

## CAiRS InnoHK Launch Ceremony concludes with great success

The InnoHK Launch Ceremony was successfully held on 25 May 2022, marking a new milestone in the Hong Kong Special Administrative Region (HKSAR) Government's commitment to promoting Hong Kong's innovation and technology (I&T). As the flagship I&T initiative of the HKSAR Government, InnoHK aims to promote global research collaboration with a view to putting Hong Kong on the global advanced technology map.



## Professor Jin-Guang Teng, President of PolyU visits CAiRS



Professor Jin-Guang Teng, President of PolyU visited CAiRS on 25 May 2022 (Wed). Accompanied by Professor Christopher Chao, Vice President (Research and Innovation), Professor Wing-tak Wong, Deputy President and Provost and Professor Larry Chow, Director of Research and Innovation of PolyU (currently he is Head(ABCT) & Professor of PolyU), Professor Teng visited the main office and Research Lab of CAiRS in Hong Kong Science Park (HKSTP) to explore how CAiRS' research in safety & reliability by using AI and advanced technologies. Ir Professor Winco Yung, Executive Director and Centre Director of CAiRS introduced the mission and vision, research works to guest at the visit.

## AI-based Reliability & Safety Transforming Smart Manufacturing and Smart City with Applications

CAiRS organised technical seminar titled "AI-based Reliability & Safety – Transforming Smart Manufacturing and Smart City with Applications" reveals the future Smart Manufacturing and Smart City in the context of reliability and safety.



Over 100 guests join the seminar



Ir Prof. H.C. Man, Dean of Engineering Faculty of PolyU to deliver welcoming remarks in the afternoon session.



# Program Leader Interview

## 訪問項目負責人助理教授



**張曉革博士**  
**Dr Xiaoge Zhang**

**CAiRS的項目負責人**  
香港理工大學工業及系統工程學系助理教授

**PolyU Program Leader of CAiRS**  
Assistant Professor,  
Department of Industrial and Systems Engineering (ISE),

Centre for Advances in Reliability and Safety (CAiRS) links academic and industrial counterparts to introduce and implement artificial intelligence methods and machine learning techniques with reliability modeling, with the goal of improving product reliability and system safety. In this issue, we invited Dr Xiaoge Zhang to share his experience in his research areas and how to apply AI to CAiRS' research. He is currently an Assistant Professor in the Department of Industrial and Systems Engineering (ISE) at The Hong Kong Polytechnic University and a Program Leader of one of the CAiRS projects.

Dr. Zhang's research interests include risk & reliability analysis, resilience modeling, machine learning, uncertainty quantification, and data science. His work has appeared in leading academic journals, such as Risk Analysis, IEEE Transactions on Reliability, Decision Support Systems, Information Sciences, Reliability Engineering and System Safety, IEEE Transactions on Cybernetics, and Annals of Operations Research, among others. He is a member of IEEE, INFORMS, and SIAM.

「產品可靠性暨系統安全研發中心」(「CAiRS」)與學術界和業界攜手，引入並應用人工智能方法和機器學習技術，同時利用模型進行分析，以提高產品可靠性和系統安全性。我們在本期週刊訪問了張曉革博士，他分享了其所屬研究範疇的經驗，以及如何將人工智能應用於CAiRS的研究中。張博士現為香港理工大學工業及系統工程學系的助理教授，也是其中一個CAiRS項目的項目負責人。

張博士的研究範疇主要圍繞風險與可靠性分析、系統彈性建模、機器學習、不確定性量化和數據科學。他的學術作品均曾在主要學術期刊上發表，期刊包括Risk Analysis、IEEE Transactions on Reliability、Decision Support Systems、Information Sciences、Reliability Engineering and System Safety、IEEE Transactions on Cybernetics 及 Annals of Operations Research等。張博士亦是電機電子工程師學會 (IEEE)、運籌學與管理科學研究所 (INFORMS) 和工業與應用數學學會 (SIAM) 的會員。



