

Wenyi ZHANG

(1) 949 594-6417 | wenyiz14@uci.edu

(2) <https://wenyizhang.w3spaces.com/>

EDUCATION

The Chinese University of Hong Kong, Shenzhen (CUHK-SZ)

Sep 2019 - June 2023 (Expected)

B.Eng. in Electronic Information Engineering (Computer Engineering Stream), cGPA: 3.548/4.0

Courses: Calculus, Linear Algebra (MATLAB), Probability and Statistics, Programming Methodology (Python), Programming Paradigms (C++), Data Structures (Java), Computer Architecture (C++), Fundamentals of Artificial Intelligence (TensorFlow), Microprocessors and Computer Systems, Database System (MySQL)

Awards: Bowen Scholarship 2019-2022; Inspirational Scholarship 2019-2022; Undergraduate Research Award 2021, 2022; Dean's List 2019-20, 2021-22; Shaw College Spirits Award 2021, 2022

The University of California, Irvine, 3+2 Engineering Program

Sep 2022 - June 2023 (Expected)

Visiting student in Computer Engineering, cGPA: 4.0/4.0

Courses: Machine learning, Individual Study, Advanced Algorithm Design, Computer Network Science, Mathematics for Engineering, Advanced Computer Security, Machine Vision.

RESEARCH

Center for Machine Learning and Intelligent Systems, UC Irvine | Supervisor: Dr. Sangeetha Jyothi

Aug 2022 - Present

➤ Topology design and routing of satellite networks

- Surveyed and summarized the literature on routing and topology design of satellite network system, and built the environment and satellite network simulators, Hypatia and Starperf
- Measured the performance of the shortest path based on the Dijkstra's algorithm using static routing tables for the topological structure of satellite networks with the +Grid strategy (a mesh-like connectivity mechanism), as well as the round-trip time (RTT) and throughput of dynamic satellite networks on the simulators
- **Result:** Wenyi Zhang, Zihan Xu, Sangeetha Abdu Jyothi. *An In-Depth Investigation of LEO Satellite Topology Design Parameters*, submitted to ACM Internet Measurement Conference (IMC) 2023

Intelligent Networking and Multimedia Lab, CUHK-SZ | Paid RA, Supervisor: Dr. Fangxin Wang

➤ Multi-modal federated learning

Jun 2022 - Oct 2022

- Designed HA-Fedformer, a novel transformer-based model that empowers unimodal training with only a unimodal dataset at the client and multimodal testing by aggregating multiple clients' knowledge for better accuracy
- Experiments on popular sentiment analysis benchmarks, CMU-MOSI and CMU-MOSEI, demonstrated that HA-Fedformer significantly outperforms SOTA multimodal models under the UTMP federated learning frameworks, with 15%-20% improvement on most attributes
- **Result:** Rongyu Zhang, Xiaowei Chi, Guiliang Liu, Wenyi Zhang, and Fangxin Wang. *Unimodal Training-Multimodal Prediction: Cross-modal Federated Learning with Hierarchical Aggregation*, submitted to IEEE Transactions on Neural Networks and Learning Systems (TNNLS)

➤ Volumetric video (VV) streaming – client-side cache-assisted content transmission

May 2022 - Sep 2022

- Proposed CaV3, an integrated cache-assisted viewport adaptive VV streaming framework, which employs a Long-short term Sequential prediction model (LSTSP) to achieve accurate short-, mid-, and long-term viewing pattern prediction with a multi-modal fusion model by capturing the viewer's behavior inertia, current attention, and subjective intention
- Included a contextual MAB-based caching adaptation algorithm (CCA) to fully utilize the viewing pattern and solve the optimal caching problem with a proved upper bound regret
- Collected a comprehensive dataset with sufficient practical unbounded 360° scenes, conducted extensive evaluation of CaV3 on the dataset, results confirming the superiority of CaV3, which outperformed SOTA algorithm by 15.6%-43% in viewport prediction and 13%-40% in system utility
- **Publication:** Junhua Liu, Boxiang Zhu, Fangxin Wang, Yili Jin, Wenyi Zhang, Zihan Xu, Shuguang Cui. *CaV3: Cache-assisted Viewport Adaptive Volumetric Video Streaming*, accepted by IEEE VR 2023: the 30th IEEE Conference on Virtual Reality and 3D User Interfaces

➤ Volumetric video (VV) streaming – viewport prediction and transmission

Dec 2021 - Jun 2022

- Designed an integrated framework, VolStream, which jointly achieves accurate viewport prediction with 6 DoF flexibility and fine-grained spatial feature-aware bitrate adaptive streaming to maximize the user quality of experience (QoE) in VVs, outperforming the SOTA algorithm by 18%-43% in viewport prediction and 13%-40% in user QoE
- **Result:** Wenyi Zhang, Zihan Xu, Yili Jin, Junhua Liu, and Fangxin Wang. *Viewport-Aware Adaptive Volumetric Video Streaming*, submitted to IEEE Internet of Things Journal

