ISRR 2019

International Symposium on Robotics Research

October 6-10, 2019 Hanoi Vietnam

International Foundation of Robotics Research

Welcome to ISRR 2019!

International Symposium on Robotics Research
October 6-10, 2019 Hanoi Vietnam

The International Symposium on Robotics Research (ISRR) promotes the development and dissemination of groundbreaking research and technological innovation in robotics useful to society by providing a lively, intimate, forward-looking forum for discussion and debate about the current status and future trends of robotics, with emphasis on its potential role to benefit humans.

As one of the pioneering symposia in robotics, ISRR has established some of the most fundamental and lasting contributions in the field bringing together top international experts in robotics since 1983. ISRR 2019 continues this tradition through a program that is designed to be ideas based, and interactive in flavor, seeking the discussion of provocative new ideas, open-ended themes, and new directions for robotics and research-derived applications, including robot design, control, robot vision, robot learning, planning, and integrated robot systems.

The ISRR 2019 program comprises a combination of distinguished talks, oral and interactive presentations as well as an attractive social program. 18 distinguished talks will be given by leading roboticists presenting blue sky ideas and their views on the field including past experience, lessons learned, success and failure stories of robotics, views on the future, latest developments in robotics and impact of robotics on society. The program includes 60 presentations, each presented in oral and interactive sessions, giving time for discussions between the participants.

We are very grateful to all the contributing authors, distinguished speakers, the program committee, reviewers and sponsors as well as the organization supporting teams in Hanoi Karlsruhe for their contributions to ISRR 2019.

Wishing everyone a wonderful experience in Hanoi!

The ISRR 2019 Organization Committee

The ISRR is sponsored by the International Foundation of Robotics Research

Organization Committee

Tamim Asfour
Karlsruhe Institute of Technology

Eiichi Yoshida
National Institute of Industrial Science and Technology

Jaeheung Park
National University of Seoul

Oussama Khatib
Stanford University

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Programm Committee

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Alberto Rodriguez (Massachusetts Institute of Technology)

Daniela Rus (Massachusetts Institute of Technology)

Bruno Siciliano (Univ. Napoli Federico II)

Wataru Takano (Osaka University)

Rudolph Triebel (German Aerospace Center – DLR)

Eiichi Yoshida (National Inst. of AIST)

Distinguished Speakers

Alin Albu-Schäffer
DLR - German Aerospace Center
TU Munich

Antonio Bicchi
University of Pisa

Oliver Brock
Technische Universität Berlin

Herman Bruyninckx
KU Leuven, Belgium
TU Eindhoven, the Netherlands

Frank Chongwoo Park
Seoul National University

Henrik Christensen
UC San Diego

Rüdiger Dillmann
Karlsruhe Institute of Technology

Ken Goldberg
UC Berkeley

Sami Haddadin
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Makoto Kaneko
Osaka University

Oussama Khatib
Stanford University

Peter Corke
Queensland University of Technology

Giorgio Metta
Istituto Italiano di Tecnologia

Yoshihiko Nakamura
University of Tokyo

Daniela Rus
Massachusetts Institute of Technology

Roland Siegwart
ETH Zurich

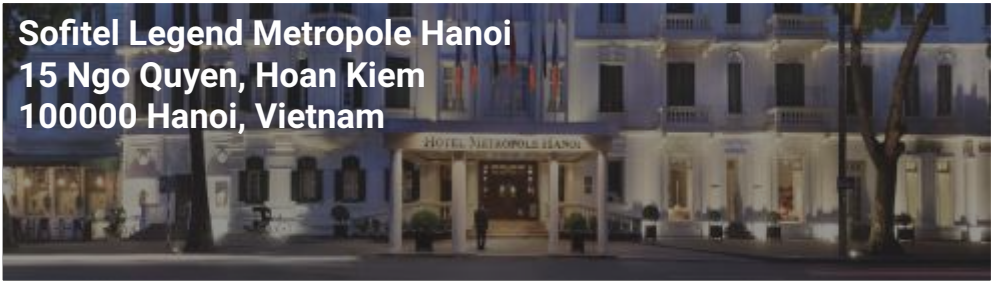
Siddhartha Srinivasa
University of Washington

Hotel information

General information

„Hanoi is a magical and charming city. I hope you will find that the character, history and romance of the Sofitel Legend Metropole Hanoi may add a little extra special something to your journey here. Savour our French art de vivre blended with elegant Vietnamese touches and please enjoy this wonderful place.“

Sofitel Legend Metropole Hotel Hanoi, General Manager



Important locations for the conference:

La Veranda & Patio:

All oral sessions and distingished talks will take place at this location.

