



Ahmad ALHILAL

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Work: Hong Kong University of Science and Technology, Clear Water Bay, Kowloon,
999077 Hong Kong (China)

WORK EXPERIENCE

Postdoctoral Fellow

Division of Emerging Interdisciplinary Areas (EMIA), Hong Kong University of Science and Technology [17/10/2022 – Current]

City: Hong Kong | **Country:** China

- Mentoring MPhil and Ph.D. students supervised by Prof. Pan HUI, conducting research in AR/VR and Metaverse technologies and GenAI.
- Leading the development of a large-scale virtual classroom as part of the MetaHKUST project.
- Write project proposals to attract funding in Hong Kong and the Greater Bay Area.
- Working on my research, focussing on Adaptive Rendering and Streaming in VR/Mobile Cloud Gaming.
- Collaborating with external researchers on enabling Metaverse technologies and methodologies, and on adaptive and real-time streaming.

Guest Lecturer

Hong Kong University of Science and Technology

City: Hong Kong | **Country:** China

• Guest Lecture on Extended Reality: Systems, Principles and Design
Presentation of my latest research on cloud-rendered XR

University teaching assistant

Hong Kong University of Science and Technology [01/09/2018 – 18/06/2022]

City: Hong Kong

- Java Programming [Spring 2021]
- Database Management Systems [Spring 2020]
- Mobile Application Development [Spring 2019]
- Introduction to Computing with Excel VBA [Fall 2018]

Mentoring UROP and FYT students:

- Mentor an Undergraduate Research Opportunities (<https://urop.ust.hk>) student, Project title: High Quality Video Transmission In VR Cloud Gaming, 2022.
- Mentor a Final Year Thesis (FYT) student, project title: "TempoSpatial Fuel Consumption Prediction", 2020-2021.

Lecturer

Arab International University [01/09/2016 – 01/01/2017]

City: Damascus | **Country:** Syria

Teaching a module on Introduction to Computer Systems

University teaching assistant

Arab International University [01/09/2015 – 30/06/2017]

City: Damascus | Country: Syria

Courses: Information and Network Security, Computer Networks

University teaching assistant

Damascus University/Information Technology college [14/02/2012 – 05/07/2016]

City: Damascus | Country: Syria

Courses: Information and Network Security, Network Application Programming and Programming Languages

Mentoring FYP students:

- Mentor of Fourth and Final Year Project (FYP) students, more than 10 FYP projects in the area of computer networks, network security, and networking systems.

Java Developer

Spacetoan and JIR [18/09/2008 – 27/02/2011]

City: Damascus | Country: Syria

Java applications and Server administration

EDUCATION AND TRAINING

PhD degree

Hong Kong University of Science and Technology [30/08/2017 – 07/09/2022]

City: Hong Kong | Country: China | Field(s) of study: Information and Communication Technologies | Final grade: GGA 3.85, CGA 3.74 | Number of credits: 21 | Thesis: Reliable and Real-time Content Streaming for Cloud and Edge Computing

Courses: Database Architecture and Implementation, Introduction to Combinatorial Optimization, Introduction to Modeling & Simulation of Complex and Multi-Disciplinary Dynamical Systems, Parallel Programming, Cryptography and Security, Computer Networks, Independent Studies.

Master's degree

Damascus University/ Information Technology college [01/10/2010 – 01/05/2014]

City: Damascus | Country: Syria

- **Core courses** are Distributed Systems, Advanced Computer Networks, Information Security, Network Applications Programming, Wireless Communication.
- **Master Thesis:** Energy efficiency in Wireless Sensor Networks.

