



CAIRS NEWSLETTER JULY 2024, ISSUE 12

CAIRS Achievement Recognized at the I&T Awards 2024 CAIRS 成就獲 2024 年創新科技獎嘉許 27 ANNIVERSARY

慶祝中華人民共和國成立75周年暨香港回歸祖國27周年活動 2024年創新科技獎項嘉許禮

香港創科成就 揚威世界舞台

HONG KONG R&D ACHIEVEMENTS SHINE AT INTERNATIONAL I&T ARENA 香港研發成果閃耀國際創科舞台

CAIRS was honoured to be invited to attend the Reception for I&T Awards 2024 hosted by the ITC, HKSARG on Monday, 15 July 2024. The Reception was organized in recognition of the outstanding research and development (R&D) achievements of Hong Kong in the field of innovation and technology (I&T) on the Mainland and overseas in the past year. More than 300 representatives of talents from the Hong Kong I&T sector, including academics, scientists, and representatives of institutes and government departments attended the Reception.

The Chief Executive, Mr. John Lee, addressed the Reception with congratulations to the various outstanding achievements, and an emphasis on the continued support of the HKSARG to the local I&T sector in its future endeavours and pathways to greater success. A selection of remarkable technologies was showcased to the CE and senior government officials during the Reception. CAiRS was proud to have presented amongst the fellow awardees of excellence on this occasion.

We are grateful that we are part of the @InnoHK research clusters community, and that our work is recognised at all levels of our engagements, from fieldwork to official government events. This July marks the fourth year of our operations, we hope to continue with this good start and goes from strength to strength in the operational year ahead.

7月15日星期一,CAiRS很榮幸受邀出席香港特別行政區政府創新科技署主辦的2024年創新 科技獎項嘉許禮。舉辦此活動是為了表彰香港過去一年在內地及海外創新科技領域的傑出研 發成果。來自香港創科界的學者、科學家、科學研究院所和政府部門代表等300多名人才代 表出席了嘉許禮。

行政長官李家超先生在嘉許禮上致辭,祝賀香港特區創科人才取得的各項傑出成就,並強調 特區政府將繼續支持本地創科界的努力和未來取得更大的成功。活動期間,獲獎者向行政長 官和政府高級官員展示了一系列的卓越技術。 CAIRS 很榮幸能夠在這次嘉許禮上與其他傑出 獲獎者一起亮相。

我們很高興成為@InnoHK進階科研發展社區的一部分,我們的工作從實地工作到官方政府活 動等各個層面也得到了認可。今年7月是CAiRS踏入營運的第四年,我們希望以這個正向的開 始,繼續保持在這一個營運年中不斷努力和成長。



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Snapshots of the Reception with all other awardees of excellence.

嘉許禮與所有其他優秀獲獎者的分享合照。

CAiRS – Facts and Figures Revisited







July marks the end of one financial year and the beginning of the next. This July brings us into the fourth year of our operations. We would like to take this opportunity to present a picture of where we are, with facts and figures revisited.

七月標誌著一個財政年度的結束和下一個財政年度的開始。今年七月,我們 剛進入了營運的第四年。我們想藉此機會透過重看CAiRS的數據來展示我們 的現狀。

Currently, this is where we are, and we will explore further in this Newsletter.

目前,這就是我們所處的進展,我們將在本通訊中進一步探討。

5 Research Programmes with 15 Working Themes 5 個研究項目,15 個工作範疇

70+ full time operational and research staff members 70 多名全職營運和研究工作人員





24 Patents in Hong Kong and PRC 24 多項在香港和中國註冊的專利

60+ Published and Accepted Conference and Journal Publications under CAiRS 60 多篇以CAiRS名義已出版並被接受的會議和期刊出 版物



CAiRS – A Happy Workplace CAiRS – 開心工作空間

Back in April, CAiRS was presented with a "Happy Organization 2024" award from the Promoting Happiness Index Foundation. At CAIRS, we strive to foster a happy working environment with positivity, collaboration, and personal growth. We are delighted to receive this badge with pride.

早在今年四月份,CAiRS成為了香港提升快樂指數基金的「2024年開心機構」其中之一。在CAiRS,我們努力營造一個充滿積極性、協作性和造就個人成長的快樂工作環境。我們很高興並對獲得這項認可感到自豪。



HAPPY開心機構 ORGANISATION

Prof. Kenneth Lam interview at Now 333 Business News Channel 林建文教授接受Now 333財經頻道採訪



CAIRS CEO & Centre Director, Professor Kenneth Lam, was invited for an interview recording with NowTV in June.We are grateful for the opportunity to engage with a wider audience with regards to the work we do. The programme was released on Friday 26 July 2024 at 12.20 pm on the Now 333 Business News Channel.

