Haopeng Wang

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Summary

Ph.D. in Electrical and Computer Engineering with extensive work and research project experience in AI, XR, Multimedia, and healthcare. Skilled in applying advanced machine learning and deep learning techniques to solve complex problems and drive impactful research, with multiple publications in top journals. Currently a postdoctoral researcher, enthusiastic about applying my expertise in a challenging role.

Work Experience

Postdoctoral Researcher *(MCRLab, University of Ottawa)*   **Ottawa, ON** *03/2024 - present*
- Lead AI, XR, multimedia, and healthcare research initiatives, applying AI algorithms to real-world challenges.
- Direct a team on wireless access point optimization, utilizing digital twin modeling to improve network efficiency.
- Supervise Master's and Ph.D. students, mentoring them in various research topics with AI algorithms.

Research Assistant *(MCRLab, University of Ottawa)*   **Ottawa, ON** *09/2018 - 03/2024*
- Conducted research under the supervision of **Prof. Abdulmotaleb El Saddik**, focusing on AI, XR, multimedia, and healthcare, contributing to innovative solutions and publications.
- Completed multiple projects and published peer-reviewed publications in top-tier journals.

Teaching Assistant *(University of Ottawa)*   **Ottawa, ON** *01/2020 - 12/2023*
- Assisted in delivering multiple courses, including Computer Architecture I/II, and Real-Time System Design.
- Led discussion sections and lab sessions, facilitating hands-on learning and reinforcing lecture materials.
- Graded assignments, exams, and quizzes for classes of 200 students, providing detailed and constructive feedback.

Project Experience

Retrieval-Augmented Generation based Literature Review Tool (2024.10-Present)
- Utilized LLMs (e.g., LLaMA, ChatGPT) and Langchain to build a document understanding tool for automatic literature review.
- Implemented a RAG pipeline with embedding models to optimize information retrieval for diverse research topics.
- Promote agile development and collaborative teamwork through regular progress updates.

Optimization of Wireless Access Point Placement with Digital Twin (2024.01-Present)
- Lead AI-driven optimization for wireless access point placement within a 3D digital twin environment, enhancing network coverage and efficiency by simulating real-world conditions and identifying optimal placement strategies.
- Reconstructed a 3D digital twin environment to simulate network conditions and identify optimal placement strategies.
- Engage regularly with sponsors to align project outcomes with real-world requirements, integrating feedback to improve solutions.

Interconnected XR Network Performance Measurement and Diagnostics (2021.01-2023.12)
- Developed an XR architecture tailored to meet campus network requirements, ensuring seamless integration of XR functionalities.
- Designed a multimodal spatial-temporal attention transformer for viewpoint trajectory prediction, enhancing accuracy by **4%**.
- Designed a dynamic packet scheduling strategy for XR streaming, enhancing streaming quality by **6.4%**.
- Built a multi-agent deep reinforcement learning (DRL) system for adaptive XR streaming, boosting system quality of experience (QoE) by up to **85.5%**.

Real-time Contactless Vital Signs Estimation (2020.01-2020.12)   *Github Demo*
- Designed and conducted experiments to collect participant data, ensuring reliable data for the estimation of vital signs.
- Proposed a deep learning approach for real-time rPPG-based vital signs estimation, achieving an accuracy improvement of **8.2%**.
- Integrated the deep learning algorithm into an Android app, enabling accurate, real-time estimation from short video sequences.

Deep Learning-Enabled Emotion Care System (2018.09-2020.12)   *Github Demo*
- Conducted comprehensive experiments, collecting data from diverse participant groups for in-depth analysis.
- Developed a deep learning emotion care system for autism patients using computer vision and image processing, achieving real-time recognition accuracy of **95.89%**.

Education

Doctorate in Philosophy Electrical and Computer Engineering *University of Ottawa*   *2018-2024*

Master of Electronics and Communication Engineering *Beijing Institute of Technology*   *2015-2017*
Bachelor of Information Engineering *Beijing Institute of Technology*   *2011-2015*

Selected Publications

- **Haopeng Wang**, Haiwei Dong, and Abdulmotaleb El Saddik. "Immersive Multimedia Communication: State-of-the-Art on eXtended Reality Streaming." **ACM Transactions on Multimedia Computing, Communications, and Applications** (Major Revision).

- **Haopeng Wang**, Zijian Long, Haiwei Dong, and Abdulmotaleb El Saddik. "MADRL-Based Rate Adaptation for 360° Video Streaming With Multi-Viewpoint Prediction." **IEEE Internet of Things Journal** (2024).

- **Haopeng Wang**, Haiwei Dong, and Abdulmotaleb El Saddik. "Tile-Weighted Rate-Distortion Optimized Packet Scheduling for 360° VR Video Streaming." **IEEE Intelligent Systems** (2024).

- **Haopeng Wang**, Roberto Martinez-Velazquez, Haiwei Dong, and Abdulmotaleb El Saddik. "Experimental Studies of Metaverse Streaming." **IEEE Consumer Electronics Magazine** (2024).

- **Haopeng Wang**, Yufan Zhou, and Abdulmotaleb El Saddik. "VitaSi: A real-time contactless vital signs estimation system." **Computers and Electrical Engineering** (2021).

- **Haopeng Wang**, M. Shamim Hossain, and Abdulmotaleb El Saddik. "Deep learning (DL)-enabled system for emotional big data." **IEEE Access** (2021).

Skills

- **Key Skills:** Machine Learning, Deep Learning, Reinforcement Learning, Transformer, Large Language Model, Data Science, Computer Vision, Signal Processing, Vital Signs (ECG/EEG, PPG), Computer Network

- **Programming Languages:** Python, Assembly Language, SQL, C

- **Machine Learning Frameworks:** PyTorch, Tensorflow, Keras, Scikit-learn, LangChain, Huggingface

- **Tools:** Pycharm, Conda, Git, MATLAB, Google Cloud Platform, Wireshark, NS3, VS Code

Academic Awards & Activities

- Won the Admission Scholarship of University of Ottawa

- Won the Academic Scholarship of Beijing Institute of Technology

- Volunteer of ACM Multimedia Conference 2023   11/2023

- Volunteer of ACM International Conference on Multimedia Retrieval 2019   06/2019