
Global AI
Challenge
For Building E&M Facilities
2022

Global AI Challenge

For Building E&M Facilities

2022

CONTENTS

Innovation, Technology and Industry Bureau, The Government of the Hong Kong Special Administrative Region

The application of AI has revolutionised the traditional electrical and mechanical (E&M) industries, laying the groundwork for smart cities and underscoring the rising significance of AI in the digital era.

AI is no longer just a technology buzzword without solid application in the real world. AI application has become an essential part of our lives, together with big data, data analytics and robotics. AI has unlocked a whole new world of potential opportunities, driving business transformations and changing our way of life, especially in the recent COVID-19 era. All industries including the E&M industries, building and construction, can now benefit from rapidly developing intelligent machines and systems. The adoption of AI and robotic technologies relieves human capital from difficult, dangerous, dirty, and tedious jobs, allowing us to focus on higher value-added work, driving business growth, increasing productivity, and improving our quality of life.

The Global AI Challenge for Building E&M Facilities promoted the opening up of data to foster more innovative ideas, and brought benefit and convenience to members of the public.

I invite you to browse through this booklet to discover this successful event. Let's work together to further promote the innovation and technology development of Hong Kong and to build a better and more innovative Hong Kong!

Prof. SUN Dong, JP

Secretary for Innovation, Technology and Industry
The Government of the Hong Kong Special Administrative Region

Office of Hong Kong, Macao and Taiwan Affairs, China Association for Science and Technology

習近平總書記指出人工智能是引領新一代科技革命和產業變革的戰略性技術，具有溢出帶動性很強的頭雁效應，正在對經濟發展、社會進步、國際政治經濟格局等方面，產生重大而深遠的影響。

加快發展新一代人工智能，是推動我國科技跨越發展、產業優化升級、生產力整體躍升的重要戰略資源。本屆國際建築機電人工智能大賽已經吸引了包括粵港澳大灣區地區九個地市，香港、澳門以及英、美、澳等國家，近 30 間高等院校和初創企業隊伍報名。

大賽的舉辦，有效促進世界人工智能領域技術交流，為推動人工智能技術人才培養和智慧城市建設發揮積極作用。中國科協將繼續推動內地與港澳地區在科普、學術、智庫、人才等領域深度交流合作，搭建多種形式、多渠道的產業、學術、研究共享平台，促進協同創新和經濟社會融合發展。本次大賽取得圓滿成功，有賴各方的共同協助。

王慶林先生

中國科學技術協會港澳台辦公室
副部長（副主任）

Electrical and Mechanical Services Department, The Government of the Hong Kong Special Administrative Region

It is my greatest honour and privilege to express my warmest gratitude to you for joining the Awards Presentation Ceremony of the Global AI Challenge for Building E&M Facilities cum Kick-off Ceremony of the E&M AI Lab. Together with Guangdong Provincial Association for Science and Technology, the Electrical and Mechanical Services Department (EMSD) was privileged to host this unique Challenge. This global event offers a rare opportunity to gather leading researchers, scientists, experts, engineers, and industry leaders from around the world for our common goal - to share and to co-innovate on AI development for building E&M facilities. With more than 40 organisations around the globe supported this event as co-organisers and supporting organisations, we were proud to have more than 120 teams from 10 regions participating in the competition and over 2,000 participants from around the world joined the online conference.

I would like to express my sincere gratitude to all the advisers, co-organisers, sponsors and supporters. My special thanks also goes to the Hong Kong Science and Technology Parks Corporation for the competition platform support. The generosity of all has made this much anticipated event come true. You all are leaders in this field, and I am fully confident that your knowledge, experience, and expertise will provide important insights to all participants. EMSD is pleased to have this opportunity to collaborate with you. We have all contributed to create an outcome that could be a significant step forward in the building E&M facility management industry, amid the rising awareness of the important contribution that AI can bring to the E&M facilities. With this initial success and the setting up of the E&M AI Lab to facilitate further sharing and co-creation, especially on the application of semantic AI, we hope that Hong Kong can be a driving force in the use of AI in the E&M sector in the years to come.

Mr PANG Yiu-hung, Eric, JP

Director of Electrical and Mechanical Services
The Government of the Hong Kong Special Administrative Region

Guangdong Provincial Association for Science and Technology

我謹代表廣東省科協表示熱烈的祝賀！對參與本次活動的國內外建築機電業界、粵港科技界、工程界及相關行業領域的各位朋友表示熱烈的歡迎！借此機會感謝給予有力指導和支持，並長期關心、支持廣東科技事業發展，積極推動粵港澳大灣區科技創新的中國科協港澳台辦公室、香港中聯辦教科部、創新科技及工業局，以及其他社會各界團體和人士，表示崇高的敬意和衷心的感謝。

本次廣東省科協與香港機電工程署攜手舉辦「國際建築機電人工智能大挑戰」活動，旨在推動大灣區人工智能技術在建築機電領域的應用與創新，使人工智能更好的服務於為大灣區智慧城市建設，讓科技成果更好的惠及民眾。中國在建智慧城市數量，位居全球第一，人工智能技術是智慧城市建設的關鍵所在，國家高度重視人工智能的技術進步與產業發展，已上升至國家戰略。

《新一代人工智能發展規劃》指出「到 2030 年使中國成為世界主要人工智能創新中心」，人工智能將實現提效降本，延續人類智慧的核心價值。當前中國在人工智能、雲計算、5G 通訊等高科技領域，專處於全球領先水平，將續推智慧城市的加快發展，能夠為智慧城市建設提供更多的技術支持和創新方案。我相信本次活動將有效促進人工智能領域、技術、學術交流，為推動人工智能技術、人才培養和智慧城市建設發揮積極作用。

最後，恭喜「國際建築機電人工智能大挑戰」取得圓滿成功！祝各位新舊朋友工作順利、吉祥安康！謝謝大家！

鄭慶順先生

廣東省科學技術協會
黨組書記、專職副主席

Organising Committee

It was a great honour for me to be the Chairman of the Organising Committee for the Global AI Challenge for Building E&M Facilities 2022. I would like to take this valuable opportunity to offer my warmest congratulations to the successful launch of the Awards Ceremony that celebrates our contestants' achievement.

