Anuj Pokhrel

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Research Interests

I'm a fourth-year PhD student, advised by Dr. Xuesu Xiao. My research focuses on off-road navigation in robots. I am particularly interested in developing robust control algorithms that enable robots to maneuver effectively in challenging terrain.

Education

George Mason University *Fairfax, VA*