## What is your research direction and focus? 你的研究方向和重點是什麼？

**Dr. Zhang:** Let me give you a brief background about myself. I got my PhD in System Engineering from Vanderbilt University in Nashville, Tennessee, United States. During my PhD, I focused on developing and applying machine learning and artificial intelligence algorithms to air transportation system, nuclear power plant, etc. AI is indeed very powerful, but we must keep in mind that AI is not perfect and there are some severe problems we need to seriously think about before we fully embrace it. For example, when we apply them to high-stakes decisions and critical applications, like healthcare, aerospace, power grid, it is important to establish a decision boundary to indicate under what kind of conditions AI produces reliable decisions. For instance, we can divide the decision region into multiple regions, like A/B/C. We may identify region A, where we can apply with 100% confidence, but in region C we shouldn't apply AI, and the decision should be passed over for human judgment. That's the first thing I want to investigate. Secondly, how can we increase our risk awareness in artificial intelligence or machine learning algorithms? What I mean is, we need to develop a dedicated risk management framework for AI, because AI faces a lot of threats in the open-world application, like model drift, adversarial attack, out-of-domain data, bias, etc.

**張博士:** 請讓我簡單介紹一下我的背景。我在美國田納西州納什維爾的範德比爾特大學取得系統工程博士學位。在攻讀博士學位期間，我專注於研發機器學習和人工智能演算法，並將其應用到航空運輸系統、核電站等。人工智能確實非常強大，但我們必須記住，人工智能並不完美，在我們完全接受它之前，有一些嚴峻的問題需要我們認真思考。例如，當我們將人工智能應用於高風險決策和重要應用環境（如醫療保健、航空航天、電網）時，首要就是要建立一個決策範圍，以界定在什麼的情況下，人工智能可以如何進行可靠的決策。例如，我們可以將決策範圍劃分為多個區域，如A/B/C。我們可以將A區域界定為具有100%信心應用人工智能的範圍，而C區域則不能，在進行決定時應交由人類去判斷。這是我想研究的第一件事。其次，我們如何提高人工智能或機器學習演算法方面的風險管理？我的意思是，我們需要為人工智能製訂一套專門的風險管理框架，因為人工智能在開放的世界應用環境當中會面臨很多威脅，比如模型漂移、對抗性攻擊、域外數據、偏見等。

## How do you see the connections between AI and reliability & safety? 你如何看待人工智能與可靠性和安全性之間的關係？

**Dr. Zhang:** Safety is an important concern in large-scale complex systems. To ensure the safety of these systems, we typically install a lot of sensors to monitor their health conditions. A large volume of data is collected by these sensors, and the data are generally in different formats, like images, videos, and even texts. How to extract useful insights from these raw data to support informative operations management is a big challenge. Our goal is to draw insights and conclusions driven by the data to support practical operations, such as health assessment, maintenance, system refinement, etc. Given the large volume of data in different formats, we cannot do anything with it by hand. That's where AI and machine learning really come into play because they are like the bridge to connect data with insights we intend to extract. In fact, AI/machine learning is a very big field, including data processing or feature engineering. The advanced deep learning algorithms free us from the need of handcrafted engineering features from the raw data. Combine these components together, like our sensors, data processing, learning, that's like a closed-loop ecosystem that'll lead us to a reliable and safe complex system. That's my understanding of AI and its role in the reliability and safety assessment of a complex system.

**張博士:** 安全性是大型複雜系統的一個重要議題。為了確保這些系統的安全性，我們通常會安裝很多傳感器來監控它們的健康狀況。這些傳感器收集了大量不同格式的數據，如圖像、影像甚至文字。最大的困難就是如何從這些原始數據中提取有用的資訊，以為營運管理提供實質的理據。我們的目標是從數據中獲取和預測到資訊和結論，以帶來實際成效，例如為健康作評估、維修保養、系統提升等。由於擁有大量不同格式的數據，我們無法用人手處理。這就是人工智能和機器學習真正發揮作用的地方，因為它們就像橋樑一般，把數據和我們想要提取的資訊聯繫起來。事實上，人工智能/機器學習是一個非常龐大的範疇，其中包含數據處理或特徵工程。先進的深度學習演算法允許我們無須對原始數據進行太多人手篩選工序。若果將這些組件（例如：傳感器、數據處理、學習）組合以建立一個閉環生態系統，從中我們就可以建立一個安全可靠的複雜系統。這就是我所理解的人工智能，以及它如何能為複雜系統的可靠性和安全評估方面發揮作用。