The COVID-19 pandemic has had a great impact on E&M businesses in Hong Kong. However, it does not stop us from building up a platform to bring together professionals, fostering the exchange of knowledge and innovative ideas amongst the industry. The Global AI Challenge for Building E&M Facilities competition lines up industry experts and the younger generation and is meant to increase understanding, advocacy, and dialogue to encourage ongoing discussions with the younger generation in the sectors as they relate to innovation. On behalf of the Organising Committee, we sincerely hope that everyone has enjoyed this communication platform to discuss new concepts, new paths, and new patterns in AI in-depth in order to create smart cities on a global scale.

I would like to express my gratitude to my fellow organising committee and advisory panel, Mr Allen Lee, Mr Arthur Chan, Mr Cecil Man, Dr Crystal Fok, Dr Dan Wang, Mr Kin Tsang, Prof. Linda F. Xiao, Ir Prof. Samson Tai, Mr Sammy Yeung, Mr Patrick So, and Mr Calvin Leung, whose unfailing contribution and incredible work have made this event a great success.

May all our collaboration and dedication lead to even greater success ahead!

Mr WONG Wai Kwong

Assistant Director of Electrical and Mechanical Services Department
The Government of the Hong Kong Special Administrative Region

OVERVIEW

Organised by the Electrical and Mechanical Services Department (EMSD) of the Government of the Hong Kong Special Administrative Region and Guangdong Provincial Association for Science and Technology, the Global AI Challenge for Building E&M Facilities is a global event highlighting AI development and applications in the building services industry. It aims to promote international innovation and technology ideas, through exchange and cooperation. The event is the first and largest AI event related to building electrical and mechanical services in the world!

Visit the website to learn more

Encourage AI technology applications in the building E&M industry

◆

Inspire young innovators' enthusiasm for AI

◆

Encourage the proposal of innovative AI solutions, and realise data sharing

VISION

TIMELINE

Oct 2021

Global Conference

Sep 2021 – Sep 2022

AI Competition

Workshop

Awards Ceremony

MID-SEP 2021

CALL FOR APPLICATIONS

12 OCT 2021

GLOBAL CONFERENCE

END OF NOV 2021

APPLICATION DEADLINE

7 DEC 2021

WORKSHOP; COMPETITION BEGINS

MID-JAN 2022

COMPETITION SUBMISSION DEADLINE

MID-FEB 2022

FINAL PRESENTATION SUBMISSION DEADLINE (FINALISTS)

23 SEP 2022

AWARDS CEREMONY

ADVISORY PANEL & ORGANISING COMMITTEE

Mr W.K. WONG

Assistant Director/2,
Electrical & Mechanical Services Department,
The Government of the Hong Kong Special Administrative Region

Advisory Panel
Chairman of Organising Committee

Mr Arthur CHAN

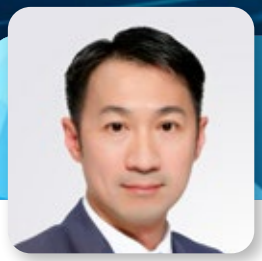
Founder,
SagaDigits Limited

Advisory Panel
Organising Committee

Mr Allen LEE

Head of Information and Communication Technology,
Cyberport

Advisory Panel



Mr Sammy YEUNG

Chief Engineer / General Engineering Services,
Electrical & Mechanical Services Department,
The Government of the Hong Kong Special Administrative Region

Advisory Panel
Vice-Chairman of Organising Committee

Dr Crystal FOK

Head of STP Platform,
Hong Kong Science and Technology Parks Corporation

Advisory Panel

Mr Calvin LEUNG

Building Services Engineer/General Engineering Services,
Electrical & Mechanical Services Department,
The Government of the Hong Kong Special Administrative Region

Organising Committee

ADVISORY PANEL & ORGANISING COMMITTEE

Mr Cecil MAN

Convenor,
ASHRAE HKC BACnet Task Force

Advisory Panel
Organising Committee

Ir Prof. Samson TAI

Professor of Practice,
Data Economy Lab,
Hong Kong Baptist University

Advisory Panel
Organising Committee

Dr Dan WANG

Associate Professor, Department of Computing,
The Hong Kong Polytechnic University

Advisory Panel
Organising Committee

Mr Patrick SO

Senior Engineer/General Engineering Services,
Electrical & Mechanical Services Department,
The Government of the Hong Kong Special Administrative Region

Secretary of Organising Committee

Mr Kin TSANG

Chief Innovation Advisor,
Logistics and Supply Chain MultiTech R&D Centre

Advisory Panel
Organising Committee

Prof. Linda F. XIAO

Professor,
Department of Building Environment and Energy Engineering,
The Hong Kong Polytechnic University

Advisory Panel
Organising Committee

TECHNICAL CONFERENCE

The Global AI Challenge for Building E&M Facilities – Technical Conference that was held on 12 October 2021 was an international conference focusing on AI technologies in the building electrical and mechanical industry. The conference gathered innovators from around the world who shared a common interest in practical solutions for smart cities through AI innovation. It explored how data and AI can create a smarter world, with the theme: AI applications revolutionise traditional E&M industry, laying the groundwork for smart cities.

Hosted in-person and also virtually, the conference brought together a diverse group of attendees including university students, professional engineers, young innovators and IT professionals, participating in guest lectures and sharing sessions. There were more than 2,300 online views globally, in addition to more than 200 onsite attendees in Hong Kong.

