

**NANYANG
TECHNOLOGICAL
UNIVERSITY**
SINGAPORE

Air Traffic Management
Research Institute



1-4 July 2024 | Singapore



ICRAT '24

11th International Conference on Research in Air Transportation



Registration (08:30 - 09:00 AM)

Lecture Theatre at The ARC (LHN-LT-B1-15)

9:00
AM

Introduction	Eric Neiderman <i>U.S. Federal Aviation Administration</i>	Marc Bourgois <i>Eurocontrol</i>
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9:15
AM

Welcome address	Sameer Alam <i>Nanyang Technological University</i>	Vu Duong (Director, ATMRI) / Prof Lam (SVP) <i>Nanyang Technological University</i>
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9:30
AM

Keynote 1	Patrick Ky <i>CEO, International Centre for Aviation Innovation</i>
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Coffee / Refreshment (10:00 - 10:30 AM)

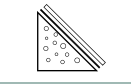


Regular Paper Sessions (10:30 AM - 12:00 PM)

Room: Lecture Theatre at The ARC (LHN-LT-B1-15) RP1: Human Performance 1 Session Chair: Maximilian Peukert		Room: TR18 (LHN-L1-06) RP2: Safety / ATC 1 Session Chair: Lishuai Li	Room: TR17 (LHN-L1-05) RP3: Fuel and Emissions 1 Session Chair: Daniel Delahaye
10:30 AM	#31 Alex Konkel On the Potential Use of Synthetic Voices in Aviation: Comparison to Human Speech	#14 Rodolphe Fremond, Yan Xu, Antonios Tsourdos and Inalhan Gokhan Urban Corridor-Based Tactical Conflict Resolution with Flight Plan Adherence and Uncertainty Resilience using a Multi-Agent Reinforcement Learning Solver	#13 Gabriel Jarry, Daniel Delahaye and Christophe Hurter Towards aircraft generic Quick Access Recorder fuel flow regression models for ADS-B data
	#6 Fedja Netjasov Decision Support System for Shift Managers based on finite state Markov chains	#56 Martin Schlosser, Hannes Braßel and Hartmut Fricke Analysis of Aircraft Ground Trajectories: Map-Matching with Open Source Data for Modeling Safety-Driven Applications	#75 Esther Roosenbrand, Junzi Sun and Jacco Hoekstra Flight Optimization for Contrails and Emissions: A Large-Scale Trade-off Analysis Using Open Data and Models
11:00 AM			
11:30 AM	#41 Marvin Mutz, Gunnar von Oesen, Florian Hasse, Dagh Zeppenfeld and Sebastian Schier-Morgenthal “How do you read?” – Dynamics of future human-automation teams in air traffic control	#97 Kaijing Ding, Ke Liu, Lu Dai and Mark Hansen Real-Time Go-Around Prediction: A case study of JFK airport	#84 Junzi Sun, Esther Roosenbrand, Yuki Nonaka and Eri Itoh Contrail Formation and Mitigation in the Japanese Airspace: A Data-Driven Study

Tutorial Session 1 (12:10 - 01:10 PM)

Room: Lecture Theatre at The ARC (LHN-LT-B1-15) Junzi Sun, David Lovell, Seth Young	Room: TR+18 (LHN-L1-06) Joost Ellerbroek	Room: TR17 (LHN-L1-05) Thinh Pham
ADSB: What's In, What's Not	BlueSky: Setup	ATM & ML (Airport)



Lunch (01:10 - 02:10 PM)



Regular Paper Sessions (02:10 - 03:10 PM)