## Would you share some more idea or methodology about using AI in reliability and safety?

你能分享更多有關可靠性和安全方面使用人工智能的構思或研究方法嗎？

**Dr. Zhang:** To give you some context, when I was a PhD student I took part in a five-year long project funded by the NASA University Leadership Initiative program. In this project, we explored a diverse set of machine learning and deep learning algorithms built upon a broad range of data sources. Since there are so many data like, onboard sensors, airport sensors, camera, etc., our goal is to fuse these different types of data together to enhance the overall safety of the air transportation system. To this end, I explored a rich set of deep learning algorithms to assess the safety of air transportation system from multiple aspects, such as the Long short-term memory (LSTM) neural network to leverage its advantage in sequence-to-sequence (Seq2Seq) prediction, etc. We also exploited the Bayesian neural network as we were not only interested in having a prediction, but also, we'd like to quantify the uncertainty in the model prediction. Such consideration is highly important to the safety of our transportation system. Besides, we also develop a model to investigate the accident database, we want to know given the component malfunction at the initial stage, what the possible outcome of such a malfunction would be.

張博士：先講解一些背景資料，當我還是一名博士生時，我參加了一個由「NASA大學領導倡議計劃」資助為期五年的項目。在這個項目中，我們對一系列來自不同數據來源的機器學習和深度學習演算法進行了研究。由於數據（例如：機載傳感器、機場傳感器、攝錄鏡頭）眾多，我們主要是將這些不同類型的數據融合一起，以提高航空運輸系統的整體安全性。為此，我認識了一套複雜的深度學習演算法，以從多方面評估航空運輸系統的安全性，例如：利用長短期記憶神經網絡的優勢來進行序列對序列比較預測等。由於我們不僅想從數據中得出預測結果，而且也想將預測模型中的不確定性量化，因此最終亦使用了貝葉斯神經網絡。這種構思對運輸系統的安全性非常重要。此外，我們還研發出一個模型，對事故數據庫進行研究，因為我們想知道，如果在起步階段部零件已出現故障，將有可能帶來什麼後果。

## What's the challenge to apply the AI or machine learning techniques to improve reliability and safety?

應用人工智能或機器學習技術來提高可靠性和安全性有什麼挑戰？

**Dr. Zhang :** We are facing multiple challenges along the development of AI and machine learning. One of them is the explainability. When we decide to apply AI, we need to convince the upper management, whether it is a good investment, and this is the right direction we should go. To this end, we are not only concerned with the overall algorithm accuracy, but also, we would like to know why the algorithm behaves like that. It is essential to provide a transparent reasoning mechanism behind the algorithm that is easy to comprehend to human. That is the first challenge AI is facing. Of course, right now, we already have a lot of feature importance metrics to explain which feature contributes to the prediction most, but that's far from what we expect. What we expect is a clear end-to-end interpretability across the model. Right now, we do not have such a clear explanation in many AI algorithms. That's the first question. Second question is, what is the limitation of AI when making decisions? We need to tackle this question before we apply AI and machine learning into practical reliability problems. It is very important to make sure AI and ML are safe and reliable. Hence, we need to know what kind of situations we can rely on AI and ML; what kind of situations we need to defer their predictions and seek human judgment. That's another challenge.