Thang Long Hall:

All interactive sessions, lunch and the farewell dinner will take place at *Thang Long Hall*.

Programme

Welcome Reception

Sunday, October 6, 19:00

La Veranda & Patio of the Sofitel
Legend Metropole Hotel

Monday, October 7

08:50 - 09:00 Welcome

09:00 - 10:10 Distinguished Talks

09:00 Oussama Khatib
TBD

09:30 Daniela Rus
Soft Capable Robots

10:10 - 11:20 Session 1: Control

10:10 Asymmetric Dual-Arm Task Execution Using an Extended Relative Jacobian
D. Almeida, Y. Karayiannidis

10:15 Consensus-Based ADMM for Task Assignment in Multi-Robot Teams
R. N. Haksar, O. Shorinwa, P. Washington, M. Schwager

10:20 Rapidly-Exploring Quotient-Space Trees: Motion Planning Using Sequential Simplifications
A. Orthey, M. Toussaint

10:25 Optimally Convergent Trajectories for Navigation
N. Kong, A. Johnson

10:30 Towards Online Observability-Aware Trajectory Optimization for Landmark-Based Estimators
K. M. Frey, T. Steiner, J. P. How

10:35 Joint Space Stiffness and Damping for Cartesian and Null Space Impedance Control of Redundant Robotic Manipulators
C. Saldarriaga, N. Chakraborty, I. Kao

10:40 On the Use of Cayley Transform for Kinematic Shape Reconstruction of Soft Continuum Robots
S. Grazioso, G. Di Gironimo, B. Siciliano

10:45 Compliance Optimization Considering Dynamics for Whole-Body Control of a Humanoid
K. Yamamoto, Y. Nakamura

10:50 Composition of Templates for Transitional Pedipulation Behaviors
T. Topping, V. Vasilopoulos, A. De, D. Koditschek

10:55 Probabilistic Mapping of Tissue Elasticity for Robot-Assisted Medical Ultrasound
M. Napoli, S. Goswami, S. McAleavey, M. Doyley, T. Howard

11:20 - 12:30 Interactive Session: Control

12:30 - 13:00 Distinguished Talk

12:30 Alin Albu-Schäffer
Nonlinear Elastic Resonance Modes for Efficient Locomotion: From Biology to Robots and Back

13:00 - 14:30 Lunch Break

14:30 - 16:10 Distinguished Talks

14:30 Ken Goldberg
Robo-Exoticism: Art, History, and Our All Too Human Machines

15:00 Antonio Bicchi
SymBionics, or about Being a Bot

15:30 Siddhartha Srinivasa
Manipulation Challenges for the Next 20 Years

16:10 - 17:20 Session 2: Grasping and Manipulation

16:10 Certified Grasping
B. Aceituno-Cabezas, J. Ballester, A. Rodriguez

16:15 KPAM: KeyPoint Affordances for Category-Level Robotic Manipulation
L. Manuelli, W. Gao, P. Florence, R. Tedrake

16:20 Aerial Manipulation and Grasping by the Versatile Multilinked Aerial Robot DRAGON
M. Zhao, K. Okada, M. Inaba

16:25 Towards Assistive Robotic Pick and Place in Open World Environments
D. Wang, C. Kohler, A. ten Pas, A. Wilkinson, M. Liu, H. Yanco, R. Platt

16:30 Inferring Occluded Geometry Improves Performance When Retrieving an Object from Dense Clutter
A. Price, L. Jin, D. Berenson

16:35 Robot-Assisted Feeding: Generalizing Skewering Strategies across Food Items on a Plate
R. Feng, Y. Kim, G. Lee, E. Gordon, M. Schmittle, S. Kumar, T. Bhattacharjee, S. Srinivasa

