Chuanchao Gao

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Research Interests

mobile edge-cloud computing systems; real-time resource scheduling; cyber-physical systems.

Education

Nanyang Technological University, Singapore Aug 2021 – Dec 2025 (expected)
Doctor of Philosophy (Ph.D.) in Computer Science and Engineering
Thesis: *Heterogeneous Resource Management for Real-Time Applications in Mobile Edge Computing*
Supervisor: Assoc. Prof. Arvind Easwaran

Nanyang Technological University, Singapore Jan 2020 – Jul 2021
Graduate Studies in Computer Science and Engineering (completed M.Eng. coursework and research before transfer to Ph.D. program)
Research Topic: *Anomaly Detection for Digital Twin Integrated Cyber-Physical Systems*
Supervisor: Assoc. Prof. Arvind Easwaran

Nanyang Technological University, Singapore Aug 2013 – Jul 2017
B.Eng. in Mechanical and Aerospace Engineering
Specialization: Robotics and Mechatronics
First Class Honours

Research Experience

Ph.D. Researcher, Nanyang Technological University Aug 2021 – Present

- Conducting research on heterogeneous resource management for real-time applications in mobile edge computing systems.
- Designed and open-sourced a mobile edge computing simulator (mecRT) that enables reproducible, large-scale experiments on scheduling and resource allocation for real-time applications in MEC.
- Proposed multiple approximation algorithms with provable performance guarantees for deadline-constrained task mapping and resource scheduling in MEC.
- Published five peer-reviewed conference papers (RTSS * 2, DATE, GLOBECOM, RTCSA) and three peer-reviewed workshop paper (RTSS, RAGE, RTCSA) in leading IEEE/ACM venues.

Research Assistant, Nanyang Technological University May 2020 – Jun 2021

- Developed fault detection algorithms for large-scale cyber-physical systems to improve system stability in industrial environments.
- Published one conference paper on anomaly detection in digital twin-driven CPS in ICCPS 2021.

Professional Experience

Equipment Engineer, United Microelectronics Corporation, Singapore Jun 2017 – Jan 2020
Developed and implemented an IoT-based sensor network that transformed manual daily data collection into continuous, real-time automated monitoring, improving operational efficiency.

Publications

Peer-reviewed Conference Papers

- **C. Gao** and Arvind Easwaran, "Real-Time Service Subscription and Adaptive Offloading Control in Vehicular Edge Computing", IEEE Real-Time Systems Symposium (RTSS), 2025.
- **C. Gao** and Arvind Easwaran, "Energy-Efficient Joint Offloading and Resource Allocation for Deadline-Constrained Tasks in Multi-Access Edge Computing", IEEE International Conference on Embedded and Real-Time Computing Systems and Applications (RTCSA), 2025.
- **C. Gao**, Niraj Kumar and Arvind Easwaran, "Energy-Efficient Real-Time Job Mapping and Resource Management in Mobile-Edge Computing", IEEE Real-Time Systems Symposium (RTSS), 2024.
- Niraj Kumar, **C. Gao** and Arvind Easwaran, "Optimal Fixed Priority Scheduling in Multi-Stage Multi-Resource Distributed Real-Time Systems", Design Automation and Test in Europe (DATE), 2024.
- **C. Gao**, Shaan Aryaman and Arvind Easwaran, "Deadline-constrained Multi-resource Task Mapping and Allocation for Edge-Cloud Systems", IEEE Global Communications Conference (GLOBECOM), 2022.
- **C. Gao**, Heejong Park and Arvind Easwaran, "An Anomaly Detection Framework for Digital Twin Driven Cyber-Physical Systems", IEEE/ACM International Conference on Cyber-Physical Systems (ICCPS), 2021

Peer-reviewed Workshop Papers

- **C. Gao** and Arvind Easwaran, "VecSim, a Vehicular Edge Computing Simulator for Real-Time Applications", Demo Session of IEEE International Conference on Embedded and Real-Time Computing Systems and Applications (RTCSA), 2025.
- **C. Gao** and Arvind Easwaran, "Local Ratio based Real-time Job Offloading and Resource Allocation in Mobile Edge Computing", Real-Time And IntelliGent Edge Computing Workshop (RAGE), 2025.
- **C. Gao** and Arvind Easwaran, "Work-in-Progress: Deadline-Constrained Multi-Resource Allocation in Edge-Cloud System", Brief-Presentations Session of IEEE Real-Time Systems Symposium (RTSS), 2022.

Awards and Scholarships

- NTU Research Scholarship — Aug 2021– Aug 2025
- NTU Science and Engineering Undergraduate Scholarship — Aug 2013 – Aug 2017

Teaching Experience

- Lab Supervisor, Operating Systems (Undergraduate Course), NTU, 2022
- Lab Supervisor, Algorithm Design & Analysis (Undergraduate Course), NTU, 2023
- Lab Supervisor, Embedded Programming (Undergraduate Course), NTU, 2023
- Supervisor, 7 Undergraduate Final-Year Projects on real-time scheduling and mobile edge computing, 2021–2025

Professional Service

- Reviewer (under supervision of Prof. Arvind Easwaran) for 10+ journal and conference papers, including IEEE Transactions on Cloud Computing, IEEE Transactions on Parallel and Distributed Systems, IEEE Transactions on Service Computing, IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems, RTSS, ECRTS, and ICCPS.
- Web Chair, ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS) 2025

Technical Skills

Programming: Python, C++, MATLAB
Research: MEC simulator design, mathematical modeling, combinatorial optimization
Tools: OMNeT++, Simu5G, Containerd, Docker, CPLEX, Gurobi