Baiting Luo

baiting.luo@vanderbilt.edu · Phone: 5182657739 · Google Scholar Profile

EDUCATION

Vanderbilt University, Tennessee 08/2021 – 2026(expected)
Ph.D. in Computer Science
Advisor: Prof. Abhishek Dubey

Northwestern University, Illinois 09/2019 – 06/2021
M.S. in Computer Engineering
Thesis: *Sybil Attack Detection in VANET (**Northwestern Best Thesis Award**)*;
Advisor: Prof. Qi Zhu

Rensselaer Polytechnic Institute (RPI), New York 09/2015 – 05/2019
B.S. in Computer Engineering | Dual Degree: Computer Science

WORK EXPERIENCES

Institute for Software Integrated Systems, Vanderbilt University 08/2021 – Present

- PhD student and Graduate Research Assistant, Computer Science Department
- Research topics: Decision Making under Uncertainty, Planning, Machine Learning, Reinforcement Learning, Autonomous Cyber-Physical Systems
- Advisor: Prof. Abhishek Dubey
- Key Projects:
  - Decision Making with High Dimensional Action Space:
    - Developed Latent Macro Action Planner for offline reinforcement learning, enabling efficient decision-making in high-dimensional, stochastic environments by learning temporally extended actions.
  - Decision Making in Non-Stationary Environment:
    - Proposed Adaptive Monte Carlo Tree Search for safe exploration and online adaptation to changing dynamics in model based reinforcement learning tasks **[paper][code]**
    - Created NS-Gym toolkit for standardized evaluation of online decision-making algorithms in dynamically changing environments **[code]**
  - Runtime Safety Assurance of Autonomous Vehicles:
    - Proposed Dynamic Simplex framework improving the performance without compromising safety in autonomous systems through planning with multiple generative models in dynamic environments.**[paper][code]**
    - Developed advanced sampling techniques for high-risk scenario generation in AV testing.**[paper] [code]**
    - Created an automated testing framework for adversarial conditions in AV simulations.**[paper] [code]**
  - Multi-channel Psych:
    - Developed automated validation and testing systems for machine learning pipelines used in depression diagnosis and treatment prediction, including a common representation framework, integrated workflows, and a performance dashboard prototype for evaluating multi-modal biomarker models.

Design Automation of Intelligent Systems Lab, Northwestern University 03/2020 – 07/2021

- Research Assistant, Computer Engineering Department
- Advisor: Prof. Qi Zhu
- Key Projects:
  - Securing Connected and Autonomous Vehicles:
    - Developed hybrid GCN-RNN model to detect Sybil attacks in connected vehicle networks. **[paper]**
    - Created dual cyber-physical blockchain framework for efficient security in large-scale vehicular networks. [**paper**]

PUBLICATIONS (* indicates equal contribution)

2024 **Baiting Luo**, Ava Pettet, Aron Laszka, Abhishek Dubey, Ayan Mukhopadhyay "Scalable Decision-Making in Stochastic Environments through Learned Temporal Abstraction", (Under Review).

2024 Nathaniel S Keplinger, **Baiting Luo**, Iliyas Bektas, Yunuo Zhang, Kyle Hollins Wray, Aron Laszka, Abhishek Dubey, Ayan Mukhopadhyay, "NS-Gym: Open-Source Simulation Environments and Benchmarks for Non-Stationary Markov Decision Processes" (Under Review) [**code**]

2024 Yunuo Zhang, **Baiting Luo**, Ayan Mukhopadhyay, Daniel Stojcsics, Daniel Elenius, Anirban Roy, Susmit Jha, Miklos Maroti, Xenofon Koutsoukos, Gabor Karsai and Abhishek Dubey, "Shrinking POMCP: A Framework for Real-Time UAV Search and Rescue", IEEE International Conference on Assured Autonomy (ICAA 2024).

