Bibek Poudel

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Skills

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

Research Experience

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

- Designed a deep RL framework for joint optimization 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 DC motor steering control of a golf cart, achieving policy learning in under two minutes in simulation and 10.5 minutes on hardware without any prior system knowledge.
- Developed a black-box adversarial attack framework for traffic flow prediction systems that degraded state-of-the-art neural network models by up to 54%.

Education

Ph.D. in Computer Science 2023 - *May* 2026 *(expected)*
University of Tennessee, Knoxville GPA: 3.83/4.0

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

Selected Publications

- **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**, R. Wickman, Y. Shen, W. Li, "AutoJoin: Efficient Adversarial Training against Gradient-Free Perturbations for Robust Maneuvering via Joint Learning." *IEEE IROS* 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.

See more in Google Scholar

Projects

- **DocuMint:** Created a 100K Python (function, docstring) dataset, benchmarked various Small Language Models, and fine-tuned Google's CodeGemma to achieve up to 35% improvement over baseline. HuggingFace · arXiv · GitHub
- **Robustness in Autonomous Steering:** Used self-supervised learning to enhance robustness of computer vision models in steering angle prediction, under camera disturbances such as rain, snow, fog, frost, and blur. PDF · Video
- **Defending RL Policies against attacks:** Developed input feature squeezing as a defense against RL agents under adversarial attacks, restoring average reward from -21 to $+21$, 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