International Association for Automation and Robotics in Construction

ISARC 2018 Berlin, Germany July 20-25, 2018

35th International Symposium on Automation and Robotics in Construction

&

International AEC/FM Hackathon

The Future of Building Things

RUB

Program • Instructions • Maps

1. Welcome Address

Dear colleagues and friends,

We cordially welcome you to the 2018 International Symposium on Automation and Robotics in Construction (ISARC), the world's leading symposium of professionals and researchers in the architecture, engineering, construction, and facility management (AEC/FM) domains who feel that the practice, education, and research of automation and robotics in construction have to transform in order to respond to the world's existing and future challenges.

Germany was host to its last ISARC exactly 20 years ago. Since then, most of our world has changed dramatically. Berlin as the host city for this year's ISARC is only one evidence in the world how quickly systems, technology, and skylines can change if humans want to.

About 300 registered participants from more than 40 countries will join the sold-out ISARC 2018 events, including a technical tour to innovative construction sites. For the first time in IAARC's history an Intl. AEC/FM Hackathon with more than 150 participants from industry and universities will precede an ISARC. Its focus is simple: creating prototype solutions while world-known experts assist young minds.

While many of the events around the ISARC 2018 and the Intl. AEC/FM Hackathon will take place in historic buildings or in well-known parts of Berlin, we are proud and very thankful for the strong industry support.

What historically has been organized by leading academics around the world has turned into vibrant events. This guide offers you the details of the program of the ISARC 2018 and the Intl. AEC/FM hackathon. It further provides instructions for the presenters and the session chairs as well as maps to navigate. All information including the ISARC 2018 conference proceedings are also freely available on www.isarc2018.org.

Welcome in Berlin and enjoy your time!

Jochen Teizer, *Markus König* (both from the Ruhr-Universität Bochum) and *Timo Hartmann* (Technical Universität Berlin)

ISARC 2018 General Chairs

2. Program Overview and Event Locations

2.1. Program Overview

Three events will take place between July 20-25, 2018: (a) Intl. AEC/FM Hackathon, (b) ISARC 2018 (keynote and research presentations), and (c) Technical Tour. Your attendance is limited to the events you are registered for. More details to the programs are on the following pages.

	Friday July 20	Saturday July 21	Sunday July 22	Monday July 23	Tuesday Jul 24	Wednesday July 25
	Intl. AEC/FM Hackathon					
			ISARC 2018			
						Technical Tour
08:00 a.m.		Hacking & Industry Presentations	Hacking & Team Presentations	Keynotes & Academic Presentations	Keynotes & Academic Presentations	Construction Site Visits
Noon	Opening & Workshops					
06:00 p.m.	Reception & Team Building		Prizes & ISARC Reception		Awards & Gala Dinner	
10:00 p.m.						

Program overview

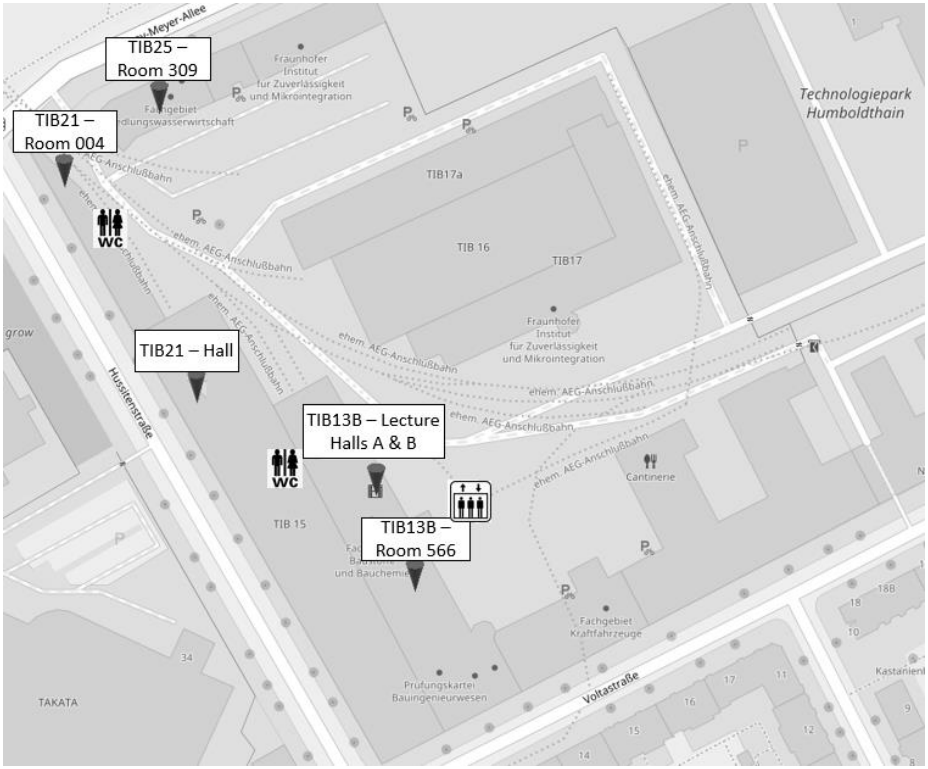
Intl. AEC/FM Hackathon: The Hackathon will take place from July 20-22, 2018 at TU Berlin's historic Humboldthain campus in the Gustav-Meyer-Allee 25, 13355 Berlin). *Transportation is on your own.*