Room: Lecture Theatre at The ARC (LHN-LT-B1-15) RP4: Economics and Policy Session Chair: Eric Neiderman		Room: TR+18 (LHN-L1-06) RP5: Infrastructure Session Chair: David Lovell	Room: TR17 (LHN-L1-05) RP6: Fuel and Emissions 2 Session Chair: Seth Young
2:10 PM	#17 Haochen Wu, Kevin Sun, Jackson Miller, Oliver Jia-Richards and Max Li Spaceport Facility Location Planning within the US National Airspace System	#59 Dario Batioja Alvarez, Kairat Tuleubekov, Matthew Brynick and Richard Ji Investigating Reflective Cracking Initiation and Propagation Rates in Asphalt Concrete Overlays on Concrete Slabs: Laboratory and Full-Scale Experiment Analysis	#80 Judith Rosenow, Hartmut Fricke and Markus Vogel Integrated CO2 Emission and Contrail Formation climate effect Benchmarking
	#99 Victor Qin and Hamsa Balakrishnan Modeling Competition Between Service Providers in Advanced Air Mobility	#60 Rajrup Mitra, Md Abdullah Ali Sourav, Ayhan Oner Yucel, Halil Ceylan, Berk Gulmezoglu, Sunghwan Kim and Matthew Brynick Airfield Pavement Crack Segmentation: Potential and Future	#95 Yati Liu and Mark Hansen How to Promote Short-Term Aviation Decarbonization: A Policy Scenario Model for Sustainable Aviation Fuel in California
2:40 PM			



Refreshments (03:10 - 03:40 PM)









Tutorial Session 1 (03:40 - 04:40 PM)

Room: Lecture Theatre at The ARC (LHN-LT-B1-15) Xavier Olive	Room: TR+18 (LHN-L1-06) Joost Ellerbroek	Room: TR17 (LHN-L1-05) Tara Gibson
Traffic: OSN Data	BlueSky: Applications	Human Readiness Level










Doctoral Symposium Sessions (04:50 - 05:50 PM)

Room: Lecture Theatre at The ARC (LHN-LT-B1-15) Doctoral Symposium 1 Session Chair: Hartmut Fricke		Room: TR18 (LHN-L1-06) Doctoral Symposium 2 Session Chair: Seth Young	Room: TR17 (LHN-L1-05) Doctoral Symposium 3 Session Chair: Yu Zhang
4:50 PM	#30 Maximilian Mendiguchia Meuser and Volker Gollnick Climate impact driven adaptation of European airspace structure to support climate-optimized flight planning	#19 Chris Nguyen and Rhea Liem A transformer-based encoder model for flight arrival sequencing	#58 Sungju Maeng and Makoto Itoh A Study on Communication Modality in UATM System Discussions and suggestions from analyzing teamwork in ATM and UTM
5:20 PM	#25 Zarah Lea Zengerling and Volker Gollnick Operational measures to mitigate the climate impact of aviation - A comparison	#82 Zhuoxuan Cao, Aaron Webb, David Lovell and Seth Young A comparative analysis of departure runway occupancy time by aircraft type and flight mission	#68 Seonho Kim and Jongho Hong Flight delay time and costs from extreme weather