張博士：安全性是大型複雜系統的一個重要議題。為了確保這些系統的安全性，我們通常會安裝很多傳感器來監控它們的健康狀況。這些傳感器收集了大量不同格式的數據，如圖像、影像甚至文字。最大的困難就是如何從這些原始數據中提取有用的資訊，以為營運管理提供實質的理據。我們的目標是從數據中獲取和預測到資訊和結論，以帶來實際成效，例如為健康作評估、維修保養、系統提升等。由於擁有大量不同格式的數據，我們無法用人手處理。這就是人工智能和機器學習真正發揮作用的地方，因為它們就像橋樑一般，把數據和我們想要提取的資訊聯繫起來。事實上，人工智能/機器學習是一個非常龐大的範疇，其中包含數據處理或特徵工程。先進的深度學習演算法允許我們無須對原始數據進行太多人手篩選工序。若果將這些組件（例如：傳感器、數據處理、學習）組合以建立一個閉環生態系統，從中我們就可以建立一個安全可靠的複雜系統。這就是我所理解的人工智能，以及它如何能為複雜系統的可靠性和安全評估方面發揮作用。



## Can you share with us an interesting AI-related project? 可以和我們分享一個有趣的人工智能相關的項目嗎？

**Dr. Zhang:** I'd like to share one project when I was working in FedEx. In this project, I assumed the technical leadership and performed as lead data scientist in the Expected Delivery Time Window (EDTW) project. This project aims to leverage the power of machine learning to develop a package analytics solution to improve the real-time package visibility. The developed machine learning model has been successfully deployed in Microsoft Azure, and it provides EDTWs to more FedEx Express customers as compared to the older model, which significantly reduces the number of Customer Service phone calls and further enhances the customer experience.

**張博士：**我想介紹一個我在聯邦快遞工作時的項目。那時的我正擔任這個項目的技術主管和「預期交付時間窗口」項目的首席數據科學家。該項目主要是利用機器學習來對包裹進行一系列分析，以提高掌握包裹實時狀況的能力。開發出的機器學習模型已成功在Microsoft Azure上應用。與舊款的機器學習模型相比，它能夠為更多聯邦快遞客戶提供「預期交付時間預測」，大大降低了客戶致電查詢的數量，並進一步提升客戶體驗。



# InnoHK Launch Ceremony concludes with great success

The InnoHK Launch Ceremony was successfully held on 25 May 2022, marking a new milestone in the Hong Kong Special Administrative Region (HKSAR) Government's commitment to promoting Hong Kong's innovation and technology (I&T). As the flagship I&T initiative of the HKSAR Government, InnoHK aims to promote global research collaboration with a view to putting Hong Kong on the global advanced technology map. CAiRS is one of the 28 InnoHK research centres admitted under AIR@InnoHK Cluster.

Addressing the Launch Ceremony, the Chief Executive, Mrs Carrie Lam who served as the 4th Chief Executive of Hong Kong from 2017 to 2022, showed her strong faith in the long-term development of Hong Kong's I&T industry, given that Hong Kong is endowed with a series of unparalleled advantages. Coupled with the unequivocal support for Hong Kong to develop into an international I&T hub as highlighted in the National 14th Five-Year Plan last year as well as the immense opportunities brought about by the development of the Guangdong-Hong Kong-Macao Greater Bay Area, there will be a promising path for the development of I&T in Hong Kong. She said that these 28 research laboratories will not only translate their impactful research into applications that bring good for humankind but also attract and nurture more research talents, thereby developing Hong Kong into the hub for global research collaboration.

Subsequently, Mrs Lam, together with other officiating guests, presided over the InnoHK launch and unveiled InnoHK's logo and official website.

The InnoHK Launch Ceremony was attended physically by more than 300 top-notch researchers of the 28 research laboratories and I&T industry leaders, and virtually by hundreds of researchers from the research clusters.



CAiRS・業界代表及理大校長等嘉賓一同大合照



CAiRS代表與當任行政長官林鄭月娥女士及多名嘉賓合照

Promoting research and development is a crucial part of I&T development. To this end, the Government has allocated \$10 billion to this flagship I&T initiative. Leveraging on Hong Kong's clear advantages in research capability, two research clusters have been set up at the Hong Kong Science Park, namely Health@InnoHK, focusing on healthcare technologies, and AIR@InnoHK, focusing on artificial intelligence and robotics technologies. InnoHK is committed to bringing together leading researchers from around the world to conduct world-class and impactful collaborative research with local universities and research institutions.

