

Waheed G. Gadallah

PhD Student in Computer Science and Engineering, HKUST

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Research Profile

PhD researcher in computer networking focusing on **AI-assisted congestion control**, **data-center networks**, **active queue management**, and **resource allocation using Network Utility Maximization (NUM) and reinforcement learning**. My current work designs deployable host/receiver-perspective congestion-control mechanisms that infer network-core conditions and end-user requirements without requiring core-switch modifications or in-switch learning. I combine algorithm design, Linux/OVS datapath implementation, dataset construction, and experimental testbed evaluation. My earlier MSc research focused on ML-based DDoS detection and SDN traffic modeling.

Research Interests

- TCP congestion control and data-center networks
- AI/ML for networking and traffic engineering
- Active queue management and flow prioritization
- NUM/RL-based resource allocation
- Open vSwitch, Linux kernel datapath, and testbeds
- SDN security, DDoS detection, and traffic modeling

Education

PhD in Computer Science and Engineering

The Hong Kong University of Science and Technology (HKUST)

2023–Present

Hong Kong SAR

- Supervisor: Prof. Brahim Bensaou. Research focus: AI-assisted congestion control, data-center networks, AQM, Linux/OVS testbeds, and NUM/RL-based resource allocation.

MSc in Information Technology

Assiut University, Faculty of Computers and Information

2022

Assiut, Egypt

- Thesis: *A Proposed Technique for Distributed Denial of Service Attack Detection in Software-Defined Network*. Supervisors: Prof. Hosny M. Ibrahim and Prof. Nagwa M. Omar.

BSc in Information Technology

Assiut University, Faculty of Computers and Information

2011–2015

Assiut, Egypt

- Graduation project: *Facial Recognition System*; supervised by Prof. Youssef B. Mahdy.

Research Experience

PhD Researcher, Computer Networking Group

HKUST, Department of Computer Science and Engineering

2023–Present

Hong Kong SAR

- Developed class-aware congestion-management mechanisms for data-center networks, including CASH and R-CASH, targeting latency-sensitive and throughput-oriented flows.
- Implemented and extended OVS/Linux kernel datapath components for real-time AI-assisted congestion management, network measurements, and testbed evaluation.
- Formulating host/receiver-perspective objective functions that estimate network-core states and end-user requirements without requiring core-switch changes or in-switch learning.
- Built and analyzed synthetic/literature-grounded data-center traffic datasets for congestion-control evaluation, with ongoing work toward archival release for reproducibility.
- Investigating NUM-based and reinforcement-learning-based resource allocation for congestion control in data-center and general network settings.

MSc Researcher, SDN Security and Traffic Modeling

Assiut University, Faculty of Computers and Information

2018–2022

Assiut, Egypt

- Proposed ML-based techniques for detecting DDoS attacks against SDN control-plane and data-plane components.
- Designed SDN traffic-flow features and datasets using flow statistics, packet inter-arrival behavior, header information, switch capacity, and flow-count measurements.
- Developed analytical and simulation models for TCP and UDP flows in SDN using seven-dimensional state modeling with multiple controllers and switches.

Selected Publications

1. **Waheed G. Gadallah**, Brahim Bensaou, and Ahmed M. Abdelmoniem, “R-CASH: Receiver-assisted Class-aware AQM via in-Switch Hysteresis Control for Data Center Networks,” *IEEE International Conference on Communications (ICC)*, 2026. Accepted.
2. **W. G. Gadallah**, B. Bensaou, and A. M. Abdelmoniem, “CASH: Class-aware AQM via in-Switch Hysteresis Control for Data Center Networks,” *IEEE INFOCOM Workshops*, 2025, pp. 1–6. DOI: [10.1109/INFOCOMWKSHPS65812.2025.11152943](https://doi.org/10.1109/INFOCOMWKSHPS65812.2025.11152943).
3. **W. G. Gadallah**, H. M. Ibrahim, and N. M. Omar, “A deep learning technique to detect distributed denial of service attacks in software-defined networks,” *Computers & Security*, vol. 137, 103588, 2024. DOI: [10.1016/j.cose.2023.103588](https://doi.org/10.1016/j.cose.2023.103588).
4. **W. G. Gadallah**, H. M. Ibrahim, and N. M. Omar, “A seven-dimensional state flow traffic modelling for multi-controller Software-Defined Networks considering multiple switches,” *Computer Communications*, vol. 196, pp. 89–108, 2022. DOI: [10.1016/j.comcom.2022.09.027](https://doi.org/10.1016/j.comcom.2022.09.027).
5. **W. G. Gadallah**, N. M. Omar, and H. M. Ibrahim, “Machine Learning-based Distributed Denial of Service Attacks Detection Technique using New Features in Software-defined Networks,” *International Journal of Computer Network and Information Security*, vol. 13, no. 3, pp. 15–27, 2021. DOI: [10.5815/ijcnis.2021.03.02](https://doi.org/10.5815/ijcnis.2021.03.02).

Current Research Outputs

- Preparing journal manuscripts on AI-assisted congestion control and multi-class flow prioritization for heterogeneous data-center traffic.
- Developing a host/receiver-perspective congestion-control framework based on smart objective functions and NUM/RL-inspired resource allocation.
- Preparing the data-center traffic dataset and analysis scripts for archival release to support reproducible DCN research.

Teaching Experience

Teaching Assistant <i>HKUST, Department of Computer Science and Engineering</i>	2023–Present <i>Hong Kong SAR</i>
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- Served as a TA across three semesters for COMP 4621 (UG), COMP 5621 (RPG), and CSIT 5610 (MSc), supporting classes of approximately 80–110 students through tutorials, laboratories, grading, consultation, and course administration.

Assistant Lecturer / Demonstrator <i>Assiut University, Faculty of Computers and Information</i>	Jul. 2016–Aug. 2023 <i>Assiut, Egypt</i>
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- Gained over six years of teaching experience with undergraduate computer science and information technology students, supporting laboratory instruction, tutorials, grading, student supervision, programming assignments, and technical projects.

Technical Skills

Networking	TCP congestion control, data-center networks, AQM, SDN, traffic engineering, DDoS detection, multi-class QoS.
Systems	Linux kernel programming, Open vSwitch datapath, Linux networking, experimental testbeds, Bash scripting.
AI/ML	Supervised learning, deep learning, reinforcement learning, dataset construction, model evaluation.
Programming	Python, C/C++, Java, Bash, PHP, C#; PyTorch, TensorFlow/Keras, scikit-learn, Jupyter, Git.

Research Visit Objective

Seeking a 4–6 month research attachment with a networking/systems group working on congestion control, data-center networks, programmable networks, network optimization, or learning-based network control. A suitable visit would aim to produce joint research output through algorithmic design, OVS/Linux implementation, dataset-driven analysis, and reproducible experimental evaluation.