ISARC 2018: The ISARC 2018 Reception (July 22, 2018, 6:30 p.m.) and Gala Dinner (evening of July 24, 2018) will be at TU Berlin's historic Humboldthain campus in the Gustav-Meyer-Allee 25, 13355 Berlin. All ISARC 2018 keynotes and paper presentations (July 23-24, 2018) will be at the Maritim proArte in the Friedrichstraße 151, 10117 Berlin. *Transportation for the ISARC Reception is on your own, buses will depart/return for the ISARC Gala Dinner from/to the Maritim proArte.*

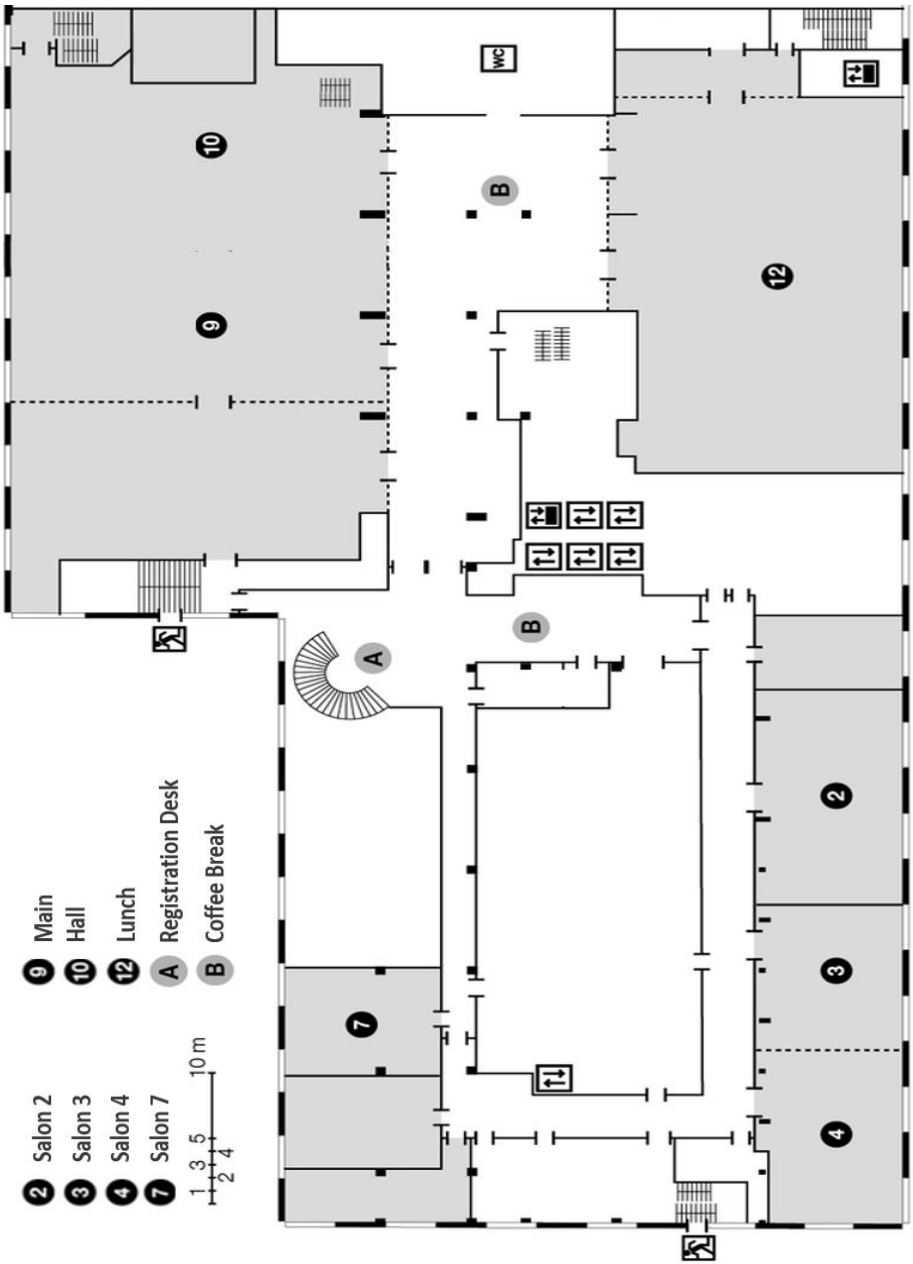
Technical Tour: All registered participants for the technical tour will meet on July 25, 2018 at 8 a.m. in the main lobby of the Maritim proArte, Friedrichstraße 151, 10117 Berlin. Please bring your coupon with you and please be on time. While personal protective equipment (PPE) is provided to you, please wear rugged shoes for medium walking distances (500 m). No tennis shoes, sandals or shorts are allowed.