Since its inception, the InnoHK initiative spearheaded by the Innovation and Technology Commission has received an overwhelming response from many world-renowned universities and research institutions. After a rigorous selection and assessment process, 28 research laboratories have been admitted, involving seven local universities and research institutions as well as over 30 institutions from 11 economies, and pooling around 2 000 researchers locally and from all over the world. In addition to fostering more collaboration among top local, Mainland and overseas researchers as well as industry, InnoHK provides an excellent platform for training and building up a pool of talents in Hong Kong. InnoHK also enables different parties to share their research outcomes and further collaborate with each other to achieve synergy and translate research outcomes into applications. All these will bring substantial benefits to society. Health@InnoHK will help promote the development of global healthcare technologies in response to the emerging challenges in society, such as an ageing population and epidemic outbreaks, whereas AIR@InnoHK will help enhance efficiency in the fields of finance, healthcare, construction, logistics and advanced manufacturing, with a view to building a smart city for the future.

For further details about the 28 research laboratories admitted to InnoHK. Please visit the newly launched official website ([www.innohk.gov.hk](http://www.innohk.gov.hk)).



## 「InnoHK創新香港研發平台」啟動禮圓滿舉行 進一步推動本港創科發展



28所進駐「InnoHK創新香港研發平台」的研發實驗室代表與嘉賓一同大合照

「產品可靠性暨系統安全研發中心」(CAiRS) 由香港電子業商會(HKEIA) 及香港電子業總會(HKEIC) 於2019年支持香港理工大學成立，並於2020年成功進駐「InnoHK創新香港研發平台」，成為28所研發實驗室之一。「InnoHK創新香港研發平台」(InnoHK) 啟動禮於2022年5月25日圓滿舉行，標誌着政府進一步推動本港創新科技發展邁向新里程。InnoHK是香港特區政府的創科旗艦項目，致力促進環球科研合作，讓香港在全球高科技版圖佔一重要席位。

當日當任行政長官林鄭月娥聯同一眾主禮嘉賓攜手主持InnoHK啟動儀式，為InnoHK標誌及官方網頁揭幕。林鄭月娥於啟動禮致辭時表示，對於香港創科產業的長足發展抱有充分信心——信心的來源是香港具備一系列得天獨厚的條件，加上國家去年公布的《十四五規劃綱要》明確支持香港建設國際創新科技中心，以及粵港澳大灣區建設帶來的龐大機遇，香港創科發展定必是一條康莊大道。她說：「這28間研發實驗室將能把具影響力的研究轉化為實際應用，造福人群，同時吸引和孕育更多科研人才，讓香港發展為國際科研合作樞紐。」

InnoHK除了推動本港、內地及海外頂尖科研人員與業界合作外，亦提供一個極佳的平台，為本港培育及建立科研人才庫。InnoHK將有助促進有關各方分享研發成果和其他相互合作，以產生協同效應，把研發成果轉移至應用層面，為社會帶來莫大裨益。其中，「Health@InnoHK」有望推動全球醫療科技發展，應對人口老化及傳染病大流行等社會難題；而「AIR@InnoHK」將可以提升金融、醫療、建造、物流及先進製造業的效率，建設未來的智慧城市。而「產品可靠性暨系統安全研發中心」(CAiRS)是進駐「AIR@InnoHK」的其中一所研發中心，相信業界必定與CAiRS緊密合作，為推動香港成為智慧城市及先進製造中心，協助推廣香港製造成為世界知名品牌。





# Professor Jin-Guang Teng, President of PolyU visits CAiRS

## 理大校長滕錦光教授到訪CAiRS

Professor Jin-Guang Teng, President of PolyU visited CAiRS on 25 May 2022 (Wed). Accompanied by Professor Christopher Chao, Vice President (Research and Innovation), Professor Wing-tak Wong, Deputy President and Provost and Professor Larry Chow, Director of Research and Innovation of PolyU (currently he is Head(ABCT) & Professor of PolyU), Professor Teng visited the main office and Research Lab of CAiRS in Hong Kong Science Park (HKSTP) to explore how CAiRS' research in safety & reliability by using AI and advanced technologies. Ir Professor Winco Yung, Executive Director and Centre Director of CAiRS introduced the mission and vision, research works to guest at the visit.