CAiRS執行長兼中心主任林建文教授於6月受邀接受NowTV訪問錄音。 我們很高興有機會與更廣 泛的受眾接觸我們所做的工作。該節目於 2024 年 7 月 26 日星期五中午 12 點 20 分在 Now 333 商業新聞頻道發布。

HKSTP x Arrow Hardware Lab Innovation Day 香港科技園公司 x Arrow Hardware Lab 創新日



Wednesday 12th June 2024 HKSTP x Arrow Hardware Lab Innovation Day, we are delighted that our research project leader, Prof. Michael G. Pecht, Distinguished Professor and Director, CALCE Electronic Products and Systems Center, University of Maryland (UMD), delivered one of the two keynote speeches of the event, on the topic of Advances in Microelectronics Qualification. Our Senior Consultant, Ir Prof. Winco Yung, was also a moderator for one of the two panel discussions during the event, on the topic of Microelectronics Innovation and How to Bring it to Real Applications and Market.

Prof. Pecht (left of top group photo) and Ir Prof. Yung (left of bottom group photo) at the event.

Pecht教授(上合照左)及 容教授工程師(下合照左) 在活動現場。



6月12日星期三是香港科技園 X 艾睿硬件實驗室創新體驗 日,我們很高興我們的研究計畫負責人、馬利蘭大學(UMD) 傑出教授兼CALCE電子產品和系統中心總監Michael G. Pecht 教授發表這次活動的兩場主題演講之一,主題是微電 子達標資格的進步。我們的高級顧問容錦泉教授工程師也擔 任活動期間兩個小組討論之一的主持人,主題是微電子創新 以及如何將其推向實際應用和市場。



Exchanges at CAiRS CAiRS的交流



We have continued to be busy with various exchanges and engagements with our audience. The following are some snapshots to share. 我們繼續忙於與各方進行各種交流和接觸。以下是一些截圖分享。



Visit at CAiRS by Prof. C. Y. Chung (PolyU, EEE) 鍾志勇教授 (PolyU, EEE)參觀CAiRS



CLP Visit at CAiRS 中電代表參觀CAiRS



Visit at CAiRS as part of the Malaysia-Hong Kong Cultural Exchange Programme 2024 2024年馬來西亞-香港文化交流計劃 的部分參觀



Visit at EMSD E&M InnoZone 參觀機電工程署機電創新區

CAiRS Researcher win "Best Poster Award" at the 22nd International Meeting on Lithium Batteries CAIRS研究員榮獲第22屆國際鋰電池會議"最佳海報獎"





CMRS.

CAIRS researchers, Dr. Neha Tewari win the "Best Poster Award" at the 22nd Meeting on Lithium Batteries on 21 June 2024. The title of the poster is "Integration of Fiber Optic Sensing with Galvanostatic Intermittent Titration for Health Monitoring of Lithium-ion Batteries" was in collaboration with GP Batteries International Limited.

The project uses Fiber Bragg Grating (FBG) sensors for measurement of strain, pressure and temperature in lithium-ion batteries, enabling continuous monitoring of crucial cell parameters. It employs non-invasive optical sensing with silica mode fiber (SMF) and polymer optical fiber (POF) in conjunction with the GITT technique to examine the overpotential of various states of charge or discharge of commercial lithium-ion batteries over 200 cycles. Integrating GITT and FBG sensing enhances our understanding of the battery's operation, as correlations between the overpotential values at different SoCs and temperature monitoring (overpotential heat) via FBG sensors reveal the irreversible heat generation change in batteries.

CAiRS研究人員Neha Tewari博士在2024年6月21日舉行的第22屆鋰電池會議上獲得「最佳 海報獎」。 Batteries" "是與 GP 電池國際有限公司合作。該專案使用光纖布拉格光柵 (FBG)感測器來測量鋰離子電池中的應變、壓力和溫度,從而能夠連續監測關鍵的電池參 數。它採用二氧化矽模式光纖(SMF) 和聚合物光纖(POF) 的非侵入式光學感測技術,並結合 GITT 技術來檢查商用鋰離子電池在200 個週期內的各種充電或放電狀態的過電位。整合 GITT 和 FBG 感測增強了我們對電池運作的理解,因為不同 SoC 的過電勢值與 FBG 感測器 的溫度監測(過電勢熱)之間的相關性揭示了電池中不可逆的發熱變化。



