The 39th Symposium on Automation and Robotics in Construction (ISARC 2022)

Technical Program Schedule

VENUE

Universidad de los Andes – Mario Laserna Auditorium
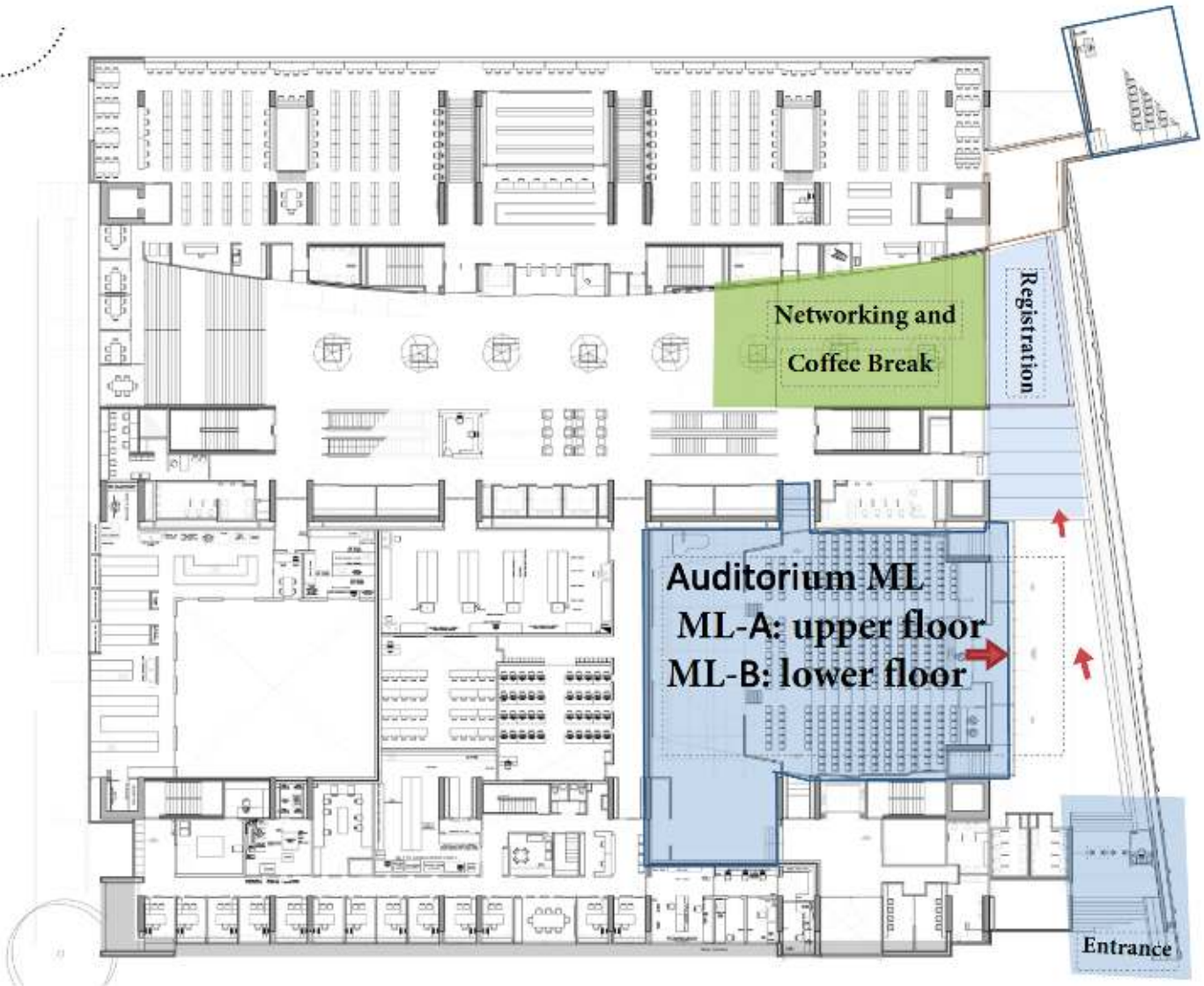
Bogotá, Colombia