 5K fun run (Gardens by the Bay) (06:30 - 08:30 AM)		
 Registration and Coffee / Refreshment (10:00 - 10:30 AM)		
Lecture Theatre at The ARC (LHN-LT-B1-15)		
Keynote 2		Akbar Sultan <i>Director, Airspace Operations and Safety Program, NASA</i>
 Regular Paper Sessions (11:00 AM - 12:30 PM)		
Room: Lecture Theatre at The ARC (LHN-LT-B1-15) RP7: Human Performance 2 Session Chair: Joe Post		Room: TR18 (LHN-L1-06) RP8: Safety / ATC 2 Session Chair: Xavier Olive
#88 Ashton Low Kin Yun, Nimrod Lilith, Sameer Alam and Leston Poh Choo Kiat Deep Neural Network-Based Automatic Speech Recognition for ATC-Pilot Audio Transcription	#5 Gabriel Jarry, Daniel Delahaye, Eric Feron, Stephane Puechmorel and Christophe Hurter Real Time Aircraft Atypical Approach Detection for Air Traffic Control	#69 Pablo Gascó and Ramon Dalmau A Comprehensive Evaluation of Data Drift Metrics for Air Transportation Applications
#83 Jan van Doorn, Junzi Sun, Jacco Hoekstra, Patrick Jonk and Vincent de Vries Whisper-ATC: Open Models for Air Traffic Control Automatic Speech Recognition with Accuracy	#78 Yash Guleria, Duc-Thinh Pham and Sameer Alam Advancing Beyond Conformal Conflict Resolution in Air Traffic Control: Balancing Efficiency and Conformance	#53 Petar Andraši, Tomislav Radišić, Kristina Samardžić and Doris Novak Air Traffic Complexity Hotspot Detection in Uncertain Adverse Weather Scenarios
#15 Maximilian Peukert, Lothar Meyer and Anna Lena Meyenburg Time Matters: Exploring a Short Fatigue Measurement Method in Air Traffic Control	#38 Kim Gaume, Richard Alligier, Nicolas Durand, David Gianazza and Xavier Olive Extracting Lateral Deconfliction Actions from Historical ADS-B data with Median Regression	#67 Stanley Förster and Hartmut Fricke A Systematic Literature Review on Complexity--Safety Correlation Models Towards Safety-Conscious Arrival Management
 Lunch (12:30 - 01:30 PM)		
 Doctoral Symposium Sessions (01:30 - 02:30 PM)		
Room: Lecture Theatre at The ARC (LHN-LT-B1-15) Doctoral Symposium 4 Session Chair: Max Li		Room: TR18 (LHN-L1-06) Doctoral Symposium 5 Session Chair: David Lovell
#10 Zhiqiang Liu, Jose Luis Muñoz Gamarra and Juan José Ramos Gonzalez A Multi-Agent negotiation framework for planning conflict-free U-space scenarios	#94 Barrett Campbell Optimizing Aeromedical Clinical Decision Support Systems through Framework Development	#65 Ziming Wang, Yanjun Wang and Mark Hansen Trajectory Clustering in a Multi-Airport System: A Deep Clustering with Generative Approach
#32 Yuting Xi, Man Liang, Alessandro Gardi and Roberto Sabatini Real time tactical path planning for UAV in main corridor and byway corridor traffic structure	#46 Nhat-Hoang P. Nguyen, Duc-Thinh Pham and Vu Duong Hierarchical Multi-agent Distributed Method for Automated Slot Allocation in Virtual Centralized ATFM	#66 Nutchanon Suvittawat and Nuno Antunes Ribeiro Aircraft Surface Defect Inspection System Using AI with UAVs
Participants free for the remainder of the day		
 Student Activities		 Conference Committee Meeting (for committee members only)
Guided Tour to Tower & Radar Simulator, ATMRI / Sungei Buloh Wetland Reserves		Location: Briefing Room, Air Traffic Management Research Institute, NTU Singapore
 Conference Committee Dinner (for committee members only)		
Location: The Malayan Council - Esplanade Mall, 8 Raffles Ave, #02-14, Singapore 039802		



