Bibek Poudel

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Experience

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

- Developed a deep RL framework to simultaneously optimize the design of urban streets and control their traffic signals, reducing pedestrian arrival time by 23%, pedestrian wait time by 79%, and vehicle delay by 65%.
- Engineered a robotic wheelchair with human-in-the-loop RL that adjusts motor 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
Research Assistant – Real-time Control and Adversarial Machine Learning

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

Publications

- **B. Poudel**, L. Zhu, W. Li, K. Heaslip, "DeCoR: Design and Control Co-Optimization for Urban Streets using Reinforcement Learning." *In Submission.*
- T. Wu, Y. Wu, **B. Poudel**, S. Meerza, R. Gore , W. Li, Z. Gao, C. Karatas, J. Liu, "VibRun: Real-time Unobtrusive Gait Analysis for Treadmill Running via Footstep Vibrations." *ACM UbiComp* 2025.
- **B. Poudel**, X. Wang, W. Li, L. Zhu, K. Heaslip, "Joint Pedestrian and Vehicle Traffic Optimization in Urban Environments using Reinforcement Learning." *IEEE IROS* 2025.
- 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.

*S*ee more in Google Scholar

Projects

- Cowrite.io
  - Independently created an AI-assisted scientific writing and collaboration tool for researchers (10+ active users).
  - Used Firebase functions to host a LaTeX compiler and real-time database for seamless multi-user collaboration.
  - Skills: React, Typescript, Firebase (Authentication, Storage, Functions), Gemini API.
- Documint: Paper · GitHub · HuggingFace (50 downloads/ month)
  - Led a team of 4 researchers to develop a fine-tuning dataset (100k samples) to improve the quality of docstrings generated by Code LLMs. Improved Google's CodeGemma model by up to 35%.
  - Skills: LoRA, PyTorch, HuggingFace, Weights & Biases.
- Robustness in Autonomous Steering: Used self-supervised learning to improve adversarial robustness of computer vision models in steering angle prediction under disturbances to camera such as rain, snow, fog, frost, and blur. PDF
- Defending game playing RL agents against attacks: Developed input feature squeezing as a defense against adversarial attacks on RL agents, enabling them to win all games that would otherwise have been lost. PDF

Education

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

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

Honors & Awards

- Best paper award finalist: "Congestion-Aware Reinforcement Learning" paper in *IEEE CYBER* 2024.
- Best project award winner: BarterBaron in COMP 7012 Software Engineering, U of M.