Please note, all information related to the **IAARC Board of Directors (BOD) Meetings** will be sent on an individual and invitation-only basis.

2.2. Location of Hackathon (Gustav-Meyer-Allee 25, 13355 Berlin)



2.3. Location of ISARC 2018 (1st floor, Friedrichstraße 151, 10117 Berlin)



3. Keynotes @ ISARC 2018

Monday, July 23, 2018

Dr. Ilka May
LocLab Consulting GmbH, Germany

Games technology in asset design and management: A digital twin is a virtual copy of a real existing object or space, enriched with data. Digital twins represent the upcoming version of user interfaces for a digitized society. Games technology provides a series of automated techniques to produce very high-quality digital twins**.** It is possible to either navigate buildings or estate. Further access to information through other software and algorithms provide deep analysis and data access.

Tuesday, July 23, 2018

Prof. Frédéric Bosché
Heriot-Watt University, Scotland

Hybrid Reality – Visual and Structural Mixed Reality: This talk will present research in the development of Mixed Reality technology for application in the AEC sector. Starting from a review of the benefits and limitations of Mixed Reality, I will highlight two on-going projects: the immersive Hybrid Reality (iHR) project that has particular application for workforce training; and the UrbanPlanAR project, which aims to enhance visualization of 3D BIM building designs within urban environments using AR.

4. Detailed Schedule

4.1. Intl. AEC/FM Hackathon

Time	Friday, July 20, 2018	Saturday, July 21, 2018	Sunday, July 22, 2018
06:30		Facility opens	Facility open
07:00			
07:30			
08:00		**Breakfast**	**Breakfast**
08:30			
09:00			
09:30			
10:00		**Industry presentations**	
10:30		Generative design	
11:00		Cloud computing	**Finalize and submit**
11:30		Mixed Reality (AR/VR)	**presentations**
12:00	Facility opens	**Lunch**	**Lunch**
12:30	**Workshop Registration**	**Team registration closes***	
13:00	**Opening remarks and logistics**	**Industry presentations**	**Team presentations*****
13:30	**Five Concurrent Workshops**	Automation	
14:00	Dynamo	Robotics	
14:30	Forge	Remote sensing	
15:00	Construction Robotics	…	Award jury meets
15:30	Big Data Mining	…	**Award announcements**
16:00	Mixed Reality (AR/VR)	…	**Hackathon closes**
16:30	Remote Sensing & IoT	and more topics	
17:00			
17:30	**Team building**		
18:00	**Registration + Dinner**	**Dinner**	
18:30			**ISARC 2018 Reception**
19:00			*(ISARC registration required)*
19:30	**Welcome remarks**		
20:00	**3 Keynotes** (AEC-Hackathon,		
20:30	RUB, TUB; KUKA, Arcadis,		
21:00	and Topcon)		
21:30	**Teams announce topics**		
…	**Hacking**		Facility closes
01:00	Facility closes**	Facility closes**	

* Only registered teams will be allowed to present on Sunday, July 22, 2018

** Separate spaces will be available upon request

*** Instructions (e.g. format and length) will be provided during Saturday

4.2. ISARC 2018

Time	Monday, July 23, 2018				
	Hall	Salon 2	Salon 3	Salon 4	Salon 7
08:00	Registration				
08:15					
08:30	Opening remarks				
08:45	Keynote				
09:00					
09:15	BOD address				
09:30	Logistics for the day				
09:45	Coffee Break				
10:00					
10:15					
10:30	Session 1	Session 2	Session 3	Session 4	
10:45					
11:00					
11:15					
11:30					
11:45					
12:00					
12:15	Lunch				
12:30					
12:45					
13:00					
13:15	Session 5	Session 6	Session 7	Session 8	Session 9
13:30					
13:45					
14:00					
14:15					
14:30					
14:45					
15:00	Coffee Break				
15:15					
15:30					BOD
15:45	Session 10	Session 11	Session 12	Session 13	(invitation
16:00					only)
16:15					
16:30					
16:45					
17:00					
17:15					
17:30					
17:45					
18:00					BOD Tour
18:15					& Dinner
18:30					(invitation
18:45					only)
…					
22:30					

