

ZHIDA LI

Coquitlam, British Columbia, Canada

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EDUCATION

Ph.D. Engineering Science

Sept. 2015–Apr. 2022

Simon Fraser University, Canada

- Dissertation: Machine Learning for Classifying Anomalies and Intrusions in Communication Networks

M.Eng.Sc. (thesis-based) Electrical and Electronic Engineering

Feb. 2013–Sept. 2015

University College Cork, Ireland

M.Eng.Sc. (course-based) Microelectronic Engineering

Sept. 2011–Feb. 2013

University College Cork, Ireland

B.E. (Hons.) Electrical and Electronic Engineering

Sept. 2009–Sept. 2011

University College Cork, Ireland

B.E. Microelectronics

Sept. 2007–Sept. 2009

Guilin University of Electronic Technology, China

TECHNICAL SKILLS

Programming Languages: Python, MATLAB, MySQL, JavaScript, Octave, C#, LaTeX

Machine Learning Libraries and Data Science Tools: PyTorch, Keras, Scikit-learn, NumPy, SciPy, Pandas, Matplotlib, Google Colab, Weka

Web Application Development: Flask, AWS Elastic Beanstalk

Certification: Cisco Certified Network Associate (CCNA)

RESEARCH AND WORK EXPERIENCE

Assistant Professor

Jan. 2023–Present

Department of Computer Science, New York Institute of Technology

Vancouver, BC

- Teaching for Master of Science in Cybersecurity (M.S.-Cybersecurity) program
- Researching network intrusion detection systems (NIDS), brain-computer interfaces, and blockchain

Postdoctoral Fellow

June 2022–Dec. 2022

Faculty of Applied Sciences, Simon Fraser University

Burnaby, BC

- Led the project for developing new machine learning (ML) algorithms based on echo state networks
- Explored applications of graph neural networks based on network topologies

Research Assistant (Advisor: Prof. Ljiljana Trajković)

Sept. 2015–Apr. 2022

Faculty of Applied Sciences, Simon Fraser University

Burnaby, BC

- **Applications of Machine Learning Techniques for Classifying Network Anomalies**
 - Processed the raw network data: BGP data from RIPE and Route Views
 - Analyzed and implemented various ML algorithms as well as employing feature selection
 - Performed experiments (cross-validation and testing) using a supercomputer managed by Compute Canada

- **Development of Novel Machine Learning Algorithms: VFBS, VCFBS**
 - Developed two fast BS-based algorithms: variable features BS algorithms without and with cascades
 - Developed generalized models based on various subsets of input data based on selected features and expanded the network structure
- **Development of Tool for Detecting Network Anomalies: BGPGuard**
 - The tool consists of multiple modules: real-time data retrieval, feature extraction, label refinement, data partition, data processing, ML algorithms, parameter selection, ML models, and classification
 - Integrated various stages of the anomaly detection process
 - Detected BG anomalies based on routing records collected worldwide from major Internet exchange points
 - Facilitated creating new machine learning models based on historical BG anomalous events

Data Analyst | Part-time

EVO-IN-MOTION Technology

May 2021–Sept. 2021

Richmond, BC

- Analyzed data from circuit simulations and experiments

Research Assistant (Advisor: Prof. Peter Kennedy)

Tyndall National Institute

Oct. 2011–Jan. 2015

Cork, Ireland

- Designed nonlinearity-tolerant requantizer architectures for fractional- N frequency synthesizers

Electrical Engineer | Internship

Dell EMC

May 2010–Aug. 2010

Cork, Ireland

- Supplied details of failure return to the suppliers and involved in customer service

TEACHING EXPERIENCE

Teaching Assistant

Faculty of Applied Sciences, Simon Fraser University

Sept. 2015–Apr. 2022

Burnaby, BC

- **ENSC 427/894 Communication Networks**, 6 terms (undergraduate and graduate levels)
 - Delivered lectures as needed; Designed and graded assignments and exams; Guided students with their projects using ns-3 and Riverbed Modeler
- **ENSC 220 Electric Circuits I**, 4 terms (undergraduate level)
 - Held lab sessions with both practical exercises and LTspice simulations: Kirchhoff's voltage and current laws, operational amplifiers, and RLC circuits; Graded assignments and exams
- **ENSC 120 Introduction to Electronics Laboratory Instruments Operation and Measurement Techniques**, 2 terms (undergraduate level)
 - Held lab sessions for operating electronics laboratory instrumentation such as linear power supply, digital multi-meter, function generator, and oscilloscope; Graded exams
- **ENSC 252 Fundamentals of Digital Logic and Design**, 2 terms (undergraduate level)
 - Held lab sessions for designing digital systems using VHDL on a FPGA; Proctored exams
- **ENSC 180 Introduction to Engineering Analysis**, 1 term (undergraduate level)
 - Helped design a lab assignment using MATLAB: Red Bull Stratos Jump; Proctored exams