Bachelor Degree

Damascus University/ Information Technology College [01/09/2003 – 10/08/2008]

City: Damascus | Country: Syria | Field(s) of study: Information and Communication Technologies

Computer programming, administration of operating system and servers, network application programming, computer networks and communication protocols

LANGUAGE SKILLS

Mother tongue(s): Arabic

Other language(s):

English

LISTENING C1 READING C1 WRITING C2

SPOKEN PRODUCTION C1 SPOKEN INTERACTION C1

German

LISTENING A1 READING A2 WRITING A1

SPOKEN PRODUCTION A1 SPOKEN INTERACTION A1

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

DIGITAL SKILLS

Development

Web Development: HTML 5, CSS, JavaScript / Network Application Programming / C# / Proficient in Java and Python / Git / C++ / Android app development / Web Development / Virtual reality

Realtime Streaming

Apache Kafka, Spark / WebRTC

System Administration

Docker, Kubernetes / SQL/MYSQL / IT Networking / Debian Linux / Basic Networking (TCP, UDP, IP, ICMP, ARP Static routing) / Linux Networking / Network programming / Conda

PUBLICATIONS

Accepted in Top-ranked Conferences

1. Reza Hadi Mogavi, Juhyung Son, Simin YANG, Derrick M. Wang, Lydia Choong, **Ahmad Alhilal**, Pengyuan Zhou, Pan Hui, and Lennart E. Nacke, "**The Jade Gateway to Exergaming: How Socio-Cultural Factors Shape Exergaming Among East Asian Older Adults**", *Accepted in CHI Play 2024*.
2. **Ahmad Alhilal**, Ze Wu, Yuk Hang Tsui, and Pan HUI, "[FovOptix: Human Vision-Compatible Video Encoding and Adaptive Video Streaming in VR Cloud Gaming](#)", *Accepted in The ACM Multimedia Systems Conference 2024 (MMSys' 24)*.
3. Juhyung Son, **Ahmad Alhilal (co-first author)**, Reza Hadi Mogavi, Tristan Braud, Pan HUI. "SimLab: Bridging the Gap between Theory and Practice in Chemical Engineering Education through a Metaverse Simulation", *Accepted in HCI International (HCII) 2024*.
4. Chun Ho Park, **Ahmad Alhilal**, Tristan Braud and Pan Hui, "[AnchorLoc: Large-scale, Real-Time Visual Localization through Anchor Extraction and Detection](#)", *Accepted in the 22nd International Conference on Pervasive Computing and Communications (PerCom 2024)*.
5. Jiadong Yu, **Ahmad Alhilal**, Tailin Zhou, Hui Pan, Danny HK Tsang, "[QoE Optimization for VR Streaming: a Continual RL Framework in Digital Twin-empowered MEC](#)", *Accepted in IEEE Global Communications Conference (IEEE GLOBECOM 2023)*.
6. Kit Yung LAM, Liang Wang, **Ahmad Alhilal**, Lik-Hang Lee, Gareth Tyson, Pan Hui, "[Human-Avatar Interaction in Metaverse: Framework for Full-Body Interaction](#)", *The 4th ACM International Conference on Multimedia in Asia (ACM MMAsia'22)*.
7. LIK-HANG LEE, CARLOS BERMEJO, **Ahmad Alhilal**, TRISTAN BRAUD, SIMO HOSIO, ESMÉE DE HAAS, PAN HUI, "[Beyond the Blue Sky of Multimodal Interaction: A Centennial Vision of Interplanetary Virtual Spaces in Turn-based Metaverse](#)", *24th ACM International Conference on Multimodal Interaction (ICMI'22)*.
8. **Ahmad Alhilal**, Tristan Braud, Bo Han, and Pan Hui, "[Nebula: Reliable Low-Latency Video Transmission for Mobile Cloud Gaming](#)", *The Web Conference 2022 (WWW '22)*.

9. Tristan Braud, **Ahmad Alhilal**, and Pan Hui, "[TALARIA: In-engine Synchronisation for Seamless Migration of Mobile Edge Gaming Instance](#)", *17th International Conference on Emerging Networking EXperiments and Technologies (CoNext 2021)*.
10. **Ahmad Alhilal**, Tristan Braud, Xiang Su, Luay Al Asadi, and Pan Hui, "[CAD3: Edge-facilitated Real-time Collaborative Abnormal Driving Distributed Detection](#)", *The 41st IEEE International Conference on Distributed Computing Systems (ICDCS 2021)*.