July 13th – 15th

2022

https://isarc2022.uniandes.edu.co/

FLOOR PLAN

Building ML - Second Floor

Networking and Coffee Break

Registration

Auditorium ML
ML-A: upper floor
ML-B: lower floor

Entrance

OVERALL PROGRAM

Time*	Wednesday, July 13, 2022	Thursday, July 14, 2022		Friday, July 15, 2022	
		Room ML-B	Room ML-A	Room ML-B	Room ML-A
8:00		Registration		Registration	
8:15					
8:30		Opening Remarks & External Keynote 1 (ML-B)		External Keynote 2 (ML-B)	
8:45					
9:00		Sponsor Keynote 1 (Autodesk) (ML-B)		Sponsor keynote 3 (Autodesk) (ML-B)	
9:15					
9:30		Technical Keynote 1 (ML-B)		IAARC Chapters & Innovation Hubs (ML-B)	
9:45					
10:00		Session A1	Session B1	Session D1	Session F1
10:15					
10:30					
10:45					
11:00					
11:15		Networking & Coffee Break		Networking & Coffee Break	
11:30		Session A2	Session B2	Session D2	Session F2
11:45					
12:00					
12:15					
12:30					
12:45		Lunch		Lunch	
13:00					
13:15					
13:30					
13:45					
14:00		Session C1	Session B3	Session D3	Session G1
14:15					
14:30	IAARC BOD General Assembly 2022 (by invitation only) (ML 805B)				
14:45					
15:00					
15:15		Networking & Coffee Break		Networking & Coffee Break	
15:30					
15:45	Registration	Session C2	Session E1	Session H1	Session G2
16:00					
16:15					
16:30					
16:45		Networking & Coffee Break		Networking & Coffee Break	
17:00	Welcome Reception (ML Building - 2nd Floor)				
17:15					
17:30		Technical keynote 2 & Three Plenary Talks (ML-B)		Technical Keynote 3 & Three Plenary Talks (ML-B)	
17:45					
18:00					
18:15					
18:30		Sponsor Keynote 2 (Trimble) (ML-B)		Awards announcement (ML-B)	
18:45					
19:00 ... 21:00		BOD Dinner (By invitation only)		Gala Dinner	

Legend - Conference Sessions

KP. Technical Keynote & Plenary Talks
A. Sensing systems & data infrastructures
B. Information modelling techniques
C. Human factors & human-system collaboration
D. Robotic machines, devices, and end-effectors
E. Construction management techniques
F. Serv. and business applications / industry papers
G. Technology management and innovation
H. Applications in developing countries

NOTE 1: Dates and times are shown in the local timezone (Bogotá, Colombia)
NOTE 2: Although not expected, some changes in the Technical Program Schedule could occur.
   Any changes will be communicated in due time.
NOTE 3: The conference follows a hybrid format. Zoom link will be provided in due course.

DETAILED PROGRAM

Wednesday July 13, 2022

July 13 | 2:30 pm - 5:30 pm | Room ML-805B (ML Building - 8th Floor)

IAARC BOD General Assembly 2022 (by invitation only)

July 13 | 5:30 pm - 7:00 pm | ML Building 2nd Floor

Welcome Reception (all registered participants)

Thursday July 14, 2022

July 14 | 8:00 am - 8:30 am | ML Building 2nd Floor

Registration

July 14 | 8:30 am - 9:00 am | Room ML-B

Opening Remarks and External Keynote 1: Edwin Chirivi (CAMACOL)

July 14 | 9:00 am - 9:30 am | Room ML-B

Sponsor Keynote 1 - Autodesk + Mcad

July 14 | 9:30 am - 10:00 am | Room ML-B

Technical Keynote

Session chair: Jose Guevara

ID 23: A framework for a comprehensive mobile data acquisition setting for the assessment of Urban Heat Island phenomenon.

