

# The 16th International Conference on Construction Applications of Virtual Reality (CONVR 2016)

**Time: 11-13 December 2016**

**Venue: Regal Kowloon Hotel, Tsim Sha Tsui, Kowloon, Hong Kong**

## PROGRAM

11 Dec 2016, Sunday	
Time	Venue: Tivoli & Tivoli Foyer (3/F)
17:00 – 19:00	Registration
18:00 – 19:30	Pre-Conference Reception
12 Dec 2016, Monday	
Time	Venue: Versailles (3/F)
08:30 – 09:00	Registration
09:00 – 09:05	Welcome Remarks <b>Prof. Jack C.P. Cheng</b> (Conference Chair)
09:05 – 09:15	Opening Speech by Guest of Honor <b>Ir Joseph Choi</b> (President, The Hong Kong Institution of Engineers, Hong Kong)
09:15 – 09:20	Remarks by Department Head <b>Prof. Hong K. Lo</b> (The Hong Kong University of Science and Technology, Hong Kong)
09:20 – 09:25	Overview of the CONVR History <b>Prof. Nashwan Dawood</b> (Teesside University, UK)
09:25 – 10:50	Keynote Speeches (Chair: <b>Prof. Jack C.P. Cheng</b> ) <i>BIM in Hong Kong: What is Your Contribution?</i> <b>Ms. Ada Fung</b> (Hong Kong Housing Authority, Hong Kong) <i>Applications of Computing and AI in Engineering</i> <b>Prof. Kincho H. Law</b> (Stanford University, USA) <i>BIM Implementation in Mainland and HK: Similarity &amp; Difference</i> (Diamond-Sponsored Keynote Speech) <b>Ir Francis Leung</b> (New World Construction Company Limited, Hong Kong)
10:50 – 11:00	Group Photos and Presentation of Souvenirs
11:00 – 11:20	Tea Break

11:20 – 12:20	Keynote Speeches ( <b>Chair: Prof. JS Kuang</b> ) <i>BIM and IT in Construction – The Research to Practice Gap</i> <b>Prof. Lucio Soibelman</b> (University of Southern California, USA) <i>Building BIM Capability in Singapore</i> <b>Mr. Tai Fatt Cheng</b> (Building and Construction Authority, Singapore)		
12:20 – 13:40	Luncheon (Café Allegro, B1/F)		
Time	Versailles (3/F)	Tivoli (3/F)	Luxembourg (3/F)
13:40 – 15:10	Diamond-Sponsored Mini-Symposium <i>Sharing of BIM Cases</i> (Prof. Jack Cheng & Prof. Yichuan Deng)	Session I-A <i>BIM Adoption and Project Management</i> (Prof. Ken-Yu Lin & Prof. Nan Li)	Session I-B <i>Laser Scanning and Photogrammetry</i> (Prof. Ning Gu & Prof. Yong Cho)
15:10 – 15:30	Tea Break		
15:30 – 17:00	Session II-A <i>Computer Vision and UAV</i> (Prof. Shih-Chung Kang & Prof. Ivan Mutis)	Session II-B <i>Data Visualization and VR</i> (Prof. Yimin Zhu & Prof. Jongsung Won)	Session II-C <i>BIM, VR and AR for Construction and Safety (I)</i> (Prof. Robert Amor & Prof. Raj Shah)
17:40 – 22:00	Conference Banquet with Tour		
13 Dec 2016, Tuesday			
Time	Venue: Versailles (3/F)		
08:30 – 09:00	Registration		
09:00 – 10:30	Keynote Speeches ( <b>Chair: Prof. JS Kuang</b> ) <i>Cyber-Physical Systems in Construction – Development Lessons and Future Directions</i> <b>Prof. Chimay J. Anumba</b> (University of Florida, USA) <i>Towards Smart Industry in Construction: a Pathway of Converging Research</i> <b>Prof. Xiangyu Wang</b> (Curtin University, Australia) <i>Global VDC Adoption – Insights into Best Practices and Challenges</i> <b>Prof. Calvin Kam</b> (Stanford University, USA)		
10:30 – 10:50	Tea Break		
10:50 – 11:50	Keynote Speeches ( <b>Chair: Prof. Nashwan Dawood</b> ) <i>Implementing Intelligent Semantic Enrichment – the SeeBridge Project</i> <b>Prof. Rafael Sacks</b> (Israel Institute of Technology, Israel)		