<div> Coffee / Refreshment (09:00 - 09:30 AM)</div>		
<div><div></div>Regular Paper Sessions (09:30 - 11:30 AM)</div>		
<div><div><div><div>Room: Lecture Theatre at The ARC (LHN-LT-B1-15)</div><div>RP10: UAS/UAM/Space 1</div><div>Session Chair: Alejandro Murrieta Mendoza</div></div><div><div>#3</div><div>Calin Andrei Badea, Andres Morfin Veytia, Joost Ellerbroek and Jacco Hoekstra</div><div>Urban Wind Measurement and Modelling for U-space Operations</div></div></div><div><div><div>Room: TR18 (LHN-L1-06)</div><div>RP11: System Performance 1</div><div>Session Chair: Max Li</div></div><div><div>#64</div><div>Wayne Ng and Nuno Antunes Ribeiro</div><div>A Modeling Framework for Rapid Assessment of Terminal Airspace Configurations and Planning Scenarios</div></div></div><div><div><div>Room: TR17 (LHN-L1-05)</div><div>RP12: Advanced Modeling 1</div><div>Session Chair: Ramon Dalmau</div></div><div><div>#12</div><div>Malte von der Burg and Alexei Sharpanskykh</div><div>Multi-Agent Planning for Autonomous Engine-Off Taxiing at Large Airports</div></div></div></div>		
<div><div><div><div>#76</div><div>Wei Zhou, Zhengyi Wang, Imen Dhief and Sameer Alam</div><div>A Reinforcement Learning Approach for Flight Re-routing in Space launch Failure Scenarios with Dynamic Debris Hazards</div></div><div><div>#33</div><div>Haochen Wu, Xinting Zhu, Shuchang Li, Ying Zhou, Lishuai Li and Max Li</div><div>Distributionally Robust Ground Delay Programs with Learning-Driven Airport Capacity Predictions</div></div><div><div>#23</div><div>Amine Heffar and Ramon Dalmau</div><div>A Universal Machine Learning Model for Better Runway Allocation Predictions</div></div></div></div>		
<div><div><div><div>#26</div><div>Josue N. Rivera and Dengfeng Sun</div><div>Air Traffic Management for Collaborative Routing of Unmanned Aerial Vehicles via Potential Fields</div></div><div><div>#62</div><div>Zhihan Xu, Ziming Wang, Yanjun Wang and Daniel Delahaye</div><div>Flow based spatio-temporal graph network model for predicting airport network delays</div></div><div><div>#20</div><div>Wissam Chalabi, Alessandro Bombelli and Glen Purdam</div><div>The Vehicle Routing Problem for Aerial Firefighting</div></div></div></div>		
<div><div><div><div>#40</div><div>Justin Poh, Nancy Leveson and Natasha Neogi</div><div>A Safety-Driven Approach to Exploring and Comparing Air Traffic Management Concepts for Enabling Urban Air Mobility</div></div><div><div>#42</div><div>Yuhan Jiang, Luigi De Giovanni, Carlo Lancia and Guglielmo Lulli</div><div>An analysis of trajectory centered ATFM with airspace users’ preference scores</div></div><div><div>#79</div><div>Stanley Förster and Hartmut Fricke</div><div>Probabilistic Prediction of Estimated Time of Arrival - Identifying Sources of Variance and Out-of-Sample Issues</div></div></div></div>		
<div><div>Tutorial Session 1 (11:40 AM - 12:40 PM)</div><div><div><div><div>Room: Lecture Theatre at The ARC (LHN-LT-B1-15)</div><div>Junzi Su</div><div>OpenAP Tool Chain</div></div><div><div>Room: TR18 (LHN-L1-06)</div><div>NTU Team</div><div>Connected VR (Hololens) in virtual towers</div></div></div></div></div>		
<div><div><div></div>Lunch (12:40 - 01:40 PM)</div></div>		
<div><div><div></div>Regular Paper Sessions (01:40 - 03:10 PM)</div></div>		