Accepted in Journals and Magazines

1. Jiadong Yu, **Ahmad Alhilal**, Tailin Zhou, Hui Pan, Danny HK Tsang, "[Attention-based QoE-aware Digital Twin Empowered Edge Computing for Immersive Virtual Reality](#)", Accepted in *IEEE Transactions on Wireless Communications journal*, 2024.
2. Jiadong Yu, **Ahmad Alhilal**, Hui Pan, Danny HK Tsang. **A. Alhilal is co-first author**, "[Bi-directional Digital Twin and Edge Computing in the Metaverse](#)", *Internet of Things magazine*.
3. **Ahmad Alhilal**, Tristan Braud, Lik-Hang LEE, Hang Chen, and Pan Hui, "[Towards a Traffic Metaverse with Shared Vehicle Perception](#)", Accepted in *IEEE Communications Standards Magazine* (2023).
4. **Ahmad Alhilal**, Benjamin Finley, Tristan Braud, Dongzhe Su, and Pan Hui, "[Street Smart in 5G: Vehicular Applications, Communication, and Computing](#)", *IEEE ACCESS* 2022.
5. Tristan Braud, Lik-Hang Lee, **Ahmad Alhilal**, Carlos Bermejo Fernández, Pan Hui, "[DiOS-An Extended Reality Operating System for the Metaverse](#)", *EEE MultiMedia* 2022.
6. **Ahmad Alhilal**, Tristan Braud, and Pan Hui, "[A Roadmap Towards a Unified Space Communication Architecture](#)", *IEEE ACCESS*, June 2021.
7. **Ahmad Alhilal**, Tristan BRAUD and Pan HUI, "[The Sky is NOT the Limit Anymore: Future Architecture of the Interplanetary Internet](#)", *IEEE Aerospace and Electronic Systems Magazine*, 2019.

Accepted in Top-ranked Workshops

1. Amna Arouj, Ahmed M. Abdelmoniem, **Ahmad Alhilal**, Linlin You, Chen Wang. "Resource-Aware Split Federated Learning for Edge Intelligence", Accepted in the *3rd Workshop on Machine Learning on Edge in Sensor Systems (Sensys-ML 2024)*.
2. **Ahmad Alhilal**, Kirill Shatilov, Gareth Tyson, Tristan Braud, and Pan Hui, "[Network Traffic in the Metaverse: The Case of Social VR](#)", Accepted in the *2nd International Workshop on Social and Metaverse Computing and Networking (SocialMeta 2023)*.
3. Kirill Shatilov, **Ahmad Alhilal**, Tristan Braud, Lik-Hang Lee, Pengyuan Zhou, and Pan Hui, "[Players are not Ready 101: A Tutorial on Organising Mixed-mode Events in the Metaverse](#)", *Proceedings of The First Workshop on Metaverse Systems and Applications (MetaSys '23)*.
4. T Li, **Ahmad Alhilal**, A Zhang, MA Hoque, D Chatzopoulos, Z Xiao, Y Li, P Hui, "[Driving Big Data: A First Look at Driving Behavior Via a Large-scale Private Car Dataset](#)", *IEEE 35th International Conference on Data Engineering Workshops (ICDEW)*, 2019.
5. Pengyuan Zhou, Tristan Braud, **Ahmad Alhilal**, Pan Hui, Jussi Kangasharju, "[ERL: Edge based Reinforcement Learning for Optimized Urban Traffic Light Control](#)", *IEEE PERCOM SmartEdge'19 Workshop*, 2019.

CONFERENCES AND SEMINARS

[18/07/2023 – 22/07/2023] Hong Kong, China

The International Workshop on Social and Metaverse Computing and Networking Presented my accepted paper entitled "**Network Traffic in the Metaverse: The Case of Social VR**"

Link: <https://socialmeta2023.github.io/>

[25/04/2022 – 29/04/2022] Virtual Event, Lyon, France

The ACM Web Conference 2022 Presented the research paper entitled "**Nebula: Reliable Low-latency Video Transmission for Mobile Cloud Gaming**"

[07/07/2021 – 10/07/2021] DC, USA

IEEE International Conference on Distributed Computing Systems (ICDCS 2021) Presented the accepted research paper entitled "**CAD3: Edge-facilitated Real-time Collaborative Abnormal Driving Distributed Detection**"

Link: https://ahmad-hl.github.io/videos/icdcs21_video.mp4

[03/08/2021 – 04/08/2021] Tokyo Institute of Technology

12th Multidisciplinary International Student Workshop (MISW 2021) Edge-assisted Vehicular Computing towards Eco-safe Driving