	<i>Integrated Management of BIM Design and Construction in Mainland China</i> <b>Mr. Jiazhi Kuang</b> (China Construction Digital International, China)		
11:50 – 13:10	Luncheon (Montparnasse Room, 2/F)		
Time	Venue: Versailles (3/F)		
13:10 – 13:40	Keynote Speeches ( <b>Chair: Prof. Jack Cheng</b> ) <i>BIM Technology Enabled Smart Airport Design and VR Applications in Third Runway Development</i> <b>Ir Kevin Poole</b> (Hong Kong Airport Authority, Hong Kong)		
Time	Versailles (3/F)	Tivoli (3/F)	Luxembourg (3/F)
13:40 – 15:10	Diamond-Sponsored Panel Discussion <i>Academia-Industry Collaboration</i> (Prof. Jack Cheng & Ir Derek So)	Session III-A <i>BIM for Design, Manufacturing and FM</i> (Prof. Po-Han Chen & Prof. Zhenhua Zhu)	Session III-B <i>BIM, GIS and Urban Computing</i> (Prof. Nobuyoshi Yabuki & Prof. Samad Sepasgozar)
15:10 – 15:30	Tea Break		
15:30 – 17:00	Session IV-A <i>Big Data and IT in Construction</i> (Prof. Ghang Lee & Prof. Tomohiro Fukuda)	Session IV-B <i>BIM, VR and AR for Construction and Safety (II)</i> (Prof. Hung-Ming Chen & Prof. Rui Liu)	<i>Visualization in Engineering (VIE)</i> <i>Editorial Board Meeting</i>
17:00 – 17:15	Closing Ceremony and Presentation of Best Student Paper Awards		
14 Dec 2016, Wednesday			
Time	Technical Visits		
09:00 – 12:30	(Optional) Technical Visit 1 – Zero Carbon Building and CIC BIM Center		
14:00 – 17:30	(Optional) Technical Visit 2 – Xiqu Center		

## Technical Program

12 December 2016, Monday

### Opening Ceremony

**09:00 – 09:25, Versailles (3/F)**

#### **Welcome Remarks**

**Prof. Jack C.P. Cheng** (*Conference Chair*)

#### **Opening Speech by Guest of Honor**

**Ir Joseph Choi** (*President, The Hong Kong Institution of Engineers, Hong Kong*)

#### **Remarks by Department Head**

**Prof. Hong K. Lo** (*The Hong Kong University of Science and Technology, Hong Kong*)

#### **Overview of the CONVR History**

**Prof. Nashwan Dawood** (*Teesside University, UK*)

### Keynote Speeches

**09:25 – 10:50, Versailles (3/F)**

**Chair: Prof. Jack C.P. Cheng**

#### **BIM in Hong Kong: What is Your Contribution?**

**Ms. Ada Fung** (*Hong Kong Housing Authority, Hong Kong*)

#### **Applications of Computing and AI in Engineering**

**Prof. Kincho H. Law** (*Stanford University, USA*)

#### **BIM Implementation in Mainland and HK: Similarity & Difference**

*(Diamond-Sponsored Keynote Speech)*

**Ir Francis Leung** (*New World Construction Company Limited, Hong Kong*)

### Keynote Speeches

**11:20 – 12:20, Versailles (3/F)**

**Chair: Prof. JS Kuang**

#### **BIM and IT in Construction – The Research to Practice Gap**

**Prof. Lucio Soibelman** (*University of Southern California, USA*)

#### **Building BIM Capability in Singapore**

**Mr. Tai Fatt Cheng** (*Building and Construction Authority, Singapore*)

## Diamond-Sponsored Mini-Symposium: Sharing of BIM Cases

13:40 – 15:10, Versailles (3/F)