Watch replays of the conference!


Invent
with
人工智能 大挑戰


Mr Zheng Qingshun
國際建築機電 人工智能 大挑戰
Global AI Challenge
Technical Conference

Mr Dennis BROSI

Global Business Developer,
Schindler PORT Technology

TOPIC Topic: Holistic Building Transit Management

Mr Steven BUSHBY

Leader
Mechanical Systems and Controls Group,
ASHRAE BACnet™

TOPIC Enabling AI Applications: Semantic Interoperability of Building Data

WATCH NOW!

Ms Ruth CARTER

Chief Executive Officer
The Chartered Institution of
Building Services Engineers (CIBSE)

TOPIC Presentation from CIBSE

WATCH NOW!

SPEAKERS

SPEAKERS

Ir Dave CHAN

Chief Executive
Information, Communications and Building Technologies, ATAL Engineering Group

TOPIC Putting AI into Action for Achieving Energy Optimisation

WATCH NOW!

Mr Wan CHAO

Vice President of Tencent Cloud
Tencent Technology Co., Limited

TOPIC Tencent Smart Building Solutions

WATCH NOW!

Dr Guansheng CHEN

Associate Professor
Guangdong University of Technology

TOPIC Smart Cold Storage-the Combination of Artificial Intelligence and Cold Storage (Putonghua Session)

WATCH NOW!

Ir Pak Kin CHEUNG

General Manager
Customer Maintenance Services,
The Hong Kong and China Gas Company

WATCH NOW!

TOPIC Artificial Intelligence in Gas Services
Riser Analytics

Dr Prof. Lixing DING

Dean
College of Mechanical & Electrical Engineering,
Zhongkai University of Agriculture and Engineering

WATCH NOW!

TOPIC Procedural Analysis and Systematic Standards of Building Equipment Load (Putonghua Session)

Dr Samira FAZLOLLAHI

Senior Process and Systems Analyst
Veolia Environmental Services Hong Kong Limited

WATCH NOW!

TOPIC Augmented Intelligence, Contributing Towards a Sustainable & Carbon Neutral Future: Focus on Smart Buildings & District Cooling Networks

SPEAKERS

Dr Cheng FENG

Expert Research Scientist
Siemens Limited

TOPIC Industrial AI Applications in Smart Building

WATCH NOW!

Dr Gabe FIERRO

Assistant Professor
Computer Science, Colorado School of Mines

TOPIC Self-Adapting Data-Driven Software for Buildings

WATCH NOW!

Dr Crystal FOK

Head of STP Platform
Hong Kong Science and Technology Parks Corporation

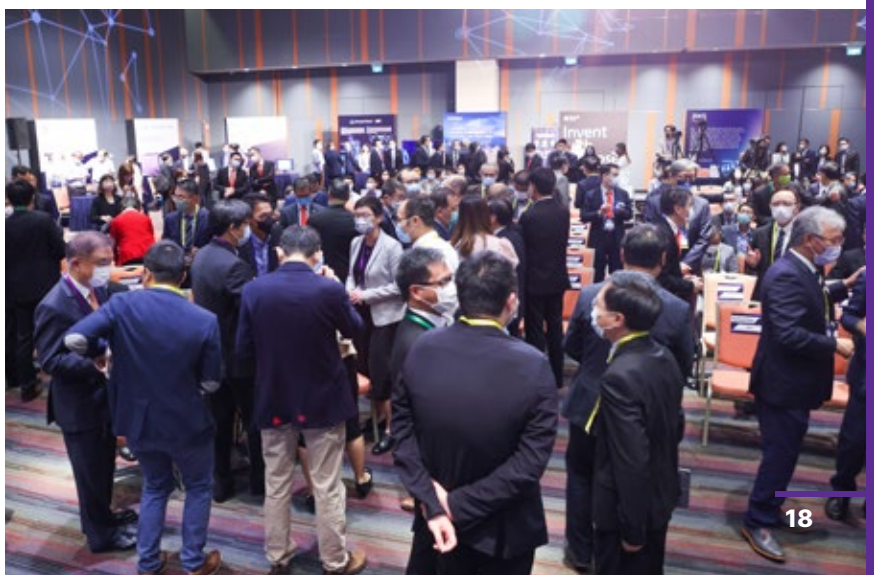
TOPIC Hong Kong Virtual Lab: Invisible to Visible

WATCH NOW!


國際建築機電
人工智能大挑戰
Global AI Challenge
Technical Conference


國際建築機電人工智能大挑戰
Global AI Challenge
Technical Conference


Co-Organisers
HKSTP
IEEE




aws
Microsoft
Towngas
YORDLAND
Technical Conference


Enabling AI Applications:
Semantic Interoperability of
Building Data
Steven T. Bushby
NIST
National Institute of Standards and Technology
U.S. Department of Commerce


主辦單位 Organisers
機電工程署
EMSD
指導單位 Advisors
中国科学技术协会
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YORDLAND
國際建築機電人工智能大挑戰
Global AI Challenge
國際論壇 Technical Conference

Ms Cristina GAMBOA

CEO
World Green Building Council

WATCH NOW!

TOPIC AI and the Shift to a Healthier, Efficient and Resilient Built Environment

Prof. Kevin KELLY

President
The Chartered Institution of Building Services Engineers (CIBSE)

WATCH NOW!

TOPIC Delivering High Quality Zero Carbon Environments

Dr Youngchoon PARK

Principal
Global Manufacturing & Industrial, Amazon Web Services

WATCH NOW!

TOPIC AI for Building Life Cycle Management

SPEAKERS

Mr Pradeep MENON

Data and AI Strategist
Microsoft Corporation

TOPIC Strategies for Adopting Data, AI and Cloud to Be an Intelligent Driven Organisation

WATCH NOW!