CAiRS is a collaboration between The Hong Kong Polytechnic University (PolyU) and the University of Maryland - College Park (UMD) from USA. The Centre gathers top local and overseas academics and scholars, uses advanced equipment, and leverages innovative artificial intelligence technology in order to conduct wide ranging product reliability and system safety research to accurately predict the occurrence of failures and prevent them from occurring.

理大校長滕錦光教授在 2022年5月25日聯同理大研究及創新副校長趙汝恒教授、常務及學務副校長黃永德教授及當任研究及創新事務總監周銘祥教授（現任理大應用生物及化學科技學系系主任及教授）到CAiRS 位於科學園總部及研究實驗室參觀，CAiRS執行董事及中心總監容錦泉教授為嘉賓介紹CAiRS 成立目的及理念等。

CAiRS 由香港理工大學（理大）創立，並夥拍美國馬里蘭大學（UMD），匯聚本地及海外頂尖學者專家，擁有先進的儀器設備，配合創新人工智能技術，以進行各項產品可靠性及系統安全研究，務求準確預測故障發生，防患於未然。



Ir Professor Winco Yung, Executive Director and Centre Director of CAiRS presents our research works to Professor Jin-Guang Teng, President of PolyU at the visit.



CAiRS teams pose a group photo with guests



(From left) Professor Larry Chow, Head (ABCT) & Professor of PolyU, Professor Wing-tak Wong, Deputy President and Provost of PolyU, Professor Jin-Guang Teng, President of PolyU, Ir Professor Winco Yung, Executive Director and Centre Director of CAiRS and Professor Christopher Chao, Vice President (Research and Innovation) visit CAiRS on 25 May 2022





# AI-based Reliability & Safety Transforming Smart Manufacturing and Smart City with Applications

CAiRS organised technical seminar titled “AI-based Reliability & Safety – Transforming Smart Manufacturing and Smart City with Applications” reveals the future Smart Manufacturing and Smart City in the context of reliability and safety.

CAiRS organised a full day technical seminar - “AI-based Reliability & Safety – Transforming Smart Manufacturing and Smart City with Applications” - at INNO2 in HKSTP on 19 May 2022. With the support of our honourable guests and speakers, over 100 participants attended the seminar. We have invited 2 Guest of Honours, 4 speakers from industries and 4 speakers from academics. They are professionals in Transforming Smart Manufacturing and Smart City with Applications in the context of reliability and safety by application of AI.

Before the seminar started during the morning session, we invited Mr Steve Chuang, Chairman, The Hong Kong Electronics Industry Council, FHKI to deliver opening remarks. He said, “AI is one of the greatest means of transforming the society in the present era. It directs transforming Smart Manufacturing and Smart City. How to apply AI to transforming Smart Manufacturing and Smart City in context of reliability and safety will become key element of doing business and even our life today; the way we design a product, a system, doing business, style of working, the means of living, the way of communication, building knowledge, etc. Reliability and safety influence our daily life, healthcare, environment and society overall. This seminar has been organised to discuss all these and many more issues which may occur during the further development and promotion of our brand and services. Well-known academics and experts from PolyU and industries have been invited to present their views and to discuss the opportunities, strengths and future development of the AI-based Reliability & Safety – Transforming Smart Manufacturing and Smart City.”