16:40 Manipulation with Suction Cups Using External Contacts
X. Cheng, Y. Hou, M. T. Mason

16:45 Combining Coarse and Fine Physics for Manipulation Using Parallel-In-Time Integration
W. C. Agboh, D. Rubrecht, M. R. Dogar

16:50 REACH: Reducing False Negatives in Robot Grasp Planning with a Robust Efficient Area Contact Hypothesis Model
M. Danielczuk, J. Xu, J. Mahler, M. Matl, N. Chentanez, K. Goldberg

16:55 A Billion Ways to Grasp: An Evaluation of Grasp Sampling Schemes on a Dense, Physics-Based Grasp Data Set
C. Eppner, A. Mousavian, D. Fox

17:20 - 18:30 Interactive Session: Grasping and Manipulation

Tuesday, October 8

09:00 - 10:10 Distinguished Talks

09:00 Roland Siegwart
From Robotics Research to Applications: A Difficult but Rewarding Journey

09:30 Henrik Christensen
Human-Robot Collaboration in Urban Environments

10:10 - 11:20 Session 3: Robot Vision

10:10 Towards Resilient Autonomous Navigation of Drones
A. Santamaria-Navarro, R. Thakker, D. D. Fan, B. Morrell, A. Agha-mohammadi

10:15 Generalized Proximal Methods for Pose Graph Optimization
T. Fan, T. Murphey

10:20 A Photo-Realistic Synthetic Dataset for Analyzing the Effects of Moving Objects on Visual Localization Algorithms for Drones
J. Yang, S. Lee, B. Lee

10:25 Attitude Tracking from a Camera and an Accelerometer on Gyro-Less Devices
T. Do, L. Neira, Y. Yang, S. Roumeliotis

10:30 A Unified Pipeline for 3D Detection and Velocity Estimation of Vehicles
X. Du, M. H. Ang Jr, S. Karaman, D. Rus

10:35 Exploration without Global Consistency Using Local Volume Consolidation
T. Cieslewski, A. Ziegler, D. Scaramuzza

10:40 Vision-Based Autonomous UAV Navigation and Landing for Urban Search and Rescue
M. Mittal, R. Mohan, W. Burgard, A. Valada

10:45 Visual-Inertial Localization for Skid-Steering Robots with Kinematic Constraints
X. Zou, M. Zhang, Y. Chen, Y. Liu, G. Huang, M. Li

10:50 Contact Inertial Odometry: Collisions Are Your Friend
T. Lew, T. Emmei, D. D. Fan, T. Bartlett, R. Thakker, A. Santamaria-Navarro, A. Agha-mohammadi

10:55 Model-Free Visual Control for Continuum Robot Manipulators Via Orientation Adaptation
M. Verghese, F. Richter, A. Gunn, W. Phil, M. C. Yip

11:20 - 12:30 Interactive Session: Robot Vision

12:30 - 13:00 Distinguished Talk

12:30 Makoto Kaneko
Fast and Fine Manipulation of RBCs in Artificial Capillary and Their Mysterious Behaviors

13:00 - 14:30 Lunch Break

14:30 - 16:10 Distinguished Talks

14:30 Oliver Brock
Intelligence: A Robotics Problem

15:00 Frank Chongwoo Park
To Learn or Not to Learn: Robot Modeling in the Age of Machine Learning

15:30 Rüdiger Dillmann
From Models to Neuromorphic Approaches for SNN-Based Robot Control

16:10 - 17:20 Session 4: Robot Learning

16:10 Unsupervised Real-Time Control through Variational Empowerment
M. Karl, P. Becker-Ehmck, M. Soelch, D. Benbouzid, P. van der Smagt, J. Bayer

16:15 Learning Collaborative Action Plans from YouTube Videos
H. Zhang, P. Lai, S. Paul, S. Korthawade, S. Nikolaidis

16:20 Deep Transfer Learning of Pick Points on Fabric for Robot Bed-Making
D. Seita, N. Jamali, M. Laskey, A. K. Tanwani, R. Berenstein, P. Baskaran, S. Iba, J. Canny, K. Goldberg

16:25 Learning User Preferences for Trajectories from Brain Signals
H. Kolkhorst, W. Burgard, M. Tangermann