2024 **Baiting Luo**, Yunuo Zhang, Abhishek Dubey, Ayan Mukhopadhyay, "Act as You Learn: Adaptive Decision-Making in Non-Stationary Markov Decision Processes", 23rd International Conference on Autonomous Agents and MultiAgent Systems (AAMAS 2024). **(Acceptance rate: 25%) (Vanderbilt C.F. Chen Best Paper Runner-Up Award) [code]**

2024 Ava Pettet, Yunuo Zhang, **Baiting Luo**, Kyle Wray, Hendrik Baier, Aron Laszka, Abhishek Dubey, and Ayan Mukhopadhyay, "Decision Making in Non-Stationary Environments with Policy-Augmented Search", Extended Abstract in the 23rd International Conference on Autonomous Agents and MultiAgent Systems (AAMAS 2024). [**code**]

2024 **Baiting Luo**, "Adaptive Decision-Making in Non-Stationary Markov Decision Processes", Doctoral Consortium in the 23rd International Conference on Autonomous Agents and MultiAgent Systems (AAMAS 2024).

2023 **Baiting Luo**, Shreyas Ramakrishna, Ava Pettet, Christopher Kuhn, Gabor Karsai, Ayan Mukhopadhyay, "Dynamic Simplex: Balancing Safety and Performance in Autonomous Cyber Physical Systems", 14th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS 2023). **(Acceptance rate: 25.6%) [code]**

2022 Shreyas Ramakrishna*, **Baiting Luo***, Christopher Kuhn, Gabor Karsai, Abhishek Dubey,"ANTI-CARLA: An Adversarial Testing Framework for Autonomous Vehicles in CARLA", IEEE 25th International Conference on Intelligent Transportation Systems (ITSC 2022). **[code]**

2022 Shreyas Ramakrishna, **Baiting Luo**, Yogesh Barve, Gabor Karsai, Abhishek Dubey, "Risk-Aware Scene Sampling for Dynamic Assurance of Autonomous Systems", IEEE International Conference on Assured Autonomy (ICAA 2022) **[code]**

2021 **Baiting Luo**, Xiangguo Liu, Qi Zhu, "Credibility Enhanced Temporal Graph Convolutional Network Based Sybil Attack Detection On Edge Computing Servers", accepted by 32nd IEEE Intelligent Vehicles Symposium (IV 2021).

2021 Xiangguo Liu, **Baiting Luo**, Ahmed Abdo, Nael Abu-Ghazaleh, Qi Zhu, "Securing Connected Vehicle Applications with An Efficient Dual Cyber-Physical Blockchain Framework", accepted by 32nd IEEE Intelligent Vehicles Symposium (IV 2021).

AWARDS AND HONORS

- Vanderbilt C.F. Chen Best Paper Runner-Up Award, 2024
- AAMAS student scholarship, 2024
- Vanderbilt University Graduate School Travel Grant, 2024

- Vanderbilt University Graduate School Travel Grant, 2023
- Northwestern Best MS Computer Engineering Thesis Award, 2021
- Dean's Graduate Fellowship, 2021
- Russell G. Hamilton Scholar, 2021

EXTERNAL SERVICES

Conference (Sub-) Reviewer

- IEEE International Transportation Systems Conference (ITSC)
- International Conference on Neural Information Processing (ICONIP)

Journal Reviewer

- IEEE Transactions on Intelligent Vehicles
- ACM Transactions on Computing for Healthcare

PC Member

- Artifact Evaluation Program Committee member, ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS)
- International Conference on Data Mining and Big Data (DMBD)

CORE COURSEWORK

Machine Learning | Advanced Machine Learning | Deep Learning | Advanced Deep Learning: Representation Learning | AI Programming | Reinforcement Learning | Design & Analysis of Algorithms | Data Structure | Computer Vision | Massively Parallel Programming w/ CUDA | Database Systems

SKILLS

Programming Languages: Python, LaTeX. C++, C, Java, SQL
Frameworks and Libraries: Sciki-Learn, PyTorch, TensorFlow, NumPy, Pandas