

Xiangyu Ren

Ph.D. candidate • Department of Electrical and Computer Engineering • Research assistant at CNLab
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EDUCATION

University of Victoria (UVIC)

Victoria, BC, Canada

Ph.D. in Electrical and Computer Engineering

Sept. '19 - Present

Supervisor: Prof. Lin Cai

Relevant courses: (GPA: 8.75/9.0) Design and Analysis of Computer Networks, Advance Wireless Communications, Advanced Optimization, Information Theory, Broadband and Wireless Networks.

University of Electronic Science and Technology of China (UESTC)

Chengdu, Sichuan, China

Bachelor of Engineering in Automation Engineering

Sept. '15 - June '19

Supervisor: Prof. Kai Chen

Relevant courses: (GPA: 3.85/4.0) Automatic Control Theory, Modern Control Theory and Computer Control, Motion Control System, Intelligent Science and Technology.

RESEARCH FOCUS

Network protocol design and performance study, Network optimization, Wireless resource management, Machine learning and deep learning application in networks.

RESEARCH EXPERIENCE

Advanced Network Protocol Architecture for 6G UW-HUAWEI FUTURE COMMUNICATION INNOVATION LAB

Self-Evolving and Transformative (SET) Protocol Architecture for 6G

Sept. '20 – present

- Evaluated potential 6G applications and provided insights on future network researches initiatives.
- Collaborated with team members to conduct literature review and technical report writing.
- Co-designed a novel network protocol architecture to support emerging 6G applications and enhance network performance.

Delay-guaranteed Scheduling and Routing Protocol

Sept. '20 – present

- Proposed a novel network routing protocol for future networks using cross-layer information to deliver guaranteed end-to-end delay performance.
- Developed an advanced scheduling algorithm to optimize network utility and achieve load balance.
- Implemented the proposed protocol using the Network-Simulator-3 (NS-3) in C++ and evaluated its quality-of-service (QoS) performance through extensive simulations.

Star-cast: Adaptive Communication Mode Selection and Route Planning

Sept. '20 – present

- Researched on advanced solutions for future wireless applications with stringent QoS requirements.
- Designed a configurable network protocol with communication mode and routing adaptations and verified it using a vehicular network scenario.
- Proposed an adaptive routing algorithm guaranteeing QoS in delay and reliability.
- Implemented the proposed algorithm on MATLAB and evaluated its QoS performances using vehicle traces generated by the Simulation of Urban MObility (SUMO) platform.

Dynamic Spectrum Allocation

COMMUNICATIONS RESEARCH CENTRE CANADA

Application of Artificial Intelligence in Dynamic Spectrum Allocation

Sept. '19 – Mar. '20

- Collaborated on analyzing spectrum load data and drafting technical report.
- Developed a spectrum load spatial estimation model using the Bayesian estimation method.
- Co-designed a spectrum spatio-temporal prediction framework based on CNN.
- Implemented and evaluated a prediction model using Keras and simulated spectrum usage data.

Battery Health management

UESTC

State-of-health (SoH) Estimation of Lithium-ion batteries

Sept. '18 – May '19

- Designed battery charge and discharge experiments to collect real-time battery data using the battery management system (BMS).
 - Developed an SoH estimation algorithm for Lithium-ion batteries using Gaussian process regression and transfer learning.
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PUBLICATIONS

Downlink Scheduler for Delay Guaranteed Services Using Deep Reinforcement Learning

Jiequ Ji, **Xiangyu Ren**, Lin Cai, Kun Zhu.

Accepted by IEEE Transactions on Mobile Computing, May 2023.

Delay Laxity-Based Scheduling with Double-Deep Q-Learning for Time-Critical Applications

Xiangyu Ren, Jiequ Ji, Lin Cai. 2022 *IEEE 30th International Conference on Network Protocols (ICNP), New IP and Beyond (NIB) Workshop, Lexington, KY, USA, October 2022.*

Self-Evolving and Transformative (SET) Protocol Architecture for 6G

Lin Cai, Jianping Pan, Wenjun Yang, **Xiangyu Ren**, Xuemin Shen. *IEEE Wireless Communications*, doi: 10.1109/MWC.003.2200022.