### Chairs:

**Prof. Jack Cheng** (Associate Professor, The Hong Kong University of Science and Technology)

**Prof. Yichuan Deng** (Assistant Professor, South China University of Technology)

### Speakers:

**Mr. W.K. Kwok**

Senior Project Manager - Project Management  
New World China Land Limited

**Ir Thomson Lai**

Director  
Innovative Solutions Department, Hong Kong, AECOM

**Ir Steve Chan**

Senior Engineer  
Electrical and Mechanical Services Department (EMSD), HKSAR

**Ir Stewart Macfarlane**

BIM Services Manager – Digital Engineering  
MTR Corporation Limited

**Mr. Lionel Lambourn**

Director  
Syntegrate

## Session I-A: BIM Adoption and Project Management

13:40 – 15:10, Tivoli (3/F)

Chairs: Prof. Ken-Yu Lin & Prof. Nan Li

### A Tool for Assessing the Compliance of Project Activities and Deliverables against the Requirements of BIM Level 2 Policy Documents

- Mohamad Kassem, Mohamadreza Jenaban, David Craggs and Nashwan Dawood

### BIM Performance Assessments and its Application in Indian AECO Industry – A Case Study

- Amarnath Chegu Badrinath, Shang-Hsien Hsieh and Niranjana Kumar

**Risk Information Based Expert System - A Participatory Model**

- Priyadarshini Das and Gangadhar Mahesh

**Investigating the Relationship between BIM Adoption and Technical Conditions of Construction Companies: Chinese Practice**

- Ying Hong, Samad Sepasgozar and Ali Akbarnezhad

**BIM: A Disruptive Process towards Traditional Practice**

- Ahmad Mohammad Ahmad., Mian Atif Hafeez., Ahmad Muhammad Ahmad., Abdullahi Adamu Aliyu., Sergio Rodriguez and Nashwan Dawood

**The Integrated Slopland Conservation and Disaster Prevention Management System, Taiwan**

- Kuei-Lin Fu, Yu-Te Chou, Shih-Chung Kang, Meng-Han Tsai and Kun-Che Chen

Session I-B: Laser Scanning and Photogrammetry

13:40 – 15:10, Luxembourg (3/F)

Chairs: Prof. Ning Gu & Prof. Yong Cho

**Semi-Automatic Correlation for Integrating Data Produced by Laser Scanning and SFM**

- Kazuki Fujisato, Hiroshige Dan, Akira Kobayashi and Yoshihiro Yasumuro

**Reality Capture for BIM – Application, Evaluation and Integration within an Architectural Plan of Works**

- Michael Crilly, David Craggs and Nashwan Dawood

**Dimensional Quality Assessment of Concrete Slabs Using 3D Laser Scan Point Clouds**

- Nisha Puri and Yelda Turkan

**Polygonization of Point Cloud of Elongated Civil Infrastructures Using Lofting Operation**

- Nao Hidaka, Takashi Michikawa, Ali Motamedi, Nobuyoshi Yabuki and Tomohiro Fukuda

**Post-Demolition Landscape Assessment Using Photogrammetry-Based Diminished Reality (DR)**

- Kazuya Inoue, Tomohiro Fukuda, Nobuyoshi Yabuki, Ali Motamedi and Takashi Michikawa

