Bibek Poudel

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Skills

- **Machine Learning:** PyTorch, TensorFlow, HuggingFace, Weights & Biases, LLM Fine-tuning, Self-supervised, and Adversarial learning
- **Reinforcement Learning:** Algorithms for Real-time Control, Human-in-the-Loop, and Multi-Agent Systems
- **Simulation/Robotics:** Gymnasium, MuJoCo, IsaacLab, Sensor integration, and Motor Control
- **Programming:** C/C++ (Embedded Systems), Python (Data Science), Ruby on Rails (Web Development), Git, Docker, and Linux

Research Experience

Fluidic City Lab & Center for Transportation Research, University of Tennessee 2023 – Present
Graduate Research Assistant – Reinforcement Learning (RL) and Robotics

- Developed a Deep Reinforcement Learning framework for joint control of pedestrian and vehicle traffic across eight real-world intersections and crosswalks, reducing wait times up to 67% for pedestrians and 52% for vehicles.
- Engineered a robotic wheelchair with human-in-the-loop RL that adjusts assistance based on real-time heart rate, enabling users to maintain moderate activity for 72% longer while reducing muscle contractions by 42%.

Department of Computer Science, University of Memphis 2019 – 2023
Graduate Research Assistant – Real-time Control and Adversarial Machine Learning

- Applied sample-efficient RL on position control of a DC motor (acting on steering wheel of a golf cart), achieving control policy learning in under two minutes in simulation and 10 minutes on hardware.
- Conducted black-box adversarial attacks on state-of-the-art deep learning models for traffic flow prediction, degrading their performance by up to 54%.

Education

Ph.D. in Computer Science 2023 – May 2026 (expected)
University of Tennessee, Knoxville

M.S. in Computer Science 2019 – 2023
University of Memphis GPA: 4.0/4.0

Selected Publications

- T. Wu, Y. Wu, R. Gore, **B. Poudel**, C. Karatas, W. Li, J. Liu "VibRun: Real-time Contactless Gait Analysis for Treadmill Running via Footstep Vibrations." *UbiComp* 2025
- **B. Poudel**, X. Wang, W. Li, L. Zhu, K. Heaslip "Joint Pedestrian and Vehicle Traffic Optimization in Urban Environments using Reinforcement Learning." *In Submission*.
- A. Zahid, **B. Poudel**, D. Scott, J. Scott, S. Crouter, W. Li, S. Swaminathan, "PulseRide: A Robotic Wheelchair for Personalized Exertion Control with Human-in-the-Loop Reinforcement Learning." *IEEE/ACM CHASE* 2025.
- **B. Poudel**, W. Li, K. Heaslip, "EnduRL: Enhancing Safety, Stability, and Efficiency of Mixed Traffic Under Real-World Perturbations Via Reinforcement Learning." *IEEE IROS* 2024.
- M. Villarreal, **B. Poudel**, J. Pan, W. Li. "Mixed Traffic Control and Coordination from Pixels." *IEEE ICRA,* 2024.
- **B. Poudel***, T. Watson*, W. Li, "Learning to Control DC Motor for Micromobility in Real Time with Reinforcement Learning." *IEEE ITSC* 2022. *equal contribution.

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Projects

- **DocuMint:** Created a fine-tuning dataset to improve the quality of documentation generated by language models used in coding. Fine-tuned Google's CodeGemma model to achieve up to 35% improvement over baseline. HuggingFace · arXiv · GitHub
- **Robustness in Autonomous Steering:** Used self-supervised learning to improve robustness of computer vision models in steering angle prediction under disturbances to camera such as rain, snow, fog, frost, and blur. PDF · Video
- **Defending RL agents against attacks:** Developed input feature squeezing as a defense against RL agents under adversarial attacks winning all games that would otherwise be lost. PDF
- **Delta 3D Printer:** Engineered a 3D printer from scratch using Arduino Mega, achieving 0.2 mm precision at 40% lower cost than commercial alternatives. PDF

Honors & Awards

- Best paper award finalist: "Congestion-Aware Reinforcement Learning" paper in *IEEE CYBER* 2024 Conference
- Won Best project in the class award: BarterBaron in COMP 7012 Software Engineering, U of M, 2021