Fiber Bragg Grating (FBG) sensors are suitable for the measurement of strain, pressure and temperature in lithium-ion batteries, enabling continuous monitoring of crucial cell parameters. Our research employs non-invasive optical sensing with silica mode fiber (SMF) and polymer optical fiber (POF) in conjunction with the GITT technique to examine the overpotential of various states of charge or discharge of commercial lithium-ion batteries over 200 cycles. Integrating GITT and FBG sensing enhances our understanding of the battery's operation, as correlations between the overpotential values at different SoCs and temperature monitoring (overpotential heat) via FBG sensors reveal the irreversible heat generation change in batteries.







BatteryGuardian

Online/Offline Battery Anomaly Detection and SOH Estimation System by Using AI

- AI-based battery anomaly detection and state of health (SOH) estimation
- Cloud based centralized online health monitoring with diagnosis

BatteryTest

Battery Aging Test with Temperature and Cell Swelling Profile Analysis

- Non-invasive Optical Sensing Technology
- Accelerated aging test for abnormal cell swelling and temperature profile detection





CircuitbreakerGuardian

Battery Aging Test with Temperature and Cell Swelling Profile Analysis

- AI-powered online circuit breaker health monitoring system
- Fusion approach of AI and signal processing
- Centralized management system for thousands of circuit breakers

Power Network Utility Health Monitoring

AI-Driven Diagnosis System for Power Network Utilities

- Automated fault diagnosis and health monitoring of power network utilities
- Optimization of scheduled maintenance and reduction in manpower costs
- Highly accurate health diagnosis and maintenance timeliness improvement







ParkVision

Advanced License Plate Number Recognition With Anomaly Detection

- Efficient license plate number recognition with integrated camera anomaly detection for condition-based maintenance
- Al-powered vehicle presence detection to replace costly loop detectors
- Streamline car park management with accurate, seamless fare calculation and enhanced operational efficiency.

AutoGuard

Advanced A.I. Solution for Electric Vehicle Reliability and Safety

- EV battery monitoring for real-time analysis of battery health with advance warning before failure
- Continuous monitoring of brake components for early defect detection and maintain optimal braking efficiency
- Advanced algorithms to analyze electric power steering (EPS) data to ensure smooth and reliable steering





AutoVision

V2X and Autonomous Vehicle Sensors & Cameras Anomaly Detection

- Al-powered system for continuous monitoring from V2X (Vehicle-to-Everything) communication system
- Detect anomalies in real-time, ensuring performance and preventing potential failures

SmartHVAC

A.I. Solution for Online Health Monitoring of Centralized HVAC System and Autonomous Energy Optimization

- Real-time optimized global control
- Self-adapted to HVAC System
- Minimize energy waste and costs
- Lower carbon emission



ClearLens

Cutting-Edge Camera Tampering and Anomaly Detection System for Video Surveillance

- Real-time anomaly classification to enhance surveillance security and reliability
- Seamless integration with existing video surveillance system to reduce cost and improved operational efficiency



ManufacturoVision

Real-Time Defect Detection and Classification System Using Deep Learning for Multi-Material Components

• Fast and accurate real-time defect detection during manufacturing process to enhance quality and reliability of multi-material components

SolderSense

A Novel AI Failure Prediction System for PCB Solder Joints Using Thermal Imaging Analytics

• Highly accurate AI method to identify PCB solder joints, classify defects and predict failure mechanisms



SolderInspect

Novel AI Failure Prediction System for PCB Solder Joints Using Automatic Optical Inspection (AOI)

• Simultaneous multitask and deep learning to enhance PCB soldering defect detection

Accelerated Life-time Test (ALT)

Advanced Product/System Lifecycle Management on Reliability and Safety

- Mitigate risk of product failure by providing valuable intelligence on potential failure modes, their causes and failure mechanism
- Save resources in product development and warranty cost





RailSwinX

Enhanced Rail Track Defect Detection Through Cutting-Edge AI Technology

• Generative method (GAN) with visualization of detect and non-defect rail track surfaces

WireInspect

Anomaly Detection System for Steel Wire Ropes Using Deep Learning Models

- Automatic steel wire rope inspection system for defect and anomaly detection with real-time alerts
- Self-learning AI for new anomalies





MotorGuard

Automated Motor Health Monitoring and Failure Diagnosis with a Rule-based Expert Inference System

- Real-time motor health monitoring system with early warning using AI approach
- Automatic diagnosis and anomaly classification

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