**Automatic Registration of Laser Scanned Color Point Clouds Based on Common Feature Extraction**

- Pileun Kim, Yong K. Cho and Jingdao Chen

**Session II-A: Computer Vision and UAV**

**15:30 – 17:00, Versailles (3/F)**

**Chairs: Prof. Shih-Chung Kang & Prof. Ivan Mutis**

**Using a UAV for a Debris Fan Digital Terrain Model Reconstruction: A Case Study of the Pu-tun-pu-nas Debris Fan**

- Cheng-Hsuan Yang, Te-Chu Liu, Er-Xuan Sung and Shih-Chung Kang

**A Vision-Based Approach for Scaffolding Monitoring**

- Jian Chai, Changzhi Wu, Hung-Lin Chi, Lei Hou, Jun Wang and Xiangyu Wang

**Unmanned Aerial Vehicles Path Planning for Alluvial Fan Digital Terrain Model Reconstruction**

- Cheng-Hsuan Yang, Ci-Jyun Liang and Shih-Chung Kang

**A UAV-Based Image Processing System for Identifying and Visualizing Construction Hazardous Areas**

- Bahaa Eddine Mneymneh, Mohamad Abbas and Hiam Khoury

**The Traffic Warning System for Crossroads on Construction Site based on Computer Vision**

- Lingjing Liu, Xiaorong Zhang, Tongtong Li, Sheng Xu, Jun Wang, Dianchen Zhu, Hongyang Li and Yichuan Deng

**Novel Occupancy Sensing in Living Spaces – Evaluation of Approaches Using Human Motion Analysis Techniques and Their Extensions**

- Arun Rajagopalan and Ivan Mutis

**Session II-B: Data Visualization and VR**

**15:30 – 17:00, Tivoli (3/F)**

**Chairs: Prof. Yimin Zhu & Prof. Jongsung Won**

**BIM Based Virtual Reality Environment for Energy Consuming by End-users**

- Zhuoqian Wu, Llewellyn Tang, Eugene Ch'Ng, Shu Tang, Weiqing Zheng and Chao Chen

**Development of a Simplified Acoustic Visualization System Using Kinect Sensors**

- Ryo Yamasaki, Nobuyoshi Yabuki, Tomohiro Fukuda and Ali Motamedi



**Immersive Virtual Environment as an Apparatus for Occupant Behavior Studies**

- Sanaz Saeidi, Yimin Zhu, Joon-Ho Choi, Chen Zhong and Qi Wang

**Viraph: Enhancing Architectural Design Visualization with Results of Visibility Graph Analysis**

- Peiman Amini Behbahani, Ning Gu and Michael Ostwald

**Integrating Building Information Modeling and Game Engine for Indoor Lighting Visualization**

- Worawan Natephra, Ali Motamedi, Tomohiro Fukuda and Nobuyoshi Yabuki

**Application of Real-Time Virtual Reality Streaming Mobile Devices for Integrated Project Delivery**

- Ali Ghaffarianhoseini, Tongrui Zhang, Kai Wang, Dat Tien Doan, Attiq Ur Rehman, Fukun Ruan, Amirhosein Ghaffarianhoseini, Nicola Naismith, John Tookey, James Rotimi, Keyu Chen, Guoyong Wang, Wange Zhang, Bobing Li, Tianming Yu, Zhentao Mu and Yicao Qi

Session II-C: BIM, VR and AR for Construction and Safety (I)

15:30 – 17:00, Luxembourg (3/F)

Chairs: Prof. Robert Amor & Prof. Raj Shah

**Integrating Augmented Reality and Building Information Modelling to Facilitate Construction Site Coordination**

- Ali Ghaffarianhoseini, Dat Tien Doan, Tongrui Zhang, Attiq Ur Rehman, Amirhosein Ghaffarianhoseini, Nicola Naismith, John Tookey, James Rotimi, Mahdiar Ghaffarianhoseini, Tianming Yu, Zhentao Mu and Yicao Qi

**Virtual Collaborative Safety Training for Crane Operations**

- Isik Ates Kiral, Semra Comu, Jiayu Chen and John E. Taylor

**Augmented Reality by Depth Camera for Image-Based Pipeline Inspection**

- Takuma Yorimitsu, Hiroshige Dan, Akira Kobayashi and Yoshihiro Yasumuro

**A Study of ‘Site BIM’ Impact on Health and Safety in Construction Sites**

- Raj Shah and Joel Edwards

**Real-Time Visualization of Crane Lifting Operation in Virtual Reality**

- Yihai Fang and Yong Cho



**Cut/Fill Optimisation Underpinned by BIM in Landscape Site Realisation Process: A Case Study**

- Huda Dawood, Nashwan Dawood, Shang-Hsien Hsieh and Yi-Wen Chen

**Investigating the Use of BIM Models for BIM Work Streams in Traditional Construction Contracting in Qatar**

- Ahmad Mohammad Ahmad, Mian Atif Hafeez, Sergio Rodriguez, Vladmir Vukovic, Khalid Naji and Nashwan Dawood