Ir Prof. Samson TAI

Professor of Practice
Data Economy Lab,
Hong Kong Baptist University

TOPIC Experience Sharing on Constructing Metadata Schema for Smart Building Applications

WATCH NOW!

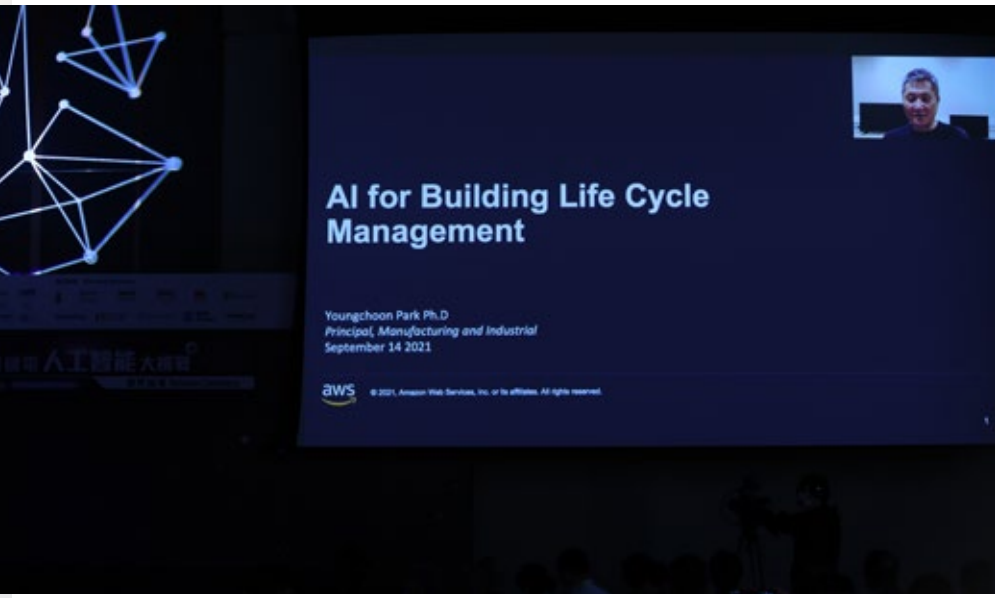
Dr Arun VISHWANATH

Senior Research Scientist
A/NZ Centre for Applied Research (CAR), IBM

TOPIC BEACH: Building Energy Analytics for Cooling and Heating

WATCH NOW!


國際建築機電人工智能大挑戰


AI for Building Life Cycle Management
Youngchoon Park Ph.D
Principal, Manufacturing and Industrial
September 14 2021
aws


Tencent Cloud


Microsoft Azure
Invent
with


Tencent Cloud | 微領


California 2021
Texas 20


國際建築機電
人工智能大挑戰
Global AI Challenge


EMSD
國際建築機電人工智能大挑戰
Global AI Challenge
國際論壇 Technical Conference

Dr Draguna VRABIE

Chief Scientist
Pacific Northwest National Laboratory

TOPIC Machine Learning Methods for Building Control Systems

WATCH NOW!

Mr Alex Chi-Nga WAN

Director
Smart Solutions, Asia, WSP

TOPIC Winning by Thinking: AI Makes Building Alive and Superior

WATCH NOW!

Dr Dan WANG

Associate Professor
Department of Computing,
The Hong Kong Polytechnic University

TOPIC Data-driven AI Services for Smart Buildings: From Operation to Deployment

WATCH NOW!


Supporting Organisations
invent with purpose


Harnessing technology to
enhance energy efficiency
Enertainer
Negawatt & PlantPro
2050


aws
azon Web Services has been the world's
ve and broadly-adopted cloud offering. It
tured services for compute, storage,
king, analytics, machine learning and
nce (AI), Internet of Things (IoT), mobile,
virtual and augmented reality (VR and
nplication development, deployment
21 Availability Zones within 25

Dr Stephen WHITE

Operating Agent
International Energy Agency
Annex 81 "Data-Driven Smart Buildings"

WATCH NOW!

TOPIC Unlocking Energy Savings Through Digitalisation of Non-Residential Buildings

Ir Andrew YOUNG

Co-lead
PropTech Alliance

WATCH NOW!

TOPIC AI and the PropTech World

Dr Jia ZENG

Director
Huawei Technologies Co., Limited

WATCH NOW!

TOPIC AI Challenges and Opportunities (Putonghua Session)

SPEAKERS

WORKSHOP

The AI competition began with the Global AI Challenge for Building E&M Facilities - Workshop, which was held on 7 December 2021.

The workshop invited representatives from the Organising Committee, Hong Kong Science and Technology Parks, Amazon Web Services, Huawei, Microsoft, and Tencent to share more information about semantic AI, the game rules, the platform which was used for AI model submission, and the various cloud platform services available. Participants had the opportunity to have a dialogue with the industry experts to get themselves ready for the competition.

See highlights of the workshop here!