Link: <http://www.aotule.eng.titech.ac.jp/MISW/2021/>

[23/11/2019 – 25/11/2019] Tokyo, Japan

Sustainable Multimodal Transportation Tokyo Institute of Technology (Tokyo Tech), Japan. Asia-Oceania Top University League on Engineering (AOTULE)

<https://aotule.org/>

Link: <https://docs.google.com/presentation/d/1jaVTCZt3oqkCCWNCwcugRaQ6VlnO7QIsID8j67RMf3Y/edit?usp=sharing>

[14/09/2019 – 18/09/2019] RWTH Aachen University, Germany

Age-friendly Mobility RWTH AACHEN UNIVERSITY, IDEA League Summer School: Mobility Concepts 2030

Link: <https://drive.google.com/file/d/1kupSTY1BRjXaChPYeJDZ0axHRjpDzd6O/view?usp=sharing>

[09/01/2019 – 10/01/2019] Hong Kong University of Science and Technology

GREAT Smart Cities Connect Conference 2019 - The Greater Bay Area Fostering the development of smart cities in the Greater China region, and the influence of technology on that.

Link: <https://gsc.hkust.edu.hk/conference2019>

[15/09/2018 – 17/09/2018] Tongji University, Shanghai, China

Realtime Abnormal Driving Activity Detection using Edge Computing Tongji University. Mobile Networking, Analytics and Edge Computing Workshop 2018

PROJECTS

[01/04/2022 – Current]

MetaHKUST HKUST-HKUST(GZ) Collaboration Project: Leading the technical team to design and develop a scalable architecture for the virtual classroom, led by Prof. Pan HUI (PI).

HKUST-HSBC Bank Collaboration Project: Mentoring the technical team to design and develop a Meta-Human system to replicate the course instructor and oneself knowledge (AI model) to deliver lectures in the virtual classroom, led by Prof. Pan HUI (PI).

MetaHKUST: the world's first physical-digital twin campuses in the metaverse. It includes developing a virtual classroom, a mixed-reality platform for immersive and interactive virtual teaching in HKUST.

Link: <https://ahmad-hl.github.io/videos/metaustDemo.mp4>

[01/04/2022 – 01/09/2022]

Press Conference and Virtual Opening Ceremony on the Metaverse

- Led the development team
- Investigated the network problems and ensured robust operation of the virtual ceremony.

Link: <https://ahmad-hl.github.io/videos/metahkust.mp4>

[01/11/2020 – 01/11/2021]

Service and tools to support Machine Learning Development Life Cycle Participated in the development of the system in collaboration with [Logistics and Supply Chain MultiTech R&D Centre](#) , Hong Kong, 2021. Prof. Pan HUI (PI), Prof. Tristan Braud (Mentor), and using technologies such as Python & git, Docker, and Kubernetes.

[01/02/2020 – 01/02/2021]

Distributed Rendering in Cloud Game Participated in the development of the system in collaboration with Huawei, Shenzhen, China, 2020. Prof. Pan HUI (PI), Prof. Tristan Braud (Mentor), and using technologies such as Unity3D, c#, and video codec.

HONOURS AND AWARDS

Academic Excellence and Scholarship

- Excellent Presentation Award in the 12th Multidisciplinary International Student Workshop (MISW 2021)
- Scholarship from Hong Kong University of Science and Technology
- Academic excellence certificate in 4th year of undergraduate study

PROFESSIONAL SERVICE

Reviewer in Journals and Conference Papers:

IEEE International Symposium on Mixed and Augmented Reality 2024 (ISMAR '24)

The ACM Web Conference 2024 (WWW '24)

IEEE Conference on Pervasive Computing and Communications (PerCom)

ACM Multimedia Conference (ACM MM)

ACM Multimedia Systems Conference (ACM MMSys)

IEEE ACCESS

IEEE Communication Magazine

IEEE Vehicular Technology Magazine

IEEE Network Magazine

IEEE Internet of Things Magazine

Technical Program Committee:

The ACM Web Conference 2024 (WWW '24)

Ph.D. Student Symposium for ICDCS 2023