Monica Pena Acosta, Faridaddin Vahdatikhaki, Joao Santos and Andre Doree

July 14 | 10:00 am - 11:15 am

Room ML-B	Room ML-A
Session A1: Sensing systems & data infrastructures	**Session B1: Information modelling techniques**
Session chair: Daniel Hall	**Session chair: Mi Pan**
ID 15: Towards BIM-based robot localization: a real-world case study	ID 1: Innovative Model for Forecasting Trailer Usage for Prefabricated Exterior Wall Panels
Huan Yin, Jia Min Liew, Wai Leong Lee, Marcelo H Ang Jr and Justin Ker-Wei Yeoh	*Andrew Rener, Aslihan Karatas and Matthew Cole*
ID 22: Current State and Future Opportunities of Data Mining for Construction 4.0	ID 6: Automated Wall Detection in 2D CAD Drawings to Create Digital 3D Models
Keyi Wu and Borja García de Soto	*Chialing Wei, Mohit Gupta and Thomas Czerniawski*
ID 29: The Use of Boston Dynamics SPOT in Support of LiDAR Scanning on Active Construction Sites	ID 7: IFC-based Information Extraction and Analysis of HVAC Objects to Support Building Energy Modeling
Eric Wetzel, Junshan Liu, Tom Leathem and Anoop Sattineni	*Hang Li and Jiansong Zhang*
ID 32: Autonomous operation of a robot dog for point cloud data acquisition of scaffolds	ID 16: Systematic Literature Review of Building Information Modelling and Green Building Certification Systems
Duho Chung, Sunwoong Paik, Juhyeon Kim and Hyungkwan Kim	*Oludolapo Olanrewaju, Wallace Enegbuma and Michael Donn*
ID 46: Cluster-based Deterioration Prediction of Composite Pavements with Incorporation of Flooding	ID 18: Information Extraction from Text Documents for the Semantic Enrichment of Building Information Models of Bridges
Ishan Neema, Fatemeh Banani Ardecani and Omidreza Shoghli	*Phillip Schönfelder, Tariq Al-Wesabi, Andreas Bach and Markus König*

July 14 | 11:15 am - 11:30 am | ML Building 2nd Floor

Networking & Coffee Break

July 14 | 11:30 am - 12:45 pm

Room ML-B	Room ML-A
Session A2: Sensing systems & data infrastructures	**Session B2: Information modelling techniques**
Session chair: Aslihan Karatas	**Session chair: Vicente Gonzalez**
ID 49: Predicting construction productivity with machine learning approaches	ID 19: BIM-Integration of Light Construction Equipment
Laura Florez-Perez, Zhiyuan Song and Jean C. Cortissoz	*Maximilian Schöberl, Sebastian Offinger, Theo Goldfuß, Stephan Kessler and Johannes Fottner*
ID 51: Automated Checking of Scaffold Safety Regulations using Multi-Class 3D Segmentation	ID 21: Visualisation and graph-based storage of customised changes in early design phases

Jeehoon Kim, Juhyeon Kim, Nahye Koo and Hyoungkwan Kim	*Daniel Napps, Ata Zahedi, Markus König and Frank Petzold*
ID 71: A Systematic Classification and Evaluation of Automated Progress Monitoring Technologies in Construction *Varun Kumar Reja, Megha S Pradeep and Koshy Varghese*	ID 25: Conceptual Modeling of Lifecycle Digital Twin Architecture for Bridges *Inga Maria Giorgadze, Faridaddin Vahdatikhaki and Hans Voordijk*
ID 82: Reducing spatial error in mobile laser scanning by real-time uncertainty visualization and human-machine interaction *Maciej Trzeciak, Chris Burgoyne and Ioannis Brilakis*	ID 33: Towards the development of a digital twin for subsoil monitoring and stability against overturning of a mobile drilling rig *Francisco Williams Riquer, Duy Anh Dao and Jürgen Grabe*
ID 87: Toward Automation in Crack Detection and Measurements: Benchmarking of CNN-based Algorithms *Donghoon Ji, Yelda Turkan and Paolo Calvi*	ID 59: Closing the Gap Between Concrete Maturity Monitoring and Nonlinear Time-dependent FEM Analysis through a Digital Twin. Case Study: Post-tensioned Concrete Slab of an Office Building, Barcelona, Spain *Héctor Posada, Rolando Chacón, David García and Lucian-Constantin Ungureanu*