Teaching Assistant

IEEE SMC Society Summer School

June 12, 2021

Tokyo, Japan (virtual)

- TA for Lecture 4: Data mining and machine learning for detecting traffic anomalies and intrusions
- Designed and presented a demo of anomaly detection (Slammer worm) with Python on Colab

AWARDS

- IEEE Outstanding Leadership Award *Dec. 2022*
 - Publicity Chair of the 2022 IEEE International Conference on Digital Twin as a part of the 2022 IEEE Smart World Congress
- Graduate Fellowship Award, SFU *Fall 2017, Fall 2019*
- Faculty of Applied Sciences Graduate Fellowship Award, SFU *Summer 2016, Fall 2016*
- Travel and Minor Research Award, SFU *Summer 2016*

EXTERNAL SERVICE AND EVIDENCE OF IMPACT

Secretary *Feb. 2022–Present*
Membership Development Committee, IEEE Canada

Treasurer *Jan. 2018–Present*
IEEE Circuits and Systems Society joint Chapter of the Vancouver/Victoria Sections

Jury Member *Apr. 2023*
Virtual [BR4IN.IO](#) Hackathon, Spring School 2023

Chair/ Secretary *Sept. 2020–Oct. 2021/ Sept. 2019–Sept. 2020*
IEEE SFU Student Branch

Technical Program Committee Membership

- IEEE International Conference on High Performance Computing and Communications: Member ([HPCC-2022](#)); Member and Session Chair ([HPCC-2020](#))
- IEEE International Conference on Cyber, Physical and Social Computing: Member and Publicity Chair ([CPSCom-2022](#)); Member and Session Chair ([CPSCom-2020](#))
- International Conference on E-Business and Internet: Member ([ICEBI 2022](#))
- International Conference on Intelligent Sensing and Industrial Automation ([ISIA 2023](#))

Reviewer

- IEEE Journal on Selected Areas in Communications (J-SAC) (2022); Computers & Security (2022); IEEE Transactions on Neural Networks and Learning Systems (2021, 2022); Neural Networks (2020–2022); IEEE International Symposium on Circuits and Systems (2022); IEEE International Conference on Systems, Man, and Cybernetics (2020–2022); Concurrency and Computation: Practice and Experience (2021); IEEE Transactions on Emerging Topics in Computational Intelligence (2019, 2021); IEEE Access (2019, 2020)

PUBLICATIONS [[Google Scholar](#)]

Book Chapters:

1. Q. Ding, Z. Li, S. Haeri, and Lj. Trajković, “[Application of machine learning techniques to detecting anomalies in communication networks: datasets and feature selection algorithms](#),” in *Cyber Threat Intelligence*, A. Dehghantanha, M. Conti, T. Dargahi, Eds., Berlin: Springer, pp. 47–70, 2018.
2. Z. Li, Q. Ding, S. Haeri, and Lj. Trajković, “[Application of machine learning techniques to detecting anomalies in communication networks: classification algorithms](#),” in *Cyber Threat Intelligence*, A. Dehghantanha, M. Conti, T. Dargahi, Eds., Berlin: Springer, pp. 71–92, 2018.

Refereed Journals:

3. Z. Li, A. L. G. Rios, and Lj. Trajković, “[Machine learning for detecting the WestRock ransomware attack using BGP routing records](#),” *IEEE Commun. Mag.* vol. 61, no. 3, pp. 20–26, Mar. 2023. (IF: 9.03)

4. **Z. Li**, A. L. G. Rios, and Lj. Trajković, “[Machine learning for detecting anomalies and intrusions in communication networks](#),” *IEEE Journal on Selected Areas in Communications (JSAC)*, vol. 39, no. 7, pp. 2254–2264, July 2021. (IF: 13.081)
5. M. P. Kennedy, **Z. Li**, and Z. Huang, “[Programmable analog frequency divider based on p-switching](#),” *Nonlinear Theory and Its Applications, IEICE*, vol. 4, no. 4, pp. 389–399, Oct. 2013.