Tuesday, July 24, 2018			
Hall	Salon 2	Salon 3	Salon 4
Registration			
Keynote			
Logistics for the day			
Session 14	Session 15	Session 16	Session 17
Coffee Break			
Session 18	Session 19	Session 20	Session 21
Lunch			
Session 22	Session 23	Session 24	Session 25
Coffee Break			
Session 26	Session 27	Session 28	Session 29
Buses depart from Maritim proArte			
Gala Dinner Reception Gala Dinner, Awards Ceremony and Closing			
Buses will start returning to Maritim proArte			

08:00–08:30 **Registration**

08:30–09:45

Opening Remarks ∗ Keynote *Ilka May*
Address to BOD ∗ General Information

09:45–10:30 **Coffee Break**

10:30–12:15 **Chair:** Frans van Gassel

Main Hall

Session 1: BIM

10:30
Barriers Analysis to Effective Implementation of BIM in the Construction Industry 019
Javad Majrouhi Sardroud, Mohammadali Mehdizadehtavasani, Amin Khorramabadi and Alireza Ranjbardar

10:45
BIM- and Mobile-Based System for Supporting Facility Maintenance Management 034
Chin-Yu Lin, Kun-Chi Wang, Tse-Yu Kuo, Li-Hsi Yang and Wei-Chih Wang

11:00
Applying Object-oriented Analysis and Design to Digital Construction Logistics Planning from a Material Flow Perspective 235
Zeng Ningshuang, König Markus and Mao Chao

11:15
Development of BIM-based Design and Inspection Prototype Process for Temporary Works 069
Chang-Hoon Choi, Choong-Hee Han and Junbok Lee

11:30
Can a Schema Solve Interoperability Problems in Construction? 128
Goran Sibenik and Iva Kovacic

11:45
Structuring Information from BIM: A Glance at Bills of Materials 087
Jani Mukkavaara, Gustav Jansson and Thomas Olofsson

12:00
Do Handstorm Principles Support Creative BIM Collaboration? 035
Frans van Gassel

10:30–12:15 **Chair:** Nan Li

Salon 2

Session 2: Safety

10:30
Machine Learning for Assessing Real-Time Safety Conditions of Scaffolds 018
Chunhee Cho, Jeewoong Park, Kyungki Kim and Sayan Sakhakarmi

10:45
Quantitative Framework for construction Safety Evaluation in Designing Temporary Haul Road Layout on Site Grading Projects 199
Chaojue Yi and Ming Lu

11:00
Analysis of Construction Accidents Based on Semantic Search and Natural Language Processing 172
Seonghyeon Moon, Taekhyung Kim, Bon-Gang Hwang and Seokho Chi

11:15
Crane Safety System with Monocular and Controlled Zoom Cameras 187
Axel Vierling, Tanittha Sutjaritvorakul and Karsten Berns

11:30
Automating Analysis of Construction Workers' Viewing Patterns for Personalized Safety Training and Management 195
Idris Jeelani, Kevin Han and Alex Albert

11:45
Predictive Analytics for Close Calls in Construction Safety 105
Olga Golovina, Manuel Perschweski and Jochen Teizer

12:15–13:15 **Lunch**

08:00–08:30 **Registration**

08:30–09:45

Opening Remarks ∗ Keynote *Ilka May*
Address to BOD ∗ General Information

09:45–10:30 **Coffee Break**

10:30–12:15 **Chair:** Jozef Gasparik

Salon 3

Session 3: Construction Management

10:30
Modeling of Identifying Mediator Effects between Project Delivery Systems and Cost Performance 130
Hyosoo Moon, Kwonhyun Kim, Trefor Williams, Hyun-Soo Lee, Moonseo Park, Bosik Son and Jae-Youl Chun

10:45
A Conceptual Framework for Tracking Design Completeness of Track Line Discipline in MRT Projects 063
Ekin Eray, Carl Haas, Derek Rayside and Mani Golparvar-Fard

11:00
Improving Supply Chain Communications for Off-Site Construction using Process Specification Language 075
Wuyue Xiong, Jian Yang, Zhaojing Wang, Hao Hu, Feng Xu and Jingbo Zhang

11:15
A Methodology for Analysing Productivity in Automated Modular Construction 213
Sundararaman Krishnamoorthi and Benny Raphael