July 14 | 12:45 pm - 2:00 pm | Campus Main Cafeteria

Lunch

July 14 | 2:00 pm - 3:15 pm

Room ML-B	Room ML-A
Session C1: Human factors & human-system collaboration	**Session B3: Information modelling techniques**
Session chair: Alessandro Carbonari	Session chair: Vineet Kamat
ID 11: The Neural Basis of Risk Attitude in Decision-Making Under Risk: fNIRS investigation of the Simulated Electrical Construction Task *Shiva Pooladvand, Deha Ay and Sogand Hasanzadeh*	ID 63: ColombiaClass: proposal for a BIM Classification System for public buildings in Colombia *María Del Pilar Revuelta Mendoza, Nelly Paola Garcia Lopez and Luis Arturo Salazar Fica*
ID 12: Toward Personalized Safety Training: Automating the Classification of Construction Workers' Cognitive Failures *Kyeongsuk. Lee, Yugandhar Shinde, Sogand Hasanzadeh and Behzad Esmaeili*	ID 68: Towards Automated Pipelines for Processing Load Test Data on a HS Railway Bridge in Spain using a Digital Twin *Carlos Ramonell and Rolando Chacon*
ID 27: iVisit-Collaborate: Online Multiuser Virtual Site Visits Using 360-Degree Panoramas and Virtual Humans *Ricardo Eiris and Masoud Gheisari*	ID 86: Potentials of 5D BIM with Blockchain-enabled Smart Contracts for Expediting Cash Flow in Construction Projects *Jong Han Yoon and Pardis Pishdad-Bozorgi*
ID 36: Vulnerability Assessment of Construction Equipment: An Example for an Autonomous Site Monitoring System *Muammer Semih Sonkor, Xinghui Xu, Samuel A. Prieto and Borja García de Soto*	ID 90: Integrating Digital Twins in Construction Education Through Hands-on Experiential Learning *Steven Kangisser, Javier Irrazary, Kelly Watt, Richard Borger and Amadeus Burger*
ID 40: Fire Evacuation and Management Model Based on Building Information Modeling and Virtual Reality *Ren-Jie Gao, Kun-Chi Wang, Xiang-Hao Lai and Wei-Hsiang Hung*	ID 96: Benefits of Open Infra BIM – Finland Experience *Rauno Heikkilä, Tanja Kolli and Teppo Rauhala*

July 14 | 3:15 pm - 3:30 pm | ML Building 2nd Floor

Networking & Coffee Break

July 14 | 3:30 pm - 4:45 pm

Room ML-B	Room ML-A
Session C2: Human factors & human-system collaboration	**Session E1: Construction management techniques**
Session chair: Polar Liang	Session chai: Zoubeir Lafhaj
ID 54: Evaluation of Construction Site Layout Using Virtual Reality Linked with 3D CAD and Body Tracking *Hidetoshi Tsuda and Kosei Ishida*	ID 14: YAKE-Guided LDA approach for automatic classification of construction safety reports *Hrishikesh Gadekar and Nikhil Bugalia*
ID 60: Automated Recognition of Hand Gestures for Crane Rigging using Data Gloves in Virtual Reality *Aparna Harichandran and Jochen Teizer*	ID 41: Automated Construction Contract Summarization Using Natural Language Processing and Deep Learning *Xiaorui Xue, Yiru Hou and Jiansong Zhang*
ID 64: A Knowledge Graph for Automated Construction Workers' Safety Violation Identification *Yifan Zhu and Xiaowei Luo*	ID 48: Construction Progress Monitoring and Reporting using Digital Images and Computer Vision Techniques – A Review *Dena Shamsollahi, Osama Moselhi and Khashayar Khorasani*
ID 78: Highway Workers and Wearable Technologies: Perception and Preferences *Sepehr Sabeti, Omidreza Shoghli, Nichole Morris and Hamed Tabkhi*	ID 75: BIM, Twin and Between: a Conceptual Engineering Approach to Formalize Digital Twins in Construction *Fabiano Correa*
ID 94: Integrated Sensor-Based Interface for Human-Robot Collaboration in Construction	ID 98: Inspection Data Exchange and Visualization for Building Maintenance using AR-enabled BIM

Xin Wang, Dharmaraj Veeramani and Zhenhua Zhu	*Jisoo Park, Soowon Chang, Hyungi Lee and Yong Cho*