國際建築機電
人工智能大挑戰
Global AI Challenge
工作坊 Workshop


國際建築機電人工智能大挑戰
Global AI Challenge
工作坊 Workshop
EMSD
SIEMENS
aws


BACnet
IEEE
SIEMENS


國際建築機電
人工智能大挑戰
Global AI Challenge
工作坊 Workshop

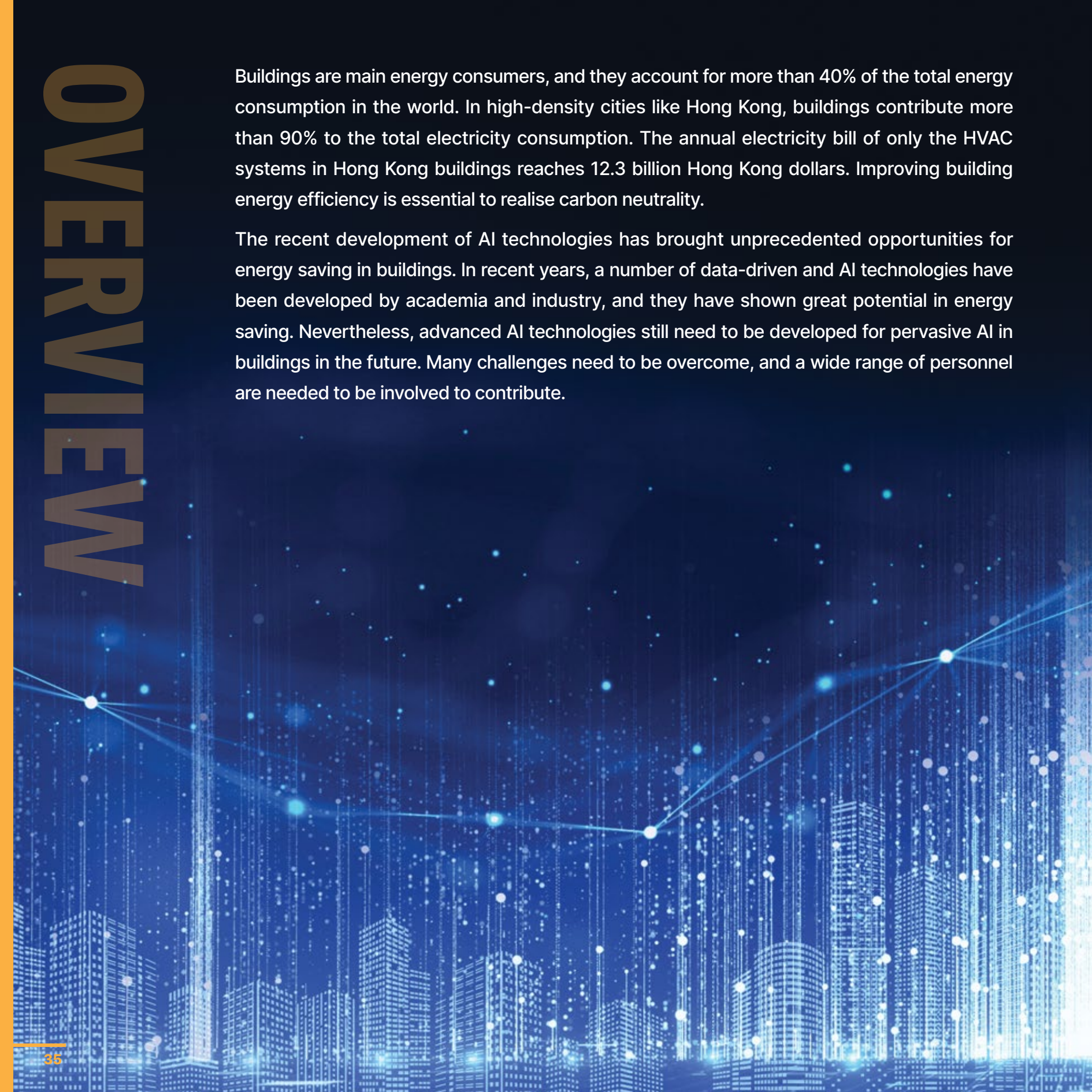
AI COMPETITION

The Global AI Challenge for Building E&M Facilities - AI Competition is a global event open to participants from all over the world. In this competition, contestants need to develop an AI model to predict the cooling demand of a commercial building in order to achieve greater building energy efficiency. The competition is a unique opportunity to inspire participants, industry leaders, innovators, and researchers to exchange ideas, and to progress the role of AI technology to have a positive impact on the world.

OVERVIEW

Buildings are main energy consumers, and they account for more than 40% of the total energy consumption in the world. In high-density cities like Hong Kong, buildings contribute more than 90% to the total electricity consumption. The annual electricity bill of only the HVAC systems in Hong Kong buildings reaches 12.3 billion Hong Kong dollars. Improving building energy efficiency is essential to realise carbon neutrality.

The recent development of AI technologies has brought unprecedented opportunities for energy saving in buildings. In recent years, a number of data-driven and AI technologies have been developed by academia and industry, and they have shown great potential in energy saving. Nevertheless, advanced AI technologies still need to be developed for pervasive AI in buildings in the future. Many challenges need to be overcome, and a wide range of personnel are needed to be involved to contribute.



We organise this international challenge competition with three objectives:

1. To allow more scholars to understand the potentials and applications of AI technologies in building energy conservation.
2. To release a unique dataset on building operations. This can facilitate a wide range of scholars to participate in the R&D of smart building technologies, which would not be possible without the access of data.
3. To allow participants to understand the challenges in large-scale AI deployment, and to introduce semantic AI platforms for large-scale AI deployment in smart buildings.

The Global AI Challenge for Building E&M Facilities - AI Competition has attracted the participation of 126 teams of research fellows, students, startups, and corporates from more than 10 regions around the world.

TIMELINE

MID-SEP
2021

Official call for applications

END OF NOV
2021

Deadline for applications

7 DEC
2021

Workshop (Part A); competition begins

EARLY DEC - 2021
MID-JAN 2022

Building semantic AI model (Part B)

MID-JAN - MID-FEB 2022

Presentation by shortlisted teams (Part C)

MID-FEB - EARLY-MAR 2022

Adjudication

23 SEP 2022

Awards Ceremony

THE CHALLENGE

TO BUILD A SEMANTIC AI MODEL

Problem

Turning the chillers on and off in a commercial building is more than just pressing a few buttons. When determining which chillers should be on or off and their operation parameters for large buildings, facility management needs to make assumptions such as the upcoming cooling load demand and external environment factors. However, these assumptions do not reflect real conditions, and may waste electricity energy when the cooling load is assumed too high or have bad occupants' ratings when assumed too low.