11:30
Holonic Execution System for Construction Management 112
Berardo Naticchia, Massimo Vaccarini and Alessandro Carbonari

11:45
Visualization of an Integrated Model of Construction Projects 009
Gunnar Lucko, Yi Su and Shabtai Isaac

12:00
Continuing Increasing of Quality Management Level in Construction Company using Excellence Model with Software Support 054
Jozef Gašparík, Tomáš Funtík, Marián Gašparík and Bader Alamro

10:30–12:15 **Chair:** Hyoungkwan Kim

Salon 4

Session 4: Deep Learning Vision

10:30
Crack Detection in Masonry Structures using Convolutional Neural Networks and Support Vector Machines 030
Krisada Chaiyasarn, Wasif Khan, Luqman Ali, Mayank Sharma, Daniel Blackenbury and Mathew Dejong

10:45
Classification of Images from Construction Sites Using a Deep-Learning Algorithm 047
Daeyoung Gil, Ghang Lee and Kahyun Jeon

11:00
Performance Comparison of Pretrained Convolutional Neural Networks on Crack Detection in Buildings 154
Çağlar Fırat Özgenel and Arzu Gönenç Sorguç

11:15
Resolution Enhancement for Thermographic Inspection in Industrial Plant Using Deep Convolutional Networks 183
Hyunchul Choi, Hyeonwoo Seong, Hyojoo Son and Changwan Kim

11:30
A Deep Residual Network with Transfer Learning for Pixel-level Road Crack Detection 166
Seongdeok Bang, Somin Park, Hongjo Kim, Yeo-San Yoon and Hyoungkwan Kim

11:45
Patch-based Crack Detection in Black Box Road Images using Deep Learning 167
Somin Park, Seongdeok Bang, Hongjo Kim and Hyoungkwan Kim

12:00
Image-based Indoor Localization using BIM and Features of CNN 170
Inhae Ha, Hongjo Kim, Somin Park and Hyoungkwan Kim

12:15–13:15 **Lunch**

13:15–15:00 **Chair:** Junbok Lee

Main Hall

Session 5: Facility Manangement

13:15
Gaming Approach to Designing for Maintainability: A light Fixture Example 229
Abiola Akanmu, Tanyel Bulbul and Aanuoluwapo Ojelade

13:30
An Information Management Framework for Optimised Urban Facility Management 092
Nicola Moretti, Mario Claudio Dejaco, Sebastiano Maltese and Fulvio Re Cecconi

13:45
Holonic Management Systems for Resilient Operation of Buildings 097
Massimiliano Pirani, Leonardo Messi, Alessandro Carbonari, Andrea Bonci and Massimo Vaccarini

14:00
Issues and Needs for Standard Classifications for Facility Management in Smart Manufacturing 145
Zhenhui Jin, Seunghee Kang, Youngsoo Jung, Chang-Gwon Koo and Seong-Hoon Choi

14:15
Integrating Facility Management Information into Building Information Modelling using COBie: Current Status and Future Directions 179
Laura Florez and Kereshmeh Afsari

14:30 (2 papers)
Estimate of Economic Feasibility of a Window Cleaning Device 224
Kyoon-Tai Kim, Young-Hun Jun and Eun-Young Shin

Determining the Cleaning Technology Demanded by Potential Clients through a Survey 225
Kyung-Ho Park and Kyoon-Tai Kim

14:45
A Study of the Influence Factors on Modular Residential Asset 049
Doyun Lee, Junbok Lee and Choonghee Han

13:15–15:00 **Chair:** Alexey Bulgakov

Salon 2

Session 6: Automation/Robotics

13:15
Earthmoving Construction Automation with Military Applications: Past, Present and Future 241
Quang Ha

13:30
Integrated, Automated and Robotic Process for Building Upgrading with Prefabricated Modules 083
Kepa Iturralde and Thomas Bock

13:45
Concrete Inspection Systems Using Hammering Robot Imitating Sounds of Workers 055
Yusuke Takahashi, Yasuichi Ogawa, Tomoya Satoh and Satoshi Maehara

14:00
Preliminary System Design for Teleoperating Construction in Extreme Environments 067
Tomohiro Narumi, Shigeru Aoki, Takashi Yokoshima, Naohiro Uyama, Sho Fukushima, Goh Tabuchi, Hiroshi Kanamori and Sachiko Wakabayashi

14:15
Marking Robot in Cooperation with Three-Dimensional Measuring Instruments 074
Takashi Kitahara, Kouji Satou and Joji Onodera

14:30
Application of Automation and Robotics Technology in High-Rise Building Construction: An Overview 077
Shiyao Cai, Zhiliang Ma, Miroslaw Skibniewski, Jianfeng Guo and Langsheng Yun

