TIANQU KANG

Hong Kong University of Science and Technology, Kowloon, Hong Kong

tkang@connect.ust.hk ◇ LinkedIn

My research interests lie in **Communication Systems** and **Machine Learning** with a current focus on Federated Learning and Differential Privacy.

EDUCATION

Hong Kong University of Science and Technology, Hong Kong   Sept. 2023 - July 2025 (expected)
MPhil in Electronic and Computer Engineering, Supervisor: Prof. Khaled B. Letaief

- Current GPA: 4.00/4.30

Hong Kong University of Science and Technology, Hong Kong   Sept. 2019 - June 2023
BEng in Electronic Engineering & Mathematics, Advisor: Prof. Kevin CHAU

- GPA: 4.04/4.30, ranked 3/102, graduated with First Class Honors and Academic Achievement Medal

École Polytechnique Fédérale de Lausanne, Switzerland   Feb. 2022 - July 2022
One-semester exchange in the section of Mathematics

- GPA: 5.69/6.00. Participated in a research semester project named *Automatic vectorization and quantitative analysis of XIXth century maps of Paris* in Digital Humanities Laboratory (DHLAB) [Github]

PUBLICATIONS AND PREPRINTS

[1] **T. Kang**, Z. Wang, H. He, J. Zhang, S. Song and K. B. Letaief, "Federated Low-Rank Adaptation with Differential Privacy over Wireless Networks," in *Proc. IEEE Int. Mediterranean Conf. Commun. Netw. (MeditCom)*, Nice, France, 2025. [Paper]

[2] **T. Kang**, L. Liu, H. He, J. Zhang, S. Song and K. B. Letaief, "The Effect of Quantization in Federated Learning: A Rényi Differential Privacy Perspective," in *Proc. IEEE Int. Mediterranean Conf. Commun. Netw. (MeditCom)*, Madrid, Spain, 2024. [Paper]

[3] **T. Kang**, A.-D. Dinh, B. Wang, T. Du, Y. Chen, and K. Chau. "Optimization of a Real-Time Wavelet-Based Algorithm for Improving Speech Intelligibility," *arXiv:2202.02545*, Jul. 21, 2022. [Paper]

[4] K. L. Wong, J. Wei Chin, T. T. Chan, I. Odinaev, K. Suhartono, **K. Tianqu**, and R. H. Y. So, "Optimising rPPG signal extraction by exploiting facial surface orientation," In *2022 IEEE/CVF Conf. Comput. Vis. Pattern Recog. Workshops (CVPRW)*, Jun. 2022, pp. 2164–2170. [Paper]

[5] Y. Chen, **T. Kang**, J. Zheng, Y. Wan, K. Y. H. Sim, E. Chau, and K. Chau, "A real-time wavelet-based algorithm for improving speech intelligibility," in *Proc. Meet. Acoust. (POMA)*, vol. 42, no. 1, p. 060009, Dec. 2020 [Paper]

RESEARCH PROJECTS

Federated Finetuning with Differential Privacy Guarantees [1]   Apr. 2024 – Present
Research Assistant, collaborating with Prof. Khaled B. Letaief & Dr. Zixin Wang   HKUST

- Designed a privacy-preserving split federated fine-tuning framework for large-scale AI models in wireless networks, leveraging differential privacy (DP) and low-rank adaptation (LoRA)

- Addressed noise amplification challenges in cascaded LoRA architectures by updating one low-rank matrix while fixing the other as a scaled orthonormal matrix, achieving superior utility under strict privacy constraints compared to baseline methods

Effects of Quantization in Federated Learning [2]   July 2023 – Apr. 2024
Research Assistant, collaborating with Prof. Khaled B. Letaief & Dr. Lumin Liu   HKUST

- Explored the relationship between quantization and privacy in federated learning systems
- Employed Rényi Differential Privacy to derive privacy budgets for quantized Gaussian mechanisms
- Demonstrated that quantization mitigates privacy leakage through Membership Inference Attack, validating the theoretical insights

Edge AI for 6G Wireless Communications   Aug. 2022 – May 2023
Final Year Thesis, supervised by Prof. Khaled B. Letaief & Dr. Lumin Liu   HKUST

- Conducted a comprehensive survey on edge learning, edge inference, and optimization algorithms for network resource allocation in future wireless networks

Semester Projects of DHLAB   Feb. 2022 – June 2022
Supervised by Prof. Frédéric Kaplan and Mr. Rémi Petitpierre   EPFL

- Developed an algorithm to automatically align historical maps of Paris, which can perfectly align vectorized maps 50% of the time. The algorithm was reused in the context of a master thesis of EPFL in late 2022

Projects in Audio Signal Processing [3][5]   Sept. 2020 – Sept. 2022
Undergraduate Research Opportunities Program, supervised by Prof. Kevin CHAU   HKUST

- Enhanced a wavelet-based algorithm for speech processing, improving intelligibility under diverse noisy environments and simulated hearing loss conditions
- Developed an innovative method for adjusting sub-band gains of discrete-time speech signals without altering the overall energy of the signal

PROFESSIONAL EXPERIENCE

PanopticAI, startup at Hong Kong   Dec. 2021 - Feb. 2022

Research Assistant

- Investigated research that uses remote photoplethysmography (rPPG) to measure vital human signs by detecting subtle skin color changes through a camera
- Generalized the code and further tested the performance of our algorithm on different datasets [4]

TEACHING AND MENTORING

Teaching Assistant, HKUST   Spring 2024

- ELEC 1200 Signals and Systems: Delivered one tutorial and seven lab sessions to a class of 70 students

Peer Counselor Training Program, HKUST   Spring 2021

- Undertook training on mental health and helped in events organized by the Counselling Center, including *Special Educational Needs Festival* and *Be a Star Exhibition*

HONORS AND AWARDS

Postgraduate Studentship (PGS)	2023
Academic Achievement Medal (about the top 1% of the graduates)	2023
Finalist of Mr Armin And Mrs Lillian Kitchell Undergraduate Research Award	2022
HKSAR Government Scholarship Fund - Reaching Out Award	2022
University's Scholarship Scheme for Continuing Undergraduate Students (top 2% of all UG)	2021 - 2022
HKSAR Government Scholarship Fund - Talent Development Scholarship	2021
HKUST School of Engineering Dean's List	2019 - 2023