Proposed Solutions

If a more accurate building cooling load forecast can be predicted, facility engineers will be able to determine the optimal chiller operation strategy to improve energy efficiency.

Details

In this competition, contestants developed an AI model to predict the **hourly cooling load** of a commercial complex. The data they used for their prediction model training and testing comes from a multi-chiller system of a commercial complex in Hong Kong. The data were provided in a CSV format, and they were required to use this data to develop a Cooling Load Prediction model that can accurately predict the **next 3 months of hourly cooling load** of this commercial complex.

Evaluation Criteria: RMSE Equation

The evaluation metric for this part of the competition is based on the accuracy of the Hourly Cooling Load Prediction model measured by the Root Mean Square Error (RMSE):

$$\epsilon = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(p_i - a_i)^2}$$

- ε is the RMSE value (score)
- n is the total number of forecasts, which is the next 3 months of the data in the dataset
- p_i is the prediction value of the cooling load demand in kW, and ai is the actual cooling load in kW

Mr PANG Yiu Hung, Eric, JP

Moderator of the Judging Panel, Director of Electrical & Mechanical Services, The Government of the Hong Kong Special Administrative Region

Ms Esther AN

Vice-Chair, Corporate Advisory Board, World Green Building Council

Mr Bruce BILLEDEAUX

AI Expert, The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

Mr Gregory BURGESS

Regional BIM Lead Asia, Buro Happold International (Hong Kong) Limited
Representative of The Chartered Institution of Building Services Engineers (CIBSE)

Prof. Guoliang CHEN

Academician of the Chinese Academy of Sciences

Mr Steven CHOI

Head of Tencent Cloud, Hong Kong and Macau, Tencent

Prof. Srinivasan KESHAV

Robert Sansom Professor of Computer Science, Department of Computer Science and Technology, University of Cambridge

Dr Youngchoon PARK

Principal, Global Manufacturing and Industrial, Amazon Web Services

COMMENTS FROM JUDGES

> Presentation slides are well set out to highlight important points such as the models tested.
>
> ***- Ms Esther AN***

> A simplified pre-processing approach and a standardised AI model with little modification can result in a good match with substantially less effort.
>
> ***- Mr Bruce BILLEDEAUX***

> Effective to use ridge regression to tune the parameters.
>
> ***- Mr Steven CHOI***

> Well-adopted Leave One Feature Out (LOFO) strategy in feature engineering to figure out the importance of each feature.
>
> ***- Mr Steven CHOI***

COMMENTS FROM JUDGES

> “Transformed new features like body feeling temperatures played an important role in improving the prediction accuracy.”
>
> ***- Prof. Guoliang CHEN***

> “The idea of creating a weighted ensemble of models was a good one.”
>
> ***- Prof. Srinivasan KESHAV***

> “The use of signal and control abstractions (rect function and step response of a second-order system) indicated good thinking and use of prior knowledge of system control.”
>
> ***- Prof. Srinivasan KESHAV***

> “Nice to see non-deep learning based on data characteristics.”
>
> ***- Dr Youngchoon PARK***


Higher saving for engineers
CDF on Effort Saving
Computer Science Engineer
0%
20%
40%
60%
80%
100%
teams from save MORE
efforts than teams from CS.
here are some cute disa
Even though data preprocessing work may
effort, it is a wonderful


Mr. Wong Wai Kwong
AD/2, EMSD


國際建築總會
人工智能大挑戰
Global AI Challenge
EXIT


EMSD


Mr. Pang Yiu Hung
DEMS/GM, EMSD


EMSD


Prof. Samson Tai
Prof. Dan Wang


Mr. Arthur Chan

AWARDS

The Global AI Challenge for Building E&M Facilities – AI Competition has attracted the participation of 126 teams of research fellows, students, startups, and corporates from around the world. 10 outstanding teams from the Academic Group and Open Group have won 11 Grand Awards with their excellent performances. Gold, Silver and Bronze Awards were also presented to various teams according to their performances in the competition.

Academic Group
A-P10043

★ AWS Most Efficient AI Algorithm Award
★ Gold Award

LI Qingyun
Hong Kong Baptist University

MIN Rui
Hong Kong Baptist University

YIN Yiao
Hong Kong Baptist University

ZHOU Shucheng
Hong Kong Baptist University

Considering the typical bias-variance dilemma, our team decided to focus on a generalised model that can be more easily applied to different buildings and is more practical in the real world.

While facing major challenges on model overfitting, long-term data prediction and date-related features, we utilised the semantic AI platform for effective data retrieval and data comparison for making decisions on models and algorithms selection. We were surprised by its intuitiveness.

Academic Group
A-P10110

★ Best Use of Tencent Cloud Award
★ HUAWEI Most Innovative Use of Data Award
★ Gold Award

> This competition provides us a unique opportunity to practice our machine learning skills with a real dataset and concrete tasks. It also provides a fair playground to compare and test different algorithms and methods.
>
> Semantic AI and Brick Schema helped us understand the structure of the mechanical system and automate the data pre-processing process.

GUO Mingyue

Tongji University*

SHA Huajing

Terminus Co. Ltd.

WU Yuze

The University of Hong Kong

WANG Zhe

The Hong Kong University of Science and Technology

** Currently a member of The Hong Kong University of Science and Technology.*

Academic Group
A-P10101

★ Microsoft Outstanding AI Influencer Award
★ Gold Award

1 HUANG Yixiao
City University of Hong Kong

2 YAO Shenglong
City University of Hong Kong

3 HAN Guo
City University of Hong Kong

4 LIU Yiren
City University of Hong Kong

5 *Prof. Joe QIN (Supervisor)* 6 *Dr ZHAO Xiangyu (Supervisor)*

> This programme gives us an idea of how well-understood and well-structured data can guide the semantically precise model construction to improve daily operational efficiency.
>
> Despite the challenges faced in the time-consuming analysis, our knowledge on control systems and linear regression with interaction terms, together with the insightful data, helped us to build a statistical learning dynamic model which is highly interpretable.