We were honoured with the presence of 2 speakers from the industry and 2 speakers from the academia in the morning session. They are:

**Dr. Daniel Lun**  
Associate Professor, Department of Electronic and Information Engineering, Faculty of Engineering, PolyU

**Topic**  
3-Dimensional Measurement using Structural Light Illumination in Smart Manufacturing applications

**Prof. KK Lee**  
Founder and CEO, KDAS

**Topic**  
Predictive Maintenance for Railways to uplift the Reliability & Safety of Railway Transportation System

**Dr. Siqi Bu**  
Associate Professor, Dept. of Electrical Engineering, Faculty of Engineering, PolyU

**Topic**  
AI-based Security Assessment of Smart Grid to Enable a Carbon Neutrality Future System

**Mr. Hasan Gadjali**  
Co-Founder, Meridian Innovation Limited

**Topic**  
CMOS Thermal Imaging - the Pursuit of Reliable High Performance Mass Producible LWIR Sensors for Everyday Applications



Mr. Steve Chuang delivers opening speech for CAiRS Technical Seminar in the morning session



Q&A session in morning session



(From left) Dr. Siqi Bu, Associate Professor, Dept. of Electrical Engineering, Faculty of Engineering, PolyU, Dr. Daniel Lun, Associate Professor, Department of Electronic and Information Engineering, Faculty of Engineering, PolyU, Mr Steve Chuang, Chairman, The Hong Kong Electronics Industry Council, FHKI, Prof. KK Lee, Founder and CEO, KDAS, Mr. Hasan Gadjali, Co-Founder, Meridian Innovation Limited and Ir Prof. Winco K.C. Yung, Executive Director & Centre Director of CAiRS pose a group photo in morning session



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We invited Ir Prof. H.C. Man, Dean of Engineering Faculty of PolyU to deliver the welcoming remarks in the afternoon session. He mentioned that CAiRS is set up by PolyU and the key research collaborator is University of Maryland, College Park (UMD). We have 12 Professors from PolyU who have expertise in product reliability and system safety. CAiRS' mission is to develop new approaches using AI methodologies for customised management, to ensure the reliability and safety of products and systems used in various and a broad range of applications. We have five research programmes at CAiRS, namely Anomaly Detection and Syndromic Surveillance, Innovative Diagnostics for Product Health Management, Prognostics for Remaining Useful Life Assessment, Safety Assurance: Improve Functional Safety, and finally Data Analytics Platform for Reliability which has commenced.

At the end of the seminar, we invited Ir Prof. Winco K.C. Yung, Executive Director & Centre Director of CAiRS to deliver the closing remarks.

**Prof. Kenneth Lam**  
Professor & Associate Dean, Faculty of Engineering, PolyU

**Topic**  
Efficient Deep Neural Network for Material Defect Detection in Smart Manufacturing

**Dr Xiaoge Zhang**  
Assistant Professor, Dept. of Industrial & Systems Engineering, PolyU

**Topic**  
AI-Driven Solutions for Increasing Air Transportation System Safety

**Mr. Lok Fung**  
Head of Transit Management Competence Centre (TMCC), Jardine Schindler Group

**Topic**  
Market Trend of AI technology for Smart Building

**Mr. Aldous Leung**  
Senior Engineering Consultant, German Pool

**Topic**  
The Smart Instantaneous Water Heaters for Energy Efficient Operations, Improved Reliability and Enhanced Safety Environment



Ir Prof. H.C. Man, Dean of Engineering Faculty of PolyU to deliver welcoming remarks in the afternoon session.



Over 100 guests join the seminar



Q&A session in afternoon session



(From left) Mr. Aldous Leung, Senior Engineering Consultant, German Pool, Dr Xiaoge Zhang, Assistant Professor, Dept. of Industrial & Systems Engineering, PolyU, Ir Prof. H.C. Man, Dean of Engineering Faculty of PolyU, Mr. Lok Fung, Head of Transit Management Competence Centre (TMCC), Jardine Schindler Group and Ir Prof. Winco K.C. Yung, Executive Director & Centre, Director of CAiRS pose a group photo in afternoon session