Caitao Zhan

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About Me

I am a PhD candidate in `computer science`. Before 2021, my research is in wireless networks and datacenter networks. I apply various machine learning and deep learning techniques to the computer networks field to improve performance.

In 2021, my research switched to `quantum information science`, including quantum computing, quantum communication networks, and quantum sensor networks. The transition from classical to quantum is both challenging and fun. It allows me to *think physically about computation* and to *think computationally about physics*.

Education

Aug. 2017 ~ Dec. 2022 (Expected)	Stony Brook University GPA: 3.9/4.0	Ph.D. Candidate in Computer Science. Advisor: Himanshu Gupta
Sept. 2013 ~ Jun. 2017	China University of Geosciences GPA: 92/100	B.S. in Computer Science and Technology Rank: 1/122

Intern Experience

May. 2021 ~ Aug. 2021	Software Engineering Intern @ Microsoft (Azure Identity) `C#` development: Active Directory/Light-weight Directory Service (AD/LDS) Replay Tool Automation. Design/implement AutoQuery, which stresses the AD/LDS server automatically and intelligently.
Jan. of 2017 & 2019	Software Engineering Intern @ Wuhan Voice Intelligent Technology `Python` development: natural language processing, machine learning `Java` development: Servlet/JSP; design rules for abnormal IP detection, Java Native Interface

Research Experience

Sep. 2021 ~ present	Quantum Sensor Networks. Design/implement efficient protocols for sensor detection using quantum state discrimination.
Jan. 2021 ~ present	Quantum Communication Networks. [9] Design/implement routing algorithms/protocols for quantum networks using entanglement-swapping trees.
Nov. 2019 ~ Dec. 2021	Intelligent Radio with Deep Learning. [5, 7, 8] Design/implement CNNs to solve wireless network problems: wireless localization & spectrum allocation. Reframe wireless problems to computer vision problems: image-to-image translation & object detection.
Mar. 2019 ~ Oct. 2019	Efficient Localization of Multiple Intruders in Shared Spectrum System. [3] Design/implement. Bayesian approach. Testbed(Odroid,Raspberry Pi,USRP,HackRF).
Dec 2018 ~ Sep. 2020	Datacenter Networks. [4] Multi-hop circuit switch scheduling. Greedy, approximation proof. Participate in implementation.
July 2018 ~ July 2019	Selection of Sensors for Efficient Transmitter Localization. [2, 6] Implement. Greedy, approximation proof. Bayesian approach. GPU acceleration.
Otc. 2015 ~ Sept. 2016	Optimization using Evolutionary Algorithms. [1] Design/implement. Shortest path-finding using ant colony optimization algorithms. Proposed a probability-based evolutionary algorithm solving shape formation problems.

Skills & Tools

`Python` are `C++` are my most frequently used language. I also have experience in `C#`, `Java`, `C`, and `Matlab`. For machine learning, have experience in `PyTorch`, `scikit-learn`, and `ML.NET`. For quantum, have experience in quantum network simulator `NetSquid` and quantum development SDK `Qiskit`. For GPU programming, have experience in `CUDA` and `Numba`. For software defined radio, have experience in `GNU Radio`. For database, have experience in `MySQL` and `SQLite`.

Selected Awards and Honors

China National Scholarship	2014, Chinese Ministry of Education, Top 1%
2nd Prize in Freshman ACM ICPC Cup	2014, China University of Geosciences, Top 6%
IMC 2018 Travel Grant	2018, ACM Internet Measurement Conference

Preprint

[9] M. Ghaderibaneh, **C. Zhan**, C.R. Ramakrishnan, H. Gupta, "Efficient Quantum Network Communication using Optimized Entanglement-Swapping Trees", IEEE Transactions on Quantum Engineering (TQE). In Submission. `arXiv`

[8] M. Ghaderibaneh, **C. Zhan**, H. Gupta, "DeepAlloc: CNN-Based Approach to Efficient Spectrum Allocation in Shared Spectrum Systems". Under resubmission. `arXiv`

Publication

[7] **C. Zhan**, M. Ghaderibaneh, P. Sahu, H. Gupta, "DeepMTL Pro: Deep Learning Based Multiple Transmitter Localization and Power Estimation", Elsevier Pervasive and Mobile Computing (PMC) 2022. `arXiv`.

[6] A. Bhattacharya, **C. Zhan**, A. Maji, H. Gupta, S. Das, P. Djuric, "Selection of Sensors for Efficient Transmitter Localization", IEEE/ACM Transaction of Networking (TON) 2021. `PDF`.

[5] **C. Zhan**, M. Ghaderibaneh, P. Sahu, H. Gupta, "DeepMTL: Deep Learning Based Multiple Transmitter Localization", IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks (WoWMoM) 2021. `PDF`, `Video`.

[4] H. Gupta, M. Curran, **C. Zhan**, "Near-Optimal Multihop Scheduling in General Circuit-Switched Networks", ACM International Conference on emerging Networking EXperiments and Technologies (CoNEXT) 2020. `PDF`, `Video`.

[3] **C. Zhan**, H. Gupta, A. Bhattacharya, M. Ghaderibaneh, "Efficient Localization of Multiple Intruders in Shared Spectrum System", ACM/IEEE Information Processing in Sensor Networks (IPSN) 2020. `PDF`, `Video`.

[2] A. Bhattacharya, **C. Zhan**, H. Gupta, S. Das, P. Djuric, "Selection of Sensors for Efficient Transmitter Localization", IEEE International Conference on Computer Communications (INFOCOM) 2020. `PDF`, `Video`.

[1] **C. Zhan** and C. Li, "Shape Formation in Games: a Probability-based Evolutionary Approach", 2016 International Conference on Computational Intelligence and Security. `PDF`.