July 14 | 4:45 pm - 5:00 pm | ML Building 2nd Floor

Networking & Coffee Break

July 14 | 5:00 pm - 6:30 pm | Room ML-B

Technical Keynote & Plenary Talks (KP)

Session chair: Daniel Castro

Keynote:

ID 4: Using BIM and LCA to evaluate material circularity: Contributions to building design improvements

    Haibo Feng, Qian Chen, Borja Garcia de Soto and Mehrdad Arashpour

Plenary talks:

ID 55: Insights into automation of construction process using parallel-kinematic manipulators

    Maike Klöckner, Mathias Haage, Helena Eriksson, Henrik Malm, Klas Nilsson, Anders Robertsson and Ronny Andersson

ID 77: Predictive Maintenance Optimization Framework for Pavement Management

    Amit Kumar and Omidreza Shoghli

ID 65: Weakly supervised pseudo label generation for construction vehicle segmentation

    Wei-Chih Chern, Vijayan Asari, Tam Nguyen and Hongjo Kim

July 14 | 6:30 pm - 7:00 pm | Room ML-B

Sponsor Keynote 2 - Construsoft

July 14 | 7:00 pm - 9:00 pm |

BOD Dinner (by invitation only)

Friday July 15, 2022

July 15 | 8:00 am - 8:30 am | ML Building 2nd Floor

Registration

July 15 |8:30 am - 9:00 am | Room ML-B

External Keynote 2 - Mani Golparvar Fard

July 15 |9:00 am - 9:30 am | Room ML-B

Sponsor Keynote 3- Autodesk + Mcad

July 15 | 9:30 am - 10:00 am | Room ML-B

IAARC Chapters & Innovation Hubs

Session chair: Thomas Linner

July 15 | 10:00 am - 11:15 am

Room ML-B	Room ML-A
Session D1: Robotic machines, devices, and end-effectors	**Session F1: Services and business applications / industry & short papers**
Session chair: Chen Feng	**Session chair: Ming Shan Ng**

ID 13: Requirements analysis of additive manufacturing for concrete printing – A systematic review
  Patricia Peralta Abadia and Kay Smarsly
	ID 24: Comparison of 3D Data Acquisition Techniques: Considerations for Low budget Contractors
	  Eyob Mengiste, Samuel A. Prieto and Borja Garcia de Soto

ID 17: Safety Risk Assessment of Drones on Construction Sites using 4D Simulation
  Zixian Zhu, Idris Jeelani and Masoud Gheisari
	ID 30: Mud Dauber: Prototype of the Mobile Gantry Architecture
	  Peter Staritz, Josiah McClurg, Caleb Miller, Moriah Schlenker and Shane Wozniak

ID 35: Progress Estimation of an Excavation Pit
  Axel Vierling, Tobias Groll, Dennis Meckel, Kristina Heim, Daniel Walter, Lukas Scheidhauer, Karsten Körkemeyer and Karsten Berns
	ID 47: Model driven method for crack detection in robotic inspection
	  Erika Pellegrino and Tania Stathaki

ID 37: Impact of Passive Back-Support Exoskeletons on Manual Material Handling Postures in Construction	ID 56: A Case Study: Conception of digitalizing prefabrication processes in the construction industry

Ali Golabchi, Linda Miller, Hossein Rouhani and Mahdi Tavakoli	*Zhen Cai, Mohamed Ben Tarfaoui, Stephan Kessler and Johannes Fottner*
ID 43: Stag hunt game-based approach for cooperative UAVs	ID 62: On the Bar Installation Order for the Automated Fabrication of Rebar Cages
Lanh Van Nguyen, Ignacio Torres Herrera, Trung Hoang Le, Duong Manh Phung, Ricardo Patricio Aguilera and Quang Phuc Ha	*Mahdi Momeni, Johan Relefors, Lars Pettersson, Alessandro Vittorio Papadopoulos and Thomas Nolte*

