple inputs. More importantly, as the only known RingCT protocol instantiated from the partial knowledge proofs, our protocol can achieve the highest anonymity level compared with other approaches like Omniring [LRR+19]. For other applications, such as multiple ring signatures, our protocol can also be applied with some modifications. We believe our techniques are also applicable in other privacy-preserving scenarios, such as multiple ring signatures and coin-mixing in the blockchain.

Session 8: Artificial Intelligence and Robotics/ Vision, Language and Graphics

Segment Anything in 3D Gaussians

HU Xu

3D Gaussian Splatting has emerged as an alternative 3D representation of Neural Radiance Fields (NeRFs), benefiting from its high-quality rendering results and real-time rendering speed. Considering the 3D Gaussian representation remains unparsed, it is necessary first to execute object segmentation within this domain. Subsequently, scene editing and collision detection can be performed, proving vital to a multitude of applications, such as virtual reality (VR), augmented reality (AR), game/ movie production, etc. In this paper, we propose a novel approach to achieve object segmentation in 3D Gaussian via an interactive procedure without any training process and learned parameters. We refer to the proposed method as SA-GS, for Segment Anything in 3D Gaussians. Given a set of clicked points in a single input view, SA-GS can generalize SAM to achieve 3D consistent segmentation via the proposed multi-view mask generation and view-wise label assignment methods. We also propose a cross-view label-voting approach to assign labels from different views. In addition, in order to address the boundary roughness issue of segmented objects resulting from the non-negligible spatial sizes of 3D Gaussian located at the boundary, SA-GS incorporates the simple but effective Gaussian Decomposition scheme. Extensive experiments demonstrate that SA-GS achieves high-quality 3D segmentation results, which can also be easily applied for scene editing and collision detection tasks.

You are invited to reach us!

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