16:30 Automatic Encoding and Repair of Reactive High-Level Tasks with Learned Abstract Representations
A. Pacheck, G. Konidaris, H. Kress-Gazit

16:35 Multi-Class Target Tracking Using the Semantic PHD Filter
J. Chen, P. Dames

16:40 Belief-Space Planning Using Learned Models with Application to Underactuated Hands
A. Kimmel, A. Sintov, J. Tan, B. Wen, A. Boularias, K. E. Bekris

16:45 Introspective Robot Perception Using Smoothed Predictions from Bayesian Neural Networks
J. Feng, M. Durner, Z. Marton, F. Balint-Benczedi, R. Triebel

16:50 Autonomous Exploration under Uncertainty Via Graph Convolutional Networks
F. Chen, J. Wang, T. Shan, B. Englot

16:55 Mitigating Network Latency in Cloud-Based Teleoperation Using Motion Segmentation and Synthesis
N. Tian, A. K. Tanwani, K. Goldberg, S. Sojoudi

17:20 - 18:30 Interactive Session: Robot Learning

Banquet

Tuesday, October 8, 19:00

Banquet at **Cau Go Vietnamese Cuisine Restaurant**

Wednesday, October 9

09:00 - 10:10 Distinguished Talks

09:00 Giogio Metta
iCub & Friends: My Quest for Building a Community of Roboticists

09:30 Herman Bruyninckx
Do You Know That Story about That Robot That Met Another Robot and Asked "Why?"

10:10 - 11:20 Session 5: Design, Control, Tools

10:10 Bilevel Optimization for Planning through Contact: A Semidirect Method
B. Landry, L. Joseph, Z. Manchester, M. Pavone

10:15 Active Rendezvous for Multi-Robot Pose Graph Optimization Using Sensing Over Wi-Fi
W. Wang, N. Jadhav, P. Vohs, N. Hughes, M. Mazumer, S. Gil

10:20 Robust Motion Planning for Non-Holonomic Robots with Planar Geometric Constraints
P. Tajvar, A. Varava, D. Kragic, J. Tumova

10:25 Fast Reciprocal Collision Avoidance under Measurement Uncertainty
K. Shah, G. Angeris, M. Schwager

10:30 Globally Optimal Joint Search of Topology and Trajectory for Planar Linkages
Z. Pan, M. Liu, X. Gao, D. Manocha

10:35 BRIGHT: Benchmarking Research Infrastructure for Generalized Heterogeneous Teams
T. Padir

10:40 The PRISMA Hand: A Sensorized Robust Hand for Adaptive Grasp and In-Hand Manipulation
H. Liu, P. Ferrentino, S. Pirozzi, B. Siciliano, F. Ficuciello

10:45 Embedded Neural Networks for Robot Autonomy
S. Aguasvivas Manzano, D. Hughes, C. Simpson, R. Patel, N. Correll

10:50 Taking Recoveries to Task: Recovery-Driven Development for Recipe-Based Robot Tasks
S. Banerjee, A. Daruna, D. Kent, W. Liu, J. Balloch, A. Jain, A. Krishnan, M. A. Rana, H. Ravichandar, B. Shah, N. S. Srikanth, S. Chernova

10:55 ScRATCHS: Scalable and Robust Algorithms for Task-Based Coordination from High-Level Specifications
A. Jones, K. Leahy, C. I. Vasile, S. Sadraddini, Z. Serlin, R. Tron, C. Belta

11:20 - 12:30 Interactive Session: Design, Control, Tools

12:30 - 13:00 Distinguished Talk

12:30 Sami Haddadin
Increasing the Closed Loop Dynamics of Robotics Research

13:00 - 14:30 Lunch Break

14:30 - 16:10 Distinguished Talks

14:30 Peter Corke
TBD

15:00 John Hollerbach
Realistic Walking on a Treadmill

15:30 Yoshihiko Nakamura
TBD

16:10 - 17:20 Session 6: Planning

16:10 The Blindfolded Robot: A Bayesian Approach to Planning with Contact Feedback
B. Saund, S. Choudhury, S. Srinivasa, D. Berenson

16:15 Introducing PIVOT: Predictive Incremental Variable Ordering Tactic for Efficient Belief Space Planning
K. Elimelech, V. Indelman