13 December 2016, Tuesday

Keynote Speeches

09:00 – 10:30, Versailles (3/F)

Chair: Prof. JS Kuang

**Cyber-Physical Systems in Construction – Development Lessons and Future Directions**

*Prof. Chimay J. Anumba (University of Florida, USA)*

**Towards Smart Industry in Construction: a Pathway of Converging Research**

*Prof. Xiangyu Wang (Curtin University, Australia)*

**Global VDC Adoption – Insights into Best Practices and Challenges**

*Prof. Calvin Kam (Stanford University, USA)*

Keynote Speeches

10:50 – 11:50, Versailles (3/F)

Chair: Prof. Nashwan Dawood

**Implementing Intelligent Semantic Enrichment – the SeeBridge Project**

*Prof. Rafael Sacks (Israel Institute of Technology, Israel)*

**Integrated Management of BIM Design and Construction in Mainland China**

*Mr. Jiazhi Kuang (China Construction Digital International, China)*

Keynote Speeches

13:10 – 13:40, Versailles (3/F)

Chair: Prof. Jack Cheng

**BIM Technology Enabled Smart Airport Design and VR Applications in Third Runway Development**

*Ir Kevin Poole (Hong Kong Airport Authority, Hong Kong)*

## Diamond-Sponsored Panel Discussion: Academia-Industry Collaboration

13:40 – 15:10, Versailles (3/F)

### Moderators:

**Prof. Jack Cheng** (Associate Professor, The Hong Kong University of Science and Technology)

**Ir Derek So** (Executive Director, Hip Hing Construction Company Limited)

### Panel Members:

**Prof. Chimay Anumba**

Dean, College of Design, Construction and Planning  
University of Florida, USA

**Prof. Shang-Hsien (Patrick) Hsieh**

Professor and Department Chair  
Department of Civil Engineering, National Taiwan University

**Prof. Nashwan Dawood**

Professor  
School of Science & Engineering, Teesside University

**Ir Ivan Ko**

Senior Manager  
Construction Industry Council, Hong Kong

**Mr. Simon Wong**

Chief Executive Officer  
Hong Kong R&D Center for Logistics & Supply Chain Management Enabling Technologies

**Ir Peter Yeung**

Head of ICT, Smart City & Green Tech  
Hong Kong Science and Technology Parks Corporation

## Session III-A: BIM for Design, Manufacturing and FM

13:40 – 15:10, Tivoli (3/F)

**Chairs: Prof. Po-Han Chen & Prof. Zhenhua Zhu**

**BIM for Manufacturing: A Case Study Demonstrating Benefits and Workflows and an  
Approach for Enterprise Application Integration (EAI)**

- **Kin Ma**, Nashwan Dawood and Mohamad Kassem

**Supporting Building Owners and Facility Managers in the Visualisation of an Integrated Asset Information Model (AIM) Based on Open Standards**

- Joao Patacas, Nashwan Dawood and Mohamad Kassem

**Strategic Daylight Visualization for the Green Building Process: Integrating Optimization into an Airport Terminal Design with Skylights**

- Siti Norzaini Zainal Abidin and Puteri Shireen Jahnkassim

**Can Experience Overcome the Cognitive Challenges in Drawing-Based Design Review? — Design Review Experiments**

- Ghang Lee, Jaehyuk Park, Jongsung Won, Harrison Kwangho Park, Miyoung Uhm and Yunho Lee