Academic Group
A-P10017

★ Siemens Best Execution of Semantic AI Award
★ Gold Award

> The programme extended our knowledge on semantic AI and the advantages of such technology. It helped users extract the necessary features in the raw dataset and apply to different datasets without the need of customising for each model.
>
> Being able to combine our knowledge with newly discovered important insights from the dataset is our most memorable moment during this competition. In order to improve the performance of the model, finding the 'stories' behind the data and combining them with human knowledge were crucial.

From left to right:

DANG QUANG Minh
Hanoi University of Science and Technology

NGUYEN Hoang Vu
Hanoi University of Science and Technology

PHAM TRUNG Hieu
Hanoi University of Science and Technology

LUONG DUC Long
Hanoi University of Science and Technology

Academic Group
A-P10038

★ Towngas Most Innovative AI Solution Award
★ Gold Award

XIAO Zhiming

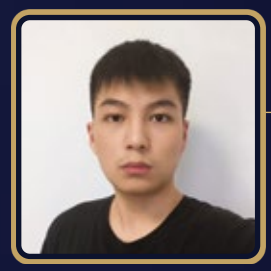
Beijing University of Civil Engineering and Architecture

MA Jianmin

Beijing University of Civil Engineering and Architecture

YANG Jieting

Beijing University of Civil Engineering and Architecture



ZHOU Liuying

Beijing University of Civil Engineering and Architecture

In this competition, we innovatively used integrated learning, Stacking, to build and employ multiple learners to jointly accomplish the task of predicting load data. KNN algorithm was also adopted for interpolating missing values for effective pre-processing of dataset.

Without knowing the intrinsic connections between the data, it could be difficult to analyse them. However, it is gratifying that the semantic AI platform can intuitively reflect the connections between various parts of building, which escalated our progress on feature engineering and further improved the model prediction accuracy.

Open Group
O-P10117

★ Alliance Contracting Outstanding AI Influencer Award
★ Gold Award

Based on our rich experience in smart building management, we adopted innovative data pre-processing and feature extraction techniques, which along with an efficient learning algorithm, obtained a competitive performance with short training time and requiring few computing resources with our model.

The complexity of the data was unexpected. We studied different research papers and explored different prediction techniques to identify the best prediction methodology for the challenge.

Timothy LOK

Swire Properties Limited

Witt SHAN

Schneider-Electric

Leiyu TANG

Schneider-Electric

Ethan ZHANG

Schneider-Electric

Open Group
O-P10079

★ Anlev Elex Elevator Best Execution of Semantic AI Award
★ Gold Award

CHAN Ming Chung

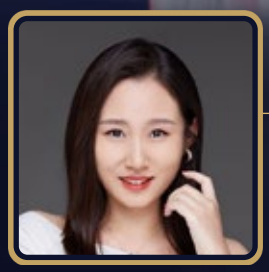
Arch & Fire Professional (Int'l) Ltd.

> This programme equipped me from being a stranger to semantic AI into someone who is able to practically adopt such technology with my existing machine learning, programming, and engineering knowledge for prediction model building.
>
> However, to effectively improve the predictive performances, non-stop search and selection of useful data and algorithms definitely require plenty of persistence and determination.

Open Group
O-P10112

★ ATAL Most Innovative Use of Data Award
★ Gold Award

> The charm of this competition is that it pushes you to keep enhancing the model before the deadline. It was so exciting every time we made progress by adding new features, modifying models, and coming up with new ideas. We found it interesting that new ideas usually appear during relaxation, like during the shower or on the way home from work. So sometimes, taking a rest helps in getting inspiration and finding bugs the other way round!
>
> We wish to have more knowledge on cooler methodologies, so that our team would be able to further optimise the input features of our model.



CHE Hangyu
Hitachi China R&D

Edmond CHU
Hitachi East Asia Ltd.

LU Shiyu
Hitachi China R&D

Open Group
O-P10001

★ Sino Group Most Innovative AI Solution Award
★ Gold Award

From left to right:

Andy PANG Kai Fai
MTRC

Kevin KWONG Ka Ming
MTRC

FOAK Chi Wai
MTRC

Matthew TSANG Yui Chi
MTRC

Unlike other data competitions such as Kaggle, the fact that teams do not know their rankings among all contestants in this competition has motivated us to cross validate our results from time to time, until the last minute. A significant amount of time was used to test and compare different combinations among our 20+ models until the best one was selected for submission.

This competition is a good start for applying machine learning in industry. With the help of semantic AI, more sophisticated prediction models could be developed and widely adopted by matching with additional data for higher accuracy.

Open Group
O-P10096

★ Yordland Most Efficient AI Algorithm Award
★ Gold Award

> In order to reach high accuracy in the prediction model, data pre-processing was adopted with the use of several algorithms to fill gaps between missing data. We were able to see the relationships of different systems more intuitively for building complexes by combining our existing knowledge on LightGBM algorithm with semantic AI.
>
> During the final part, the original prediction model no longer fulfilled the high accuracy requirements. We further improved the model by creating numerous new features and ending up abandoning ⅔ of them after rounds of analysis and testing.

DENG Zhaowen

Guangzhou TEWO
Energy Management Co., Ltd.

JIANG Feiguo

Guangzhou TEWO
Energy Management Co., Ltd.

SHAN Yaoxing

Guangzhou TEWO
Energy Management Co., Ltd.

ZHU Shilun

Guangzhou TEWO
Energy Management Co., Ltd.