14:45
A Cyber-physical System of Diagnosing Electric Drives of Building Robots 007
Alexey Bulgakov, Tatyana Kruglova and Thomas Bock

15:00–15:45 **Coffee Break**

15:30–21:00 **BOD Meeting Salon 7 (invitation only)**

13:15–15:00 **Chair:** Carl Haas

Salon 3

Session 7: Machine Learning

13:15
A Data-Mining Approach for Energy Behavioural Analysis to Ease Predictive Modelling for the Smart City 205
Lavinia Chiara Tagliabue, Stefano Rinaldi, Mario Favalli Ragusini, Giovanni Tardioli and Angelo Luigi Camillo Ciribini

13:30
Reasoning on Human Experiences of Indoor Environments using Semantic Web Technologies 024
Haonan Qiu, Georg Ferdinand Schneider, Tomi Kauppinen, Sebastian Rudolph and Simone Steiger

13:45
Robotic Inspection Tests of Tunnel Lining Concrete with Crack Light-section Device on Variable Guide Frame 123
Daisuke Inoue, Takao Ueno and Satoru Nakamura

14:00
Application of Machine Learning Technology for Construction Site 032
Heejae Ahn, Dongmin Lee, Hunhee Cho, Kyung-In Kang, Seongsoo Lee and Taehoon Kim

14:15
A Numerical Model for the Attitude Manipulation of Twin-Hoisted Object 056
Peng-Yuan Chen, Zhao-Yang Zhuang, Chia-Ming Chang and Shih-Chung Kang

14:30
Inferring Construction Activities from Structural responses using Support Vector Machines 080
Aparna Harichandran, Benny Raphael and Koshy Varghese

14:45
Evaluating Artificial Intelligence Tools for Automated Practice Conformance Checking 026
Seokyoung Kang and Carl T. Haas

13:15–15:00 **Chair:** Burcu Akinci

Salon 4

Session 8: Computer Vision

13:15
Crack detection in frozen soils using infrared camera 048
Yang Zhao, Rui Li and Hyungjoon Seo

13:30
A Framework for Constructing Semantic As-is Building Energy Models (BEMs) for Existing Buildings Using Digital Images 078
Huaquan Ying, Qiuchen Lu, Hui Zhou and Sanghoon Lee

13:45
Recognition and Positioning of SBCs in BIM Models Using a Geometric vs Colour Consensus Approach 186
Antonio Adan, Blanca Quintana and Samuel A. Prieto

14:00
Automatic Tracking Camera System for Construction Machines by Combined Image Processing 143
Makito Inoue and Takashi Yoshimi

14:15
Integration of Imaging and Simulation for Earthmoving Productivity Analysis 160
Hongjo Kim, Seongdeok Bang, Hoyoung Jeong, Youngjib Ham and Hyoungkwan Kim

14:30
Applying BIM and visualization techniques to support construction quality management for soil and water conservation construction projects 161
Kun-Chi Wang, Shih-Hsu Wang, Cheng-Ju Kung, Shao-Wei Weng and Wei-Chih Wang

14:45
Construction Worker Detection and Tracking in Birds-Eye View Camera Images 236
Marcel Neuhausen, Jochen Teizer and Markus König

13:15–15:00 **Chair:** Ronie Navon

Salon 4

Session 9: Miscellaneous

Representation of the Joystick Using the Virtual Configuration 119 *Hiroki Kato and Masamitsu Kurisu*

Construction Equipment Collision-Free Path Planning Using Robotic Approach 248 *Navid Kayhani, Hosein Taghaddos and Saeed Behzadipour*

A probabilistic-Based Deterioration Model Using Ground Penetrating Radar 201 *Mohamed Marzouk, Eslam Mohammed Abdelkader and Tarek Zayed*

From the Pyramids via Modern CE to Automation & Robotics: Progress or Regress? 155 *Ronie Navon and Shabtai Isaac*

15:00–15:45 **Coffee Break**

15:30–21:00 **BOD Meeting Salon 7 (invitation only)**

15:45–17:15 **Chair:** Angelo L. C. Cirbini

Main Hall

Session 10: BIM

15:45
Parametric BIM Façade Module Development For Diagrid Twisted Structures 219
Tahir Akkoyunlu

16:00
Supporting Post-Occupant Evaluation through Work Order Evaluation and Visualization in FM-BIM 011
Chris Pin, Clarice Medina and J.J. McArthur

16:15
Development of Web-based BIM Models Inspection and Modification Management System for Supervisions 046
Pao-Tsu Hsiao and Yu-Cheng Lin

16:30
Automatic Generation of the Consumption for Temporary Construction Structures Using BIM: Applications to Formwork 020
Keyi Wu, Borja Garcia de Soto, Feilian Zhang and Bryan Adey