<div><div><div><div>Room: Lecture Theatre at The ARC (LHN-LT-B1-15)</div><div>RP13: UAS/UAM/Space 2</div><div>Session Chair: Raja Sengupta</div></div><div><div>#37</div><div>Yuk Shan Cheung, Peter van der Geest, Tom van Birgelen and Jinyoung Choi</div><div>Safety Targets for Urban Air Mobility Vehicles - From a perspective of Third Party Risk due to UAM operations in the Netherlands</div></div></div><div><div><div>Room: TR18 (LHN-L1-06)</div><div>RP14: System Performance 2</div><div>Session Chair: Fedja Netjasov</div></div><div><div>#55</div><div>Anahita Jain, Husni Idris and John-Paul Clarke</div><div>Impact of Traffic-Following on Order of Autonomous Airspace Operations</div></div></div><div><div><div>Room: TR17 (LHN-L1-05)</div><div>RP15: Advanced Modeling 2</div><div>Session Chair: Hamsa Balakrishnan</div></div><div><div>#70</div><div>Kevin Zimmer, Hamsa Balakrishnan and Amedeo Odoni</div><div>Improving Robustness through Buffer Placement in the Gate Assignment Problem: An Empirical Approach</div></div></div></div>		
<div><div><div><div>#7</div><div>Casey Denham and William Cummings</div><div>Air Traffic Management Impacts of a Vertiport Closure</div></div><div><div>#74</div><div>Hasnain Ali, Duc-Thinh Pham and Sameer Alam</div><div>Reduced Taxi Delays with Intelligent Departure Metering Advisory Tool (I-MATE): Insights from Air Traffic Controller Validation Experiments</div></div><div><div>#87</div><div>Reinier Vos, Junzi Sun and Jacco Hoekstra</div><div>A Transformer-based Trajectory Prediction Model to Support Air Traffic Demand Forecasting</div></div></div></div>		
<div><div><div><div>#92</div><div>Shangqing Cao, Xuan Jiang, Emin Burak Onat, Mark Hansen, Raja Sengupta and Anjan Chakrabarty</div><div>Fleet Size and Spill for UAM Operation under Uncertain Demand</div></div><div><div>#72</div><div>Krishna Kalyanam, Milad Memarzadeh, John Crissman, Rebekah Yang and Kanvasi Tejasen</div><div>Applying Machine Learning Tools for Runway Configuration Decision Support</div></div><div><div>#61</div><div>Banishree Ghosh, Yixiang Lim, Timothy Tay, Sheng Zhang and Jaya Shankar Pathmasuntharam</div><div>A Physical Aircraft-Following Model for Aerodrome Modelling and Simulation</div></div></div></div>		
<div><div><div></div>Refreshments (03:10 - 03:40 PM)</div></div>		
<div><div>Showcase Session (03:40 - 04:00 PM)</div><div><div>Lecture Theatre at The ARC (LHN-LT-B1-15)</div><div>Hartmut Fricke, TU Dresden</div><div>The Smart Mobility Lab in Lusatia, Germany – a unique Test Environment for eVTOLs</div></div></div>		
<div><div><div></div>Doctoral Symposium Sessions (04:00 - 05:30 PM)</div></div>		
<div><div><div><div>Room: Lecture Theatre at The ARC (LHN-LT-B1-15)</div><div>Doctoral Symposium 7</div><div>Session Chair: Yanjun Wang</div></div><div><div>#71</div><div>Anh Nguyen-Duy and Duc-Thinh Pham</div><div>Multi-Agent Reinforcement Learning for Multi-Airport Slot Scheduling</div></div></div><div><div><div>Room: TR18 (LHN-L1-06)</div><div>Doctoral Symposium 8</div><div>Session Chair: Joost Ellerbroek</div></div><div><div>#34</div><div>Muhammad Fazlur Rahman, Joost Ellerbroek and Jacco Hoekstra</div><div>Effect of CNS Systems Performance on Autonomous Separation in U-Space</div></div></div></div>		
<div><div><div><div>#73</div><div>Zhi Jun Lim and Sameer Alam</div><div>Optimizing Terminal Maneuvering Area Operations: A Comprehensive Study with a Focus on Extended Arrival Manager and Multi-Agent Negotiation Framework</div></div><div><div>#44</div><div>Sasha Vlaskin, Emmanuel Sunil, Joost Ellerbroek, Jacco Hoekstra and Dennis Nieuwenhuisen</div><div>Autonomous Separation Management System for Drones Through Optimal Layer Interactions</div></div></div><div><div><div>#63</div><div>Finn Sutherland, Matthew Marino, Simon Watkins and Abdulghani Mohamed</div><div>The Role of Vertiport Design for a Safe Wind Field for AAM Operations</div></div></div></div>		
<div><div><div></div>Venue tour of Chinese Heritage Center and Gala Dinner</div><div><div>Location: Nanyang Lake Pavillion, Yunnan Gardens, 46 Nanyang Drive</div></div></div>		