Spatio-temporal Spectrum Load Prediction using Convolutional Neural Network and ResNet

Xiangyu Ren, Hamed Mosavat-Jahromi, Lin Cai, David Kidston. *IEEE Transactions on Cognitive Communications and Networking*, vol. 8, no. 2, pp. 502-513, June 2022.

Spatio-temporal Spectrum Load Prediction using Convolutional Neural Network and Bayesian Estimation

Xiangyu Ren, Hamed Mosavat-Jahromi, Lin Cai, David Kidston. *GLOBECOM 2020 - 2020 IEEE Global Communications Conference, Taipei, Taiwan, December 2020.*

Fully capsnet for semantic segmentation

Su Li, **Xiangyu Ren**, Lu Yang. *Pattern Recognition and Computer Vision: First Chinese Conference, Guangzhou, China, November 2018.*

PAPERS IN PROGRESS

QoS-guaranteed Clustering and Routing Protocol for Extended Sensor Sharing in Vehicular Networks

Xiangyu Ren, Lin Cai, Pooria Seyed Eftetahi.

Submitted to IEEE GLOBECOM 2023-2024, May 2023.

Congestion-Aware Delay-Guaranteed Scheduling and Routing with Renewal Optimization

Xiangyu Ren, Lin Cai, Pu Yang, Jiequ Ji.

Submitted to Computer Networks, May 2023.

PROFESSIONAL SERVICES

Paper Reviewer

UVIC

IEEE community

Sept. 19 – Present

- Journal papers: IEEE Journal on Selected Areas in Communications, IEEE Transaction on Networking, IEEE Transactions on Mobile Computing, IEEE Transactions on Communications, Journal of Communication and Network, IEEE Transactions on Vehicular Technology, IEEE Internet of Things Journal, IEEE Network Magazine, IEEE Wireless Communications Letters, IEEE Transactions on Cognitive Communications and Networking.
- Conference papers: IEEE INFOCOM (2022, 2023), ACM MMSys (2023), IEEE/CIC ICC (2022), IEEE VTC (2021).

Mentorship

UVIC

Mitacs Globalink program

Sept. 21 – Present

- Instructed undergraduate student's research on vehicular communications modeling.
- Instructed undergraduate student's research on UAV-assisted vehicular network performance improvement and UAV deployment algorithm design.

Teaching assistant

UVIC

Department of Electrical and Computer Engineering

Sept. 19 – Present

- Courses: Communication Networks, Introduction to Computer Architecture, Continuous-Time Signals and Systems, Control Theory and Systems, Design Projects.
- Delivered lab lectures and guided student on their assignments and experiments.

Undergraduate Student Advisor

UESTC

Department of Automation Engineering

Sept. 18 – May 19

- Instructed undergraduate freshmen on study and career planning.
- Assisted academic advisor with document collection and drafting using Microsoft Office.
- Organized student events and activities.

TECHNICAL SKILLS

Programming languages C/C++, Python.

Software & Tools: MATLAB, SUMO, NS-3, Wireshark, LaTeX, MS Office.

Github: <https://github.com/jamesrenxiangyu>

HONORS AND AWARDS

Best Reviewer award, F.U.N. Workshop 2023-Spring poster competition, UVIC.	2023
2022 Albert Hung Chao Hong Award, Department of Electrical and Computer Engineering, UVIC.	2022
IEEE 2022 ICNP travel grant, 2022 ICNP Organizing Committee.	2022
University of Victoria Fellowship, Department of Electrical and Computer Engineering, UVIC.	2021
Research Assistant Fellowship, Department of Electrical and Computer Engineering, UVIC.	2019
Outstanding Graduate Student, Department of Automation Engineering, UESTC.	2019
First Prize Ren Min Award, Department of Automation Engineering, UESTC.	2018
Honorable Mention, International Award, Mathematical Contest in Modeling (MCM).	2018
First Prize in Sichuan Province, China Undergraduate Mathematical Contest in Modeling.	2017