16:45
BIM Guidelines Review for Public Post-secondary Institutions 041
Beda Barkokebas, Samer Bu Hamdan, Aladdin Alwisy, Ahmed Bouferguene and Mohamed Al-Hussein

17:00
BIM-based Interoperable Workflow for Energy Improvement of School Buildings over the life cycle 096
Lavinia Chiara Tagliabue, Sebastiano Maltese, Fulvio Re Cecconi, Angelo Luigi Camillo Ciribini and Enrico De Angelis

15:45–17:15 **Chair:** André Borrmann

Salon 2

Session 11: Automation/Robotics

15:45
A Methodological Approach to Implement On-Site Construction Robotics and Automation: A Case in Hong Kong 086
Wen Pan, Rongbo Hu, Thomas Linner and Thomas Bock

16:00
Cable-Driven Parallel Robot for Curtain Wall Modules Automatic Installation 094
Meysam Taghavi, Kepa Iturralde and Thomas Bock

16:15
Towards Robotic Fabrication in Joining of Steel 101
Ethan Kerber, Sven Stumm, Lukas Oster, Sigrid Brell-Cokcan, Uwe Reisgen and Tobias Heimig

16:30
Development of Automated Mobile Marking Robot System for Free Access Floor 141
Takehiro Tsuruta, Kazuyuki Miura and Mikita Miyaguchi

16:45
Trajectory Planning of Forces and Arm Tips for Tumbling Operation by Two Arms 180
Takahiro Kitazawa and Masamitsu Kurisu

17:00 (2 papers)
Design of a Window Cleaning Device and Its Operating Mechanism 226
Young-Hun Jun, Kyoon-Tai Kim and Eun-Young Shin

Conceptual Design of the Cleaning Tool for a Window Cleaning Device 227
Eun-Young Shin, Kyoon-Tai Kim and Young-Hun Jun

Dinner on your own

15:45–17:15 **Chair:** Nobuyoshi Yabuki

Salon 3

Session 12: Construction Management

15:45
A Simulation-based Earthmoving Fleet Optimization Platform (SEFOP) for Truck/Excavator Selection in Rough Grading Project 197
Chaojue Yi and Ming Lu

16:00
Multiskilled Human Resource Problem in Off-Site Construction 210
Araz Nasirian, Mehrdad Arashpour and Babak Abbasi

16:15
Integrated Digital and Model-Based Construction Logistics Management Based on Lean Thinking Approaches 099
Christian Leifgen and Steffen Kujajewski

16:30
Process of Verification of Earthworks Execution using Terrestrial Laser Scanning 214
Marek Dubek, Tomas Funtik, Jan Erdelyi, Peter Makys and Marek Petro

16:45
Utilization of Virtual Reality Visualizations on Heavy Mobile Crane Planning for Modular Construction 249
Navid Kayhani, Hosein Taghaddos, Mojtaba Noghabaee, and Ulrich (Rick) Hermann

17:00
Automation of the Execution of Monolithic Reinforced Ceilings 999
Andrzej Więckowski

15:45–17:15 **Chair:** Zhenhua Zhu

Salon 4

Session 13: IoT

15:45
Using Wearable Devices to Explore the Relationship among the Work Productivity, Psychological State, and Physical Status of Construction Workers 238
Chao Mao, Yuhan Gao, Guiwen Liu, Markus König and Jingke Hong

16:00
A review of IoT Applications in Supply Chain Optimization of Construction Materials 110
Amit Kumar and Omidreza Shoghli

16:15
Scaffolding Modelling for Real-Time Monitoring using a Strain Sensing Approach 017
Chunhee Cho, Sayan Sakhakarmi, Kyungki Kim and Jeewoong Park

16:30
An Accident Notification System in Concrete Pouring using Sound Analysis 033
Inchie Kim, Sangyoon Chin and Jinho Ko

Dinner on your own

08:00–08:30 **Registration**

08:30–09:15 **Keynote *Frédéric Bosché* ∗ General Information**

09:15–10:30 **Chair:** Markus König

Main Hall

Session 14: BIM

09:15
A BIM-based Conceptual Cost Estimation Model Considering Structural Analysis and Design 072
Chun-Liang Wu, Kun-Chi Wang and Wei-Chih Wang

09:30
A Master Model Approach for Design and Analysis of Roof Trusses 079
Sebastian Kubicki, Jani Mukkavaara and Marcus Sandberg

09:45
Key Factors of an Initial BIM Implementation Framework for Small and Medium-sized Enterprises (SMEs) 190
Arman M. Kouch, Kimmo Illikainen and Seppo Perälä