16:20 Multilevel Monte-Carlo for Solving POMDPs Online
M. Hoerger, H. Kurniawati, A. Elfes

16:25 Multi-Objective Policy Generation for Multi-Robot Systems Using Riemannian Motion Policies
A. Li, M. Mukadam, M. Egerstedt, B. Boots

16:30 Task-Motion Planning for Navigation in Belief Space
A. Thomas, F. Mastrogiovanni, M. Baglietto

16:35 Adaptive Underwater Robotic Sampling of Dispersal Dynamics in the Coastal Ocean
G. E. Berget, J. Eidvik, M. O. Alver, F. Py, E. I. Grøtli, T. A. Johansen

16:40 A Unified Sampling-Based Approach to Integrated Task and Motion Planning
W. Thomason, R. A. Knepper

16:45 Temporal Scheduling and Optimization for Multi-MAV Planning
W. Wu, F. Gao, L. Wang, B. Zhou, S. Shen

16:50 Taming Combinatorial Challenges in Clutter Removal
W. N. Tang, J. Yu

16:55 Probabilistically Safe Corridors to Guide Sampling-Based Motion Planning
J. Huh, O. Arslan, D. Lee

17:20 - 18:30 Interactive Session: Planning

Farewell Dinner

Wednesday, October 9, 19:00

Dinner at Sofitel Legend Metropole Hotel Restaurant

Thursday, October 10

Excursion & Discussion Groups

"Once upon a time, soon after the Việt people established their country, invaders came. The Jade Emperor sent Mother Dragon and her Child Dragons down to earth to help the Việt people fight against their enemy. Right at the time invaders' boats were rushing to the shore, the dragons landed down on earth. The dragons immediately sent out from their mouths a lot of pearls, which then turned into thousands of stone islands emerging in the sea like great walls challenging the invaders' boats. The fast boats couldn't manage to stop and crashed into the islands and into each other and broke into pieces.

After the victory, Mother Dragon and Child Dragons didn't return Heaven but stayed on earth at the place where the battle had occurred. The location Mother Dragon landed is nowadays Hạ Long Bay..."

The Excusion to Halong bay will **start at 09:30 at the Sofiel Legend Metropole Hotel.**

All participants will enjoy a drive to Halong city in around 2.5 hours via the highway followed by a stopover at Legend Pearl to learn how locals culture pearl into the live oysters and to see how they harvest pearl.

After that, a deluxe boat awaits for an about 4 hour long boat cruise of this stunning area. The crew will offer a special seafood lunch while the boat is cruising through the islets. Lunch includes one complimentary soft drink. Then, visit the natural beautiful landscapes of Halong Bay and discover a beautiful caves: Heaven Palace grotto.

After about 4 hour navigation, all participants are back to harbor for a drive back to Hanoi. Arrive the hotel at around 18.00.

Friday, October 11

Workshop at Hanoi University of Science and Technology (HUST)
Details will be announced during the symposium

Social Events

Sunday, October 6, 19:00
Welcome Reception
La Veranda & Patio of the Sofitel Legend Metropole Hotel

Tuesday, October 8, 19:00
Banquet
Cau Go Vietnamese Cuisine Restaurant

Wednesday, October 9, 19:00
Farewell Dinner
Sofitel Legend Metropole Hotel Restaurant

Thursday, October 10, 9:30 am
Excursion and Discussion Groups
Halong Bay

Contact information for urgent matters

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ISRR Organizers:

Tamim Asfour (24/7)
ISRR 2019 General Co-Chair

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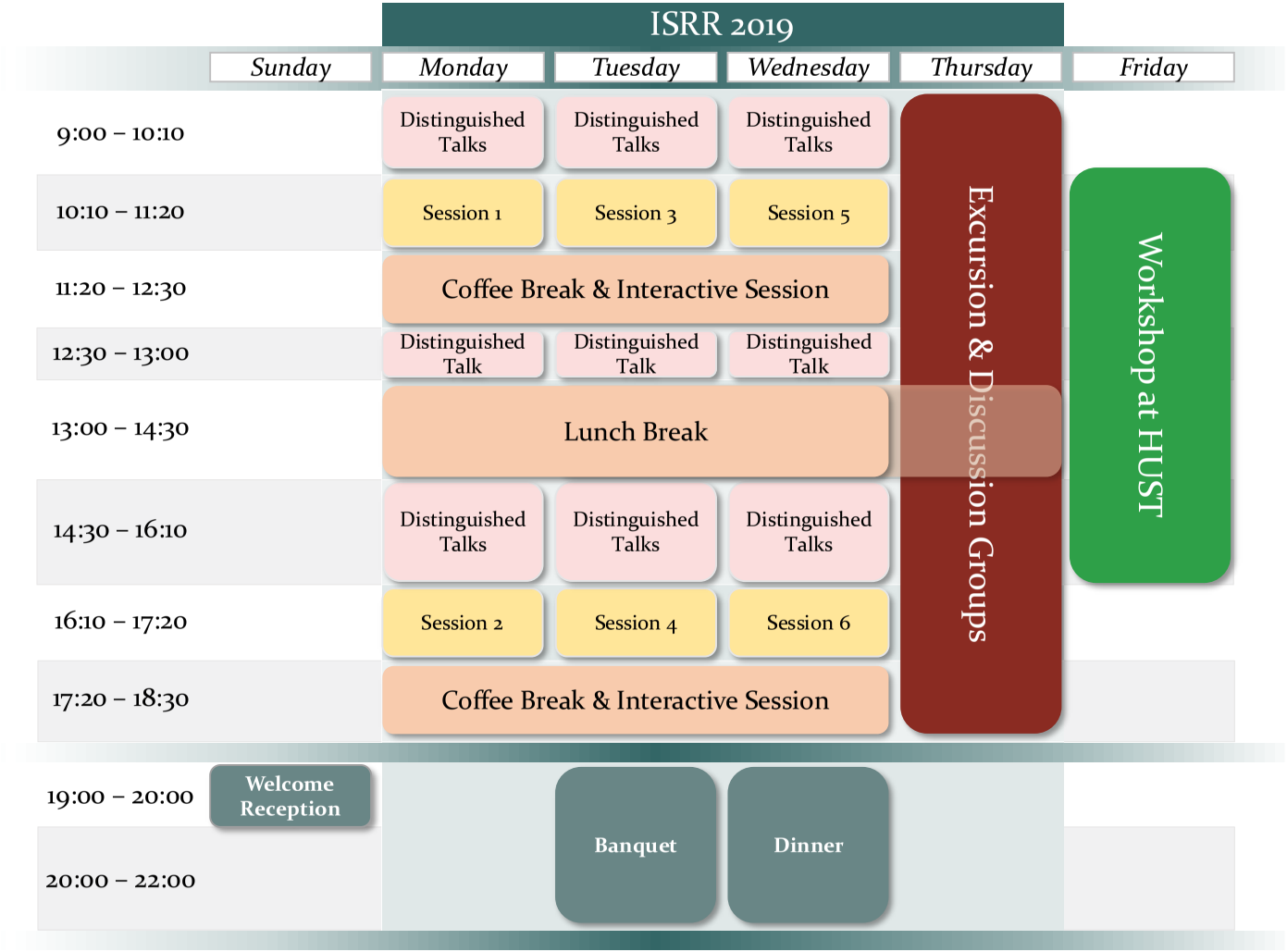
Emergency information:

Police assistance: 113
Fire brigade: 115
Medical emergency (Hanoi): 9340555


ISRR 2019
Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
9:00 – 10:10
Distinguished Talks
Distinguished Talks
Distinguished Talks
10:10 – 11:20
Session 1
Session 3
Session 5
11:20 – 12:30
Coffee Break & Interactive Session
12:30 – 13:00
Distinguished Talk
Distinguished Talk
Distinguished Talk
13:00 – 14:30
Lunch Break
14:30 – 16:10
Distinguished Talks
Distinguished Talks
Distinguished Talks
16:10 – 17:20
Session 2
Session 4
Session 6
17:20 – 18:30
Coffee Break & Interactive Session
Excursion & Discussion Groups
Workshop at HUST
19:00 – 20:00
Welcome Reception
Banquet
Dinner
20:00 – 22:00