 Coffee / Refreshment (09:00 - 09:30 AM)

Lecture Theatre at The ARC (LHN-LT-B1-15)

9:30
AM

Keynote 3

Massimiliano Zanin
*Institute for Cross-Disciplinary Physics and Complex Systems, University of the Balearic Islands (UIB)
and the Spanish National Research Council (CSIC)*

 Regular Paper Sessions (10:10 - 11:40 AM)

Room: Lecture Theatre at The ARC (LHN-LT-B1-15)
RP16: Human Performance 3
Session Chair: Marc Bourgois

Room: TR18 (LHN-L1-06)
RP17: Trajectory Optimization
Session Chair: Michael Schultz

Room: TR17 (LHN-L1-05)
RP18: Network Management
Session Chair: Mark Hansen

10:10
AM

#9

Sinan Abdulhak, Anthony Carvette, Kate Shen, Robert Goldman, Bill Tuck and Max Li

User Feedback-Informed Interface Design for Flow Management Data and Services (FMDS)

#52

Thomas Zeh, Judith Rosenow, Martin Lindner, Stanley Förster and Hartmut Fricke

Trajectory and Airspace Optimization Depending on Controller Task Load

#51

Santiago Rodriguez, Daniel Delahaye and Rodrigo Ventura

Crossing Waypoint Optimization in Free Route Airspace

10:40
AM

#39

Sergen Dag, Alejandro Murrieta-Mendoza, Kian Tan and Stefan Froehlich

Accelerating UCO Sequence Validation in iCAS ATM System with Dynamic Flight Profiles

#11

Xavier Olive, Manuel Waltert, Ryota Mori and Philippe Mouyon

Filtering Aircraft Surface Trajectories Using Information on the Taxiway Structure of Airports

#36

Martina Galeazzo, Luigi De Giovanni, María Florencia Lema-Esposto and Guglielmo Lulli

An Integer Programming approach to Dynamic Airspace Configuration

11:10
AM

#47

Sinan Abdulhak, Wayne Hubbard, Karthik Gopalakrishnan and Max Li

ChatATC: Large Language Model-Driven Conversational Agents for Supporting Strategic Air Traffic Flow Management

#93

Ramon Dalmau, Chunyao Ma and Sameer Alam

Mastering the Management of the Vertical Flight Profile with Reinforcement Learning

#91

Emin Burak Onat, Shangqing Cao, Raiyan Rizwan, Xuan Jiang, Mark Hansen, Raja Sengupta and Anjan Chakrabarty

A Simulation-Optimization Framework for Developing Wind-Resilient AAM Networks

 Lunch (11:40 AM - 12:40 PM)

12:40
PM

 Awards and Closing Remarks (12:40 - 01:40 PM)

Lecture Theatre at The ARC (LHN-LT-B1-15)

Tuesday July 2

6:30 AM – 8:30 AM



5KM FUN RUN @ Gardens By The Bay

Join ATMRI to run in one of the most scenic route in Singapore!

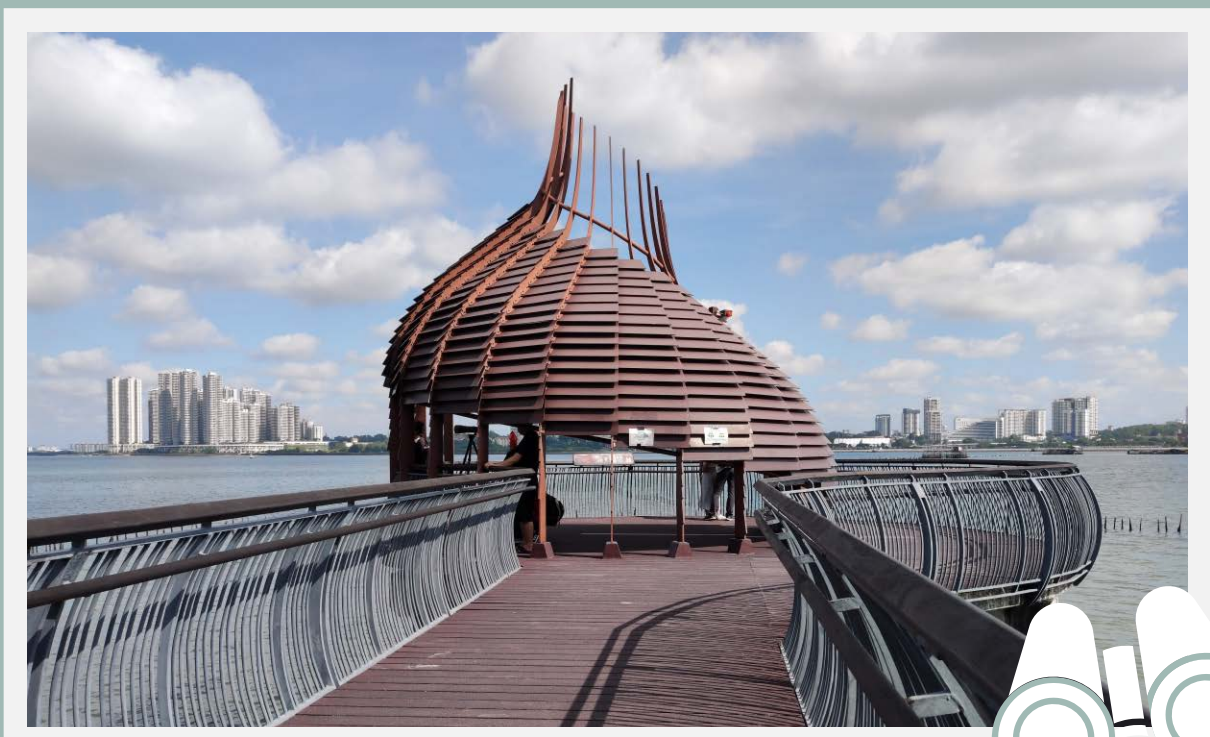
Feast your eyes on the sights as you pass by some of the most iconic structures in Singapore!