**BIM-Integrated System for Energy-Saving Design Modeling of Green Buildings**

- Po-Han Chen, Chi-Feng Hua, Po-Chuan Chuang and Thanh-Chuong Nguyen

**Design Change Management in Construction Projects based on Building Information Modeling**

- Valeh Moayeri, Osama Moselhi and Zhenhua Zhu

**A BIM-based Facility Management Framework for Automatic Scheduling of Maintenance Work Orders**

- Weiwei Chen, Keyu Chen and Jack C. P. Cheng

**Session III-B: BIM, GIS and Urban Computing**

**13:40 – 15:10, Luxembourg (3/F)**

**Chairs: Prof. Nobuyoshi Yabuki & Prof. Samad Sepasgozar**

**Evoking Malaysian Architecture Cultural Identity through Development of Parametric BIM**

- Maisarah Ali, Norwina Mohd Nawawi, Puteri Shireen Jahnkassim, Nashwan Dawood and Saiful Nizam Mohd

**Near-Road Environment Sensitivity Analysis for Heavy Vehicle Freight Transportation by BIM and GIS Integration System**

- Yongze Song, Xin Liu, Xiangyu Wang, Yi Tan and Jack C.P. Cheng

**Building Polygon Rectification for Automatic Generation of 3D Building Models**

- Kenichi Sugihara and Takahiro Murase

**Modeling Urban Technology Acceptance: Factor Analysis Approach**

- Sharifeh Sargolzaei, Samad M.E. Sepasgozar and Mohammad Mojtahedi

**BIM and GIS Integration: An Investigation on its Scope in the U.A.E**

- Amreen Nizam, Nithin Thomas, Dr Yasemin Nielsen and Dr Hagir Hakim

**Sustainable Smart Cities: Evaluation of Australian Practice**

- Fahim Ullah, Samad M.E. Sepasgozar and Muhammad Jamaluddin Thaheem

Session IV-A: Big Data and IT in Construction

15:30 – 17:00, Versailles (3/F)

Chairs: Prof. Ghang Lee & Prof. Tomohiro Fukuda

**Labor Sentiment Analysis for the Construction Industry: a Case Study of Twitter in the USA**

- Liyaning Tang, Yiming Zhang, Fei Dai, Yoojung Yoon Yangqiu Song and Radhey S. Sharma

**Real-Time Simulation of Construction Worker Using Human Body and Hand Tracking for Robotic Construction Worker System**

- Manoj Kurien, Min-Koo Kim and Ioannis Brilakis

**The Energy Performance Analysis of Residential Buildings in Saudi Arabia**

- Ahmad Alkanani, Nashwan Dawood and Mohamad Kassem

**Dynamic Modelling of Cranes and Concrete Pumps Diffusion in the Construction Industry**

- Samad Sepasgozar and Perry Forsythe

**Survey of the Research of ICT Applications in the AEC Industry: A View from Two Mainstream Journals**

- Huaquan Ying and Sanghoon Lee

**Intelligent Emergency Exit Signage Guidance System Framework for Real-Time Emergency Evacuation**

- Jun Zhang and Raymond Issa

Session IV-B: BIM, VR and AR for Construction and Safety (II)

15:30 – 17:00, Tivoli (3/F)

Chairs: Prof. Hung-Ming Chen & Prof. Rui Liu

**A Web-Based Construction Site Risk Evaluation and IFC-Based Presentation System**

- Yo-Ming Hsieh, Shih-Hui Chang and Mao-Sheng Tsa

**The System Development and Application Scenarios of an On-Site BIM Viewer based on Augmented Reality and Indoor Positioning**

- Hung-Ming Chen and Hong-Dao Lin

**A Conceptual Workflow for BIM Based Prefabrication Design Visualization with Augmented Reality**

- Shu Tang, Llewellyn Tang, Zhuoqian Wu, Weiqing Zheng and Chao Chen

**Identifying Construction Risk Sources by Virtual Environments**

- Cem Sebzeci, Semra Comu and Isik Ates Kiral

**BIM to Mitigate Health and Safety Risks in the Construction and Maintenance of Infrastructure**

- Mohammed Muzafar and Darshan Ruikar

**BIM-based Smart Facility Management Virtual Reality via Indoor Localization Technology**

- Rui Liu, Yishuai Cao and Xiaolin Li

Closing Ceremony and Presentation of Best Student Paper Awards

17:00 – 17:15, Versailles (3/F)

Chair: Prof. Jack C.P. Cheng