10:00
Cost Analysis of Equipment in a Building using BIM-based Methods 088
Chuang Liu, Meng-Xue Yang, Luke Allan and Chiu-Jen Ku

10:15
An Algorithm for Optimizing the Location of Attached Tower Crane and Material Supply Point with BIM 095
Rongyan Li, Yan Fu, Guiwen Liu, Chao Mao and Pengpeng Xu

09:15–10:30 **Chair:** Isaac Shabtai

Salon 2

Session 15: Quality

09:15
A Mathematical Job Allocation Model to Maximize Career Development Opportunities for Construction Workers 168
Babak Shahbazi, Ali Akbarnezhad, David Rey and Alireza Ahmadian Fard Fini

09:30
The Accuracy Enhancement of Architectural Walls Quantity Takeoff for Schematic BIM Models 171
Chavanont Khosakitchalert, Nobuyoshi Yabuki and Tomohiro Fukuda

09:45
Modelling Information Flow of Occupant Feedback in Office Buildings 176
Deniz Artan, Deniz Donmez, Isilay Tekce and Esin Ergen

10:00
Robotics in the Construction Industry: State of the Art and Future Opportunities 185
Guglielmo Carra, Alfredo Argiolas, Alessandro Bellissima, Marta Niccolini and Matteo Ragaglia

10:15
4D BIM for Improving Plant Turnaround Maintenance Planning and Execution: A Case Study 243
Wenchi Shou, Jun Wang and Xiangyu Wang

10:30–11:00 **Coffee Break**

08:00–08:30 **Registration**

08:30–09:15 **Keynote *Frédéric Bosché* ∗ General Information**

09:15–10:30 **Chair:** Ronie Navon

Salon 3

Session 16: 3D Printing

09:15
Strategic Optimization of 3D concrete Printing using the Method of CONPrint3D 006
Martin Krause, Jens Otto, Alexey Bulgakov and Daher Sayfeddine

09:30
Design for Manufacture and Assembly in Off-Site Construction: Advanced Production of Modular Façade Systems 057
Mehrdad Arashpour, Miro Miletic, Nicholas Williams and Yihai Fang

09:45
Optimisation of Mixture Properties for 3D Printing of Geopolymer Concrete 065
Alireza Kashani and Tuan Ngo

10:00
Digitally Fabricated Innovative Concrete Structures 127
Eric Herrmann, Jeldrik Mainka, Hendrik Lindemann, Franz Wirth and Harald Kloft

10:15
Integrating Parametric Design with Robotic Additive Manufacturing for 3D Clay Printing: An Experimental Study 192
Odysseas Kontovourkis and George Tryfonos

09:15–10:30 **Chair:** Quang Ha

Salon 4

Session 17: Emergency+Rescue

09:15
Framework of Automated Beam Assembly and Disassembly System for Temporary Bridge Structures 058
Yao-Yu Yang, Chia-Ming Chang and Shih-Chung Kang

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18:30–21:30 **Gala Dinner**

5. Instructions for Paper Presentations and Session Chairing

Paper presentation instructions:

Each presenter must confirm the corresponding presentation slot(s) upon signing in at the registration desk. Every presenter has a **maximum of 10 minutes for the presentation of one paper** available. The presentation is directly followed by a short discussion. This equals to about 10 slides (one per minute, not more). Please focus your presentation by pointing out your research motivation (1-2 slides), the novelty of your research method (2-3 slides), your results (about 3-4 slides), limitations of your research (1 slide) and an outlook of future work (1 slide). Although you should have an appropriate mix of readable/ error-free text bullets (in English) and well-composed visuals on your slides, no formal presentation template is provided.

All presentations must be uploaded to the computer (PDF or PowerPoint 2016) provided in the session room 15 minutes ahead of the session start. Please keep the time limit in mind, since the session chair may interrupt you once you reach the time limit. Thanks very much for your assistance in making your session a success for all!

Instructions for session chairs:

Each session chair will be responsible for an assigned number of papers that will be presented during the session. Please **maintain the order and the timing of the presentations, do not fill gaps when a presenter does not show up** (maximum 10 minutes for each presentation and 3 minutes for the answering of a few questions). It is particularly important that the authors respect the timing and we are counting on you to stop presenters if necessary.

All presentations should be uploaded in the break and before the sessions starts. Members of the ISARC 2018 Organizing Committee are attending the sessions as well in case there is a technical problem that needs to be fixed. They will also inform you about no-shows. Please go early (15 minutes) in the presentation room to meet the member of the Organizing Committee who will support you during the session. All presentations have to be grouped on one laptop when possible. Thanks very much for your help in making the meeting run smoothly.

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