Publications in Refereed Conference Proceedings:

6. T. Sharma, K. Patni, **Z. Li**, and Lj. Trajković, “Deep Echo State Networks for Detecting Internet Worm and Ransomware Attacks,” in *Proc. IEEE Int. Symp. Circuits Syst.*, to be published.
7. **Z. Li**, A. L. G. Rios, and Lj. Trajković, “[Classifying denial of service attacks using fast machine learning algorithms](#),” in *Proc. IEEE Int. Conf. Syst., Man, Cybern.*, Melbourne, Australia, Oct. 2021, pp. 1221–1226.
8. **Z. Li**, A. L. G. Rios, and Lj. Trajković, “[Detecting Internet worms, ransomware, and blackouts using recurrent neural networks](#),” in *Proc. IEEE Int. Conf. Syst., Man, Cybern.*, Toronto, Canada, Oct. 2020, pp. 2165–2172.
9. A. L. G. Rios, **Z. Li**, K. Bekshentyeva, and Lj. Trajković, “[Detection of denial of service attacks in communication networks](#),” in *Proc. IEEE Int. Symp. Circuits Syst.*, Sevilla, Spain, Oct. 2020.
10. **Z. Li**, A. L. G. Rios, G. Xu, and Lj. Trajković, “[Machine learning techniques for classifying network anomalies and intrusions](#),” in *Proc. IEEE Int. Symp. Circuits Syst.*, Sapporo, Japan, May 2019, pp. 1–5.
11. A. L. G. Rios, **Z. Li**, G. Xu, A. Diaz Alonso, and Lj. Trajković, “[Detecting network anomalies and intrusions in communication networks](#),” in *Proc. 23rd IEEE Int. Conf. Intell. Eng. Syst.*, Hungary, Apr. 2019, pp. 29–34.
12. **Z. Li**, P. Batta, and Lj. Trajković, “[Comparison of machine learning algorithms for detection of network intrusions](#),” in *Proc. IEEE Int. Conf. Syst., Man, Cybern.*, Miyazaki, Japan, Oct. 2018, pp. 4248–4253.
13. P. Batta, M. Singh, **Z. Li**, Q. Ding, and Lj. Trajković, “[Evaluation of support vector machine kernels for detecting network anomalies](#),” in *Proc. IEEE Int. Symp. Circuits Syst.*, Florence, Italy, May 2018, pp. 1–4.
14. H. B. Yedder, Q. Ding, U. Zakia, **Z. Li**, S. Haeri, and Lj. Trajković, “[Comparison of virtualization algorithms and topologies for data center networks](#),” in *Proc. 26th Int. Conf. Comput. Commun. Netw., 2nd Workshop Netw. Security. Analytics Autom.*, Vancouver, Canada, Aug. 2017.
15. Q. Ding, **Z. Li**, P. Batta, and Lj. Trajković, “[Detecting BGP anomalies using machine learning techniques](#),” in *Proc. IEEE Int. Conf. Syst., Man, Cybern.*, Budapest, Hungary, Oct. 2016, pp. 3352–3355.
16. S. Haeri, Q. Ding, **Z. Li**, and Lj. Trajković, “[Global resource capacity algorithm with path splitting for virtual network embedding](#),” in *Proc. IEEE Int. Symp. Circuits Syst.*, Montreal, Canada, May 2016, pp. 666–669.
17. M. P. Kennedy, H. Mo, **Z. Li**, G. Hu, P. Scognamiglio, E. Napoli, “[The noise and spur delusion in fractional-N frequency synthesizer design](#),” in *Proc. IEEE Int. Symp. Circuits Syst.*, Lisbon, Portugal, May 2015.
18. **Z. Li**, H. Mo, and M. P. Kennedy, “[Comparative spur performance of a fractional-N frequency synthesizer with a nested MASH-SQ3 divider controller in the presence of memoryless piecewise-linear and polynomial nonlinearities](#),” in *Proc. 25th IET Irish Signals Syst. Conf.*, Limerick, Ireland, June 2014, pp. 374–379.
19. M. P. Kennedy, **Z. Li**, and H. Mo, “How to eliminate integer boundary spurs in fractional-N frequency synthesizers,” in *Proc. 17th RIA/URSI Research Colloquium Commun. Radio Sci. into the 21st Century*, Dublin, Ireland, May 2014, pp. 1–4.
20. **Z. Li** and M.P. Kennedy, “[The switched injection-locked oscillator \(SILO\) concept](#),” in *Proc. Int. Symp. Nonlinear Theory and Its Applications (NOLTA)*, Palma, Mallorca, October 2012, pp. 868–871.

TALKS

UNM ME Seminar Series 2022:

- Zhida Li, “Machine Learning for Classifying Anomalies and Intrusions in Communication Networks,” Mechanical Engineering Seminar Series ([UNM ME Seminar Series](#)), University of New Mexico, Albuquerque, USA, Dec. 2, 2022 (virtual).