Public Transportation (making your own way!)
1. Take Bus No.401 from Bedok Interchange (Bedok MRT Station), alight at Bus Stop No.91111 (Cp B1).
2. Hitch a Taxi/Grab Car, enter the address below "East Coast Park Car Park B1"

Shuttle Bus Schedule:
1. Pick up from NTU Hall/Dorm @ 5.45am
2. Pick up from Genting Hotel @ 6am
3. Pick up from Concorde Hotel @ 6am

2:30 PM – 5:30 PM



NATURE WALK @ Sungei Buloh Wetland Reserve

For Student Activities

Please wear comfortable attire and shoes.



Return Transport will be provided from Sungei Buloh to NTU Halls / Appointed Hotels / nearest MRT Station

Wednesday July 3

6:00 PM – 6:30 PM



Tour to NTU Chinese Heritage Centre

The Chinese Heritage Centre (CHC) was founded in 1995 to advance knowledge and understanding of the ethnic Chinese communities in different parts of the world, undertakes a range of research, exhibitions, public education, documentation/archival collections, and community outreach activities.



6:30 PM – 9:30 PM



Conference Dinner @ Nanyang Lake Pavilion, Yunnan Garden

The rejuvenated Yunnan Garden, a sprawling open space of greenery, waterscapes and heritage landmarks.



Transport will be provided from the dinner venue to the 2 appointed hotels, NTU Halls & Pioneer MRT.

ICRAT 2024 Main Contacts

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Getting to the Conference Venue

Via CDG ZIG app / GRAB app:
Provide the address:
63 Nanyang Dr, Singapore 636922

Via MRT Train/Subway & SBS Bus:
- Alight at Boon Lay MRT Station
- Walk through the Jurong Point Shopping Mall and look for Boon Lay Interchange.
- Take bus 179 from Boon Lay Interchange (alight at Nanyang Dr - Lee Wee Nam Lib (27211))
- Turn left and walk towards the open carpark (round about)

Useful links:

Bus 179 Route 

NTU Map 



Look out for ICRAT 2024 signages & officials.

Places of Interest

Marina Bay Sands
Singapore's most iconic hotel for the world's largest rooftop Infinity Pool, award-winning dining, and a wide range of shopping and entertainment options.

Nearest MRT station: Bayfront MRT

SENTOSA
Visit the beautiful beach and many other attractions such as S.E.A. Aquarium, Universal Studios theme park, Adventure Cove Waterpark, Wings of Time, Singapore Cable Car and Skyline Luge Sentosa!

Nearest MRT Station: HarbourFront MRT

Useful Information

Going around Singapore with Singapore MRT Lines
Download the latest MRT map

Major Banks in Singapore:
DBS, OCBC, UOB

Singapore Currency: Dollar (SGD)
The climate in Singapore is Summer all day, the average is 27° Celsius daily.
Singapore's Country Code: +65