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	The Hong Kong University of Science and Technology	Syed Awais Wahab SHAH
	The Hong Kong University of Science and Technology	Muhammad WAQAR
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	South China University of Technology	CHEN Junpeng
	South China University of Technology	LIU Hongfei
	South China University of Technology	XIE Jiayuan
A-P10109	University of Science and Technology Beijing	XU Maoyuan
A-P10114	Beijing University of Civil Engineering and Architecture	HE Jianlin
	Beijing University of Civil Engineering and Architecture	LIU Chenxi
	Beijing University of Civil Engineering and Architecture	LU Hongjian
	Beijing University of Civil Engineering and Architecture	NING Jiameng
A-P10115	Hong Kong Baptist University	MAK Lok Yi
	Hong Kong Baptist University	TANG Zhiye
	Hong Kong Baptist University	YANG Xu

* All Grand Award winning teams featured in previous pages are also Gold Award winners. The list above indicates other teams that have won Gold Award only.

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	The Chinese University of Hong Kong	XU Qiang
	The Chinese University of Hong Kong	XU Zhijian
	The Chinese University of Hong Kong	ZENG Ailing
A-P10007	The Hong Kong Polytechnic University	Ronisha BASKER
	The Hong Kong Polytechnic University	CHEN Zhe
	The Hong Kong Polytechnic University	ZHANG Hanbei
	The Hong Kong Polytechnic University	ZHANG Jing
A-P10019	Tsinghua University	DENG Xiangtian
	Tsinghua University	ZHANG Yuhang
A-P10047	The Chinese University of Hong Kong, Shenzhen	CHEN Guiming
	The Chinese University of Hong Kong, Shenzhen	LI Chenang
	The Chinese University of Hong Kong, Shenzhen	LIANG Jialu
A-P10057	Guangzhou University	TAN Weijun
	Guangzhou University	WENG Jinta
	Guangzhou University	XU Binghong
	Guangzhou University	XU Xiaofeng

Team Number	Organisation	Name
A-P10062	Shenzhen University	LEI Yutian
	Shenzhen University	CHEN Meiling
	Shenzhen University	LI Xueqing
	Shenzhen University	MA Yuanyuan
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	Karlsruhe Institute of Technology	Felicitas MÜLLER
	Karlsruhe Institute of Technology	Hartmut SCHMECK
	FZI Research Center for Information Technology	David WÖLFLE
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	The Hong Kong Polytechnic University	CHEUNG Jeremy Daniel
	Hong Kong Baptist University	LAM Hin Shun Thomas
	The Hong Kong University of Science and Technology	MAK Chi Teng
A-P10102	University of California, Berkeley	LIN Yuwen
	University of California, Berkeley	SUN Ruiji
	Johnson Controls	ZHANG Chenlu
	University of Nottingham Ningbo China	ZHANG Zhiang
A-P10108	Tsinghua University	LIU Xue
	Tsinghua University	TANG Hao
A-P10113	Hong Kong Baptist University	FONG Long Lok Elvis
	Hong Kong Baptist University	SO Tin King

Team Number	Organisation	Name
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A-P10126	Tsinghua University	CHEN Hanran
	Tsinghua University	KANG Xuyuan
	Tsinghua University	WANG Xiao
	Tsinghua University	YAN Da

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	The Hong Kong University of Science and Technology	Josef GSTOETTNER
	The Hong Kong University of Science and Technology	Muhammad TALHA
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	The Hong Kong Polytechnic University	JIANG Hao
	The Hong Kong Polytechnic University	XIE Yangxiaolong
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	IVE(Haking Wong), VTC	LI Cheukyin
	IVE(Haking Wong), VTC	WANG Weiquan
	IVE(Haking Wong), VTC	WONG Tszchung
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	Shenzhen University	LIU Xuyuan
	Shenzhen University	LIU Yichen
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	City University of Hong Kong	JIN Haolin
	N/A	YANG Yurong
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	Huazhong University of Science and Technology	HAN Linzhi
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	Guangdong Polytechnic	LIN Xianxiang
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	Hunan University	ZHANG Yihu
	Tsinghua University	ZHAO Hengxin
A-P10116	City University of Hong Kong	WANG Yucheng

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	Midea Group Ltd.	Jeffrey XU

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	NV5 Limited	YING Sen
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	ATAL Technologies Ltd.	LI Ming Yip
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	ATAL Technologies Ltd.	YEUNG Chu Fai
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	RaSpect Intelligence Inspection Ltd.	Dr Dhanada Kanta MISHRA
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O-P10111	Zhuhai Pilot Technology Co., Ltd.	CHEN Shiming
	Zhuhai Pilot Technology Co., Ltd.	XIONG Jun
	Zhuhai Pilot Technology Co., Ltd.	XU Yongkai
	Zhuhai Pilot Technology Co., Ltd.	ZHANG Qiongsi

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	The University of Hong Kong	TANG Kam
	Building Intelligent & Consultancy Office	YU Tsang Shing
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	Shanghai KONG Intelligent Building Co., Ltd.	LI Yuanyang
	Gd Midea Heating & Ventilating Equipment Co., Ltd.	LOH Chang Wei
	Gd Midea Heating & Ventilating Equipment Co., Ltd.	YAN Rui
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	Institute of Marine Engineering, Science & Technology	LEUNG Chun Fung
	The Hong Kong University of Science and Technology	WONG Kwing Fung
	HBDG International Limited	WONG Yuk Ming
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	The Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia	WANG Weihong

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	CLP Power Hong Kong Limited	LO Tak Yan
	Automotive Parts and Accessory Systems (APAS) R&D Centre of Hong Kong Productivity Council	LUK Tze Ching
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	Location AI Technology Limited	Jimmy WAN
	Location AI Technology Limited	YING Kai Chi
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	REC Green Technologies Co., Ltd.	Dr Andrew NING
	REC Green Technologies Co., Ltd.	Ms Carmen WONG
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