➤ User-aware viewpoint prediction of 360° video streaming

Aug 2021 - Dec 2021

- Investigated the impact of gaze behaviors in 360° videos, proposed a new multi-modal Transformer-based approach to achieve fine-grained and accurate field of view (FoV) prediction
- Considering the lack of eye gazing in existing datasets, collected a dataset of the head and gaze behaviors of users watching a 360° video, which outperforms existing datasets with rich dimensions, large scale, strong diversity, and high sampling frequency
- Designed a new FoV prediction approach using a cross-modal attention mechanism, which effectively extracts historical

FoV trajectory, video content, and gaze information for joint analysis; conducted extensive experiments, which showed 26.24% improved performance on average compared to SOTA algorithms

- **Result:** Yilin Jin, **Wenyi Zhang**, Zihan Xu, Junhua Liu, Fangxin Wang, and Shuguang Cui. *Exploring Gaze Behavior in 360-Degree Videos: Dataset and Multimodal Attentive FoV Prediction*, submitted to IEEE Transactions on Mobile Computing

➤ Video streaming distribution optimization in edge computing Dec 2020 - Aug 2021

- Proposed Proffler, an integrated framework that enables effective stream caching at the network edge server
- Examined the underlying correlations in viewing patterns across different regions and proposed a novel transformer-based algorithm, Chili-TF, that achieves accurate viewer request prediction, even for regions with insufficient data
- Designed a scalable algorithm, U2VR, that achieves near-optimal video stream allocation as well as viewer scheduling, and conducted extensive experiments based on real data for validation
- **Result:** **Wenyi Zhang**, Zihan Xu, and Fangxin Wang. *Proffler: Towards Collaborative and Scalable Edge-Assisted Crowdsourced Livecast*, submitted to IEEE Internet of Things Journal

COURSEWORK

CSC3050 Computer Architecture | *Individual Project* Apr 2021 - May 2021

- Implemented MIPS commands with C++ to access memory
- Constructed a 5-stage pipelined MIPS microprocessor capable of solving structural, control, and data hazards

EXTRACURRICULAR TECHNICAL ACTIVITIES

China College Students' IC Innovation and Entrepreneurship Competition | *Team Leader* Jan 2021 - Oct 2021

- Built a handwritten digit (from 0 to 9) recognition device on a Nexys Video Artix-7 FPGA board (required by the competition), implemented the RISC-V instruction set architecture, and constructed the Linux environment
- Trained and tested a LeNet-5 model with Python and C++, and deployed the model with Vivado HLS to construct the handwritten digit recognition IP core, achieving recognition accuracy of 79.55%
- Technically responsible for hardware design and soft IP core building with Vivado, preparation of training data, image loading, and data transmission between IP cores; contacted OmniVision Technologies, the manufacturer of OV5640, to obtain detailed specifications of the image sensor related to Video Graphics Array (VGA, an image transmission standard) and the Advanced eXtensible Interface (AXI) protocol, and improved the recognition speed by 80 times
- Organized topic selection and idea development, planned project scoping and timeline, performed task division, and monitored team progress and troubleshooting
- **Award:** 3rd Prize in the Southern China Finals

Shenzhen Institute of Artificial Intelligence and Robotics for Society (AIRS) | *Teaching Assistant* Jun 2021 - Sep 2021

- Assisted with the institute's summer camp about unmanned boat
- Calibrated the inertia measurement unit (IMU), designed an adaptive PID controller of the steering gear with Arduino Nano and Uno boards
- Completed automatic obstacle avoidance with Motion Capture equipment

Summer Mini Camp on Federated Learning, CUHK-SZ | *Participant* Jun 2020 - Sep 2020

- Conducted background research and compiled learning materials (e.g., of TensorFlow) for the program
- Designed, implemented, and tested a federated learning framework on Raspberry Pi
- **Result:** Ranked 1st in the study group and 3rd in the school

LEADERSHIP

Billiards Club, CUHK-SZ | *Founder, President* Nov 2019 - Present

- Recruited 70+ members in the first year within the school and another 100+ across schools in 2020 and 2021
- Hosted monthly training sessions for billiard sports aficionados, prepared teaching materials like technical documents and recorded matches, and organized team outings
- Collaborated with administrative offices and other student organizations to host on-campus activities like the 2020 and 2021 Freshman Cup, 2021 CUHK-SZ Sports Festival (billiard games)

SKILLS AND PROFICIENCIES

Languages	English (<i>Proficient</i> , TOEFL 109, GRE V166+Q170+AW 4.0), Mandarin (<i>Native-speaker</i>)
Software	Python, C++, R, SQL; Anaconda, MATLAB, Vivado, Multisim, Arduino, Photoshop, MS Office
Interests	Billiards, Basketball, Violin