July 15 | 11:15 am - 11:30 am | ML Building 2nd Floor

Networking & Coffee Break

July 15 | 11:30 am - 12:45 pm

Room ML-B	Room ML-A
Session D2: Robotic machines, devices, and end-effectors (D)	**Session F2: Services and business applications / industry & short papers**
Session chair: Wen Pan	Session chair: Cynthia Brosque
ID 44: Reinforcement learning with construction robots: A review of research areas, challenges and opportunities *Xinghui Xu and Borja Garcia de Soto*	ID 73: A Taxonomy for Connected Autonomous Plant *Cormac Browne, Ross Walker, Tim Embley, Muneer Akhtar, Amer Essa, Anette Pass, Simon Smith and Alex Wright*
ID 45: Constrained Control Scheme for the Manipulation of Heavy Pre-fabricated Elements with Lightweight Robotic Arm *Michele Ambrosino, Fabian Boucher, Pierre Mengeot and Emanuele Garone*	ID 81: Digital Commissioning Processes for the Oil and Gas Sector *Daniel Luiz de Mattos Nascimento, Alessandra Brancher Roeder, Diego Calvetti, Alexander Chavez Lopez, Fernando Rodrigues Gonzalez and Flavio Araujo*
ID 50: Importance of a 5G Network for Construction Sites: Limitation of WLAN in 3D Sensing Applications *Hyung Joo Lee, Ajith Krishnan, Sigrid Brell-Cokcan, Janina Knußmann, Maximilian Brochhaus, Robert H. Schmitt, Johannes J. Emontsbotz and Johannes Sieger*	ID 88: Overview of the State-of-Practice of BIM in the AEC Industry in the United States *Hala Nassereddine, Makram Bou Hatoum and Awad Hanna*
ID 70: Path Generation for Foam Additive Manufacturing of Large Parts with a Cable-Driven Parallel Robot *Elodie Paquet, Marceau Metillon, Kevin Subrin, Benoit Furet and Stéphane Caro*	ID 93: Machine Learning for Construction Process Control: Challenges and Opportunities *Bharath Sankaran*
ID 76: Automated material selection based on detected construction progress *Tyler Stephans, Austin McClymonds, Robert Leicht and Alan Wagner*	ID 95: 5G Wireless Communication for Autonomous Excavation *Rauno Heikkilä, Matti Immonen, Heikki Keränen, Olli Liinamaa, Esa Piri and Tanja Kolli*

July 15 | 12:45 pm - 2:00 pm | Campus Main Cafeteria

Lunch

July 15 | 2:00 pm - 3:15 pm

Room ML-B	Room ML-A
Session D3: Robotic machines, devices, and end-effectors	**Session G1: Technology management and innovation**
Session chair: Rongbo Hu	Session chair: Martin Fisher
ID 83: Solution Kits for automated and robotic façade upgrading *Kepa Iturralde, Thomas Bock, Philip Zimmermann, Renzo G. Bazan Santos, Samanti Das, Wenlan Shen, Mahruk Malik, Steven Maio, Agi Hidri and Juncheng Shen*	ID 5: The Use of Drones in the Construction Industry: Applications and Implementation *Makram Bou Hatoum and Hala Nassereddine*
ID 84: Concept of a Robot Assisted On-Site Deconstruction Approach for Reusing Concrete Walls *Hyung Joo Lee, Christoph Heuer and Sigrid Brell-Cokcan*	ID 8: Intelligent BIM-based spatial conflict simulators: A comparison with commercial 4D tools *Leonardo Messi, Borja Garcia de Soto, Alessandro Carbonari and Berardo Naticchia*
ID 91: Subjective Evaluation of Passive Back-Support Wearable Robot for Simulated Rebar Work *Nihar Gonsalves, Mohamad Khalid, Abiola Akinniyi, Omobolanle Ogunseiju and Abiola Akanmu*	ID 9: BIM-assisted, automated processes for commissioning in building services engineering *Ralf Becker, Christoph Blut, Christoph Emunds, Jérôme Frisch, Dirk Heidermann, Tristan Kinnen, Alexander Lenz, Michael Möller, Nicolas Pauen, Tobias Rettig, Dominik Schlütter, Matthias Wenthe, Jörg Blankenbach, Günter Bleimann-Gather, Johannes Fütterer, Jörg Jungedeitering and Christoph van Treeck*
ID 92: Industry Perspectives of the Potential of Wearable Robot for Pipe Installation Work	ID 10: Blockchain-supported design tool on building element scale

Nihar Gonsalves, Mohamad Khalid, Abiola Akinniyi and Abiola Akanmu	*Goran Sibenik, Marijana Sreckovic, Thomas Preindl, Martin Kjäer and Wolfgang Kastner*
ID 97: Development of Framework for Highway Lawn Condition Monitoring using UAV Images	ID 26: Digital Transformation in Asset Management – A Case of BIM Adoption in New Zealand Local government
Yeseul Kim, Seongyong Kim, Yosuke Yajima, Javier Irizary and Yong K. Cho	*John Jiang, Theuns Henning and Yang Zou*

July 15 | 3:15 pm - 3:30 pm | ML Building 2nd Floor

Networking & Coffee Break

July 15 | 3:30 pm - 4:45 pm

Room ML-B	Room ML-A
Session H1: Applications in developing countries	**Session G2: Technology management and innovation**
Session chair: Harrison Mesa	Session chair: Chair Zhenhua Zhu
ID 20: An Approach for Estimation of Swing Angle and Digging Depth During Excavation Operation	ID 31: Project-based curriculum for teaching construction robotics
Amirmasoud Molaei, Marcus Geimer and Antti Kolu	*Cynthia Brosque and Martin Fischer*
ID 52: Automated Valve Detection in Piping and Instrumentation (P&ID) Diagrams	ID 53: A case-based reasoning technique for evaluating performance improvement in automated construction projects
Mohit Gupta, Chialing Wei and Thomas Czerniawski	*Krishnamoorthi Sundararaman and Benny Raphael*
ID 57: Suitability and Effectiveness of Visualization Platform-based Construction Safety Training modules	ID 69: The Optimized Process for Effective Decision Makings to Minimize Fall From Height (FFH) Accidents on Construction Site
Kishor Bhagwat and Venkata Santosh Kumar Delhi	*Qinghao Zeng and Jong Han Yoon*
ID 61: Semiarid Terrain Alteration for Converting Dryland into Arable Land – Construction and Earthmoving Perspectives	ID 79: Construction Robotics Excellence Model: A framework to overcome existing barriers for the implementation of robotics in the construction industry
Moshe Alamaro, Joseph Louis and Jochen Teizer	*Jan-Iwo Jäkel, Shervin Rahnama and Katharina Klemt-Albert*
ID 74: Action Sequencing in Construction Accident Reports using Probabilistic Language Model	ID 89: State of Advances in Reality Capture for Construction Progress Monitoring and Documentation
Quan Do, Tuyen Le and Chau Le	*Jordan Grogan, Anoop Sattineni and Jeff Kim*

July 15 | 4:45 pm - 5:00 pm | ML Building 2nd Floor

Networking & Coffee Break

July 15 | 5:00 pm - 6:30 pm | Room ML-B

Technical Keynote & Plenary Talks (KP)

Session chair: Borja García de Soto

Keynote:

ID 58: Building Information Model Pre-Processing for Automated Geometric Quality Control

Martin Bueno and Frederic Bosche

Plenary talks:

ID 80: Teaching Construction Robotics for Higher Education Students: "Imagine and Make"

Zoubeir Lafhaj, Wassim Al Balkhy and Thomas Linner

ID 42: Integrating VR and Simulation for Enhanced Planning of Asphalt Compaction

Andre Renato Revollo Dalence, Faridaddin Vahdatikhaki, Seirgei Miller and Andre Doree

ID 66: Direction of Arrival of Equipment Sound in the Construction Industry

Kehinde Elelu, Tuyen Le and Chau Le

July 15 | 6:30 pm - 7:00 pm | Room ML-B

Awards announcement

Session chairs: Frédéric Bosché & Carl Haas

July 15 | 7:00 pm - 9:00 pm |

Gala Dinner (all registered participants)

NOTE 1: Dates and times are shown in the local timezone (Bogotá, Colombia)

NOTE 2: Although not expected, some changes in the Technical Program Schedule could occur. Any changes will be communicated in due time.

NOTE 3: The conference follows a hybrid format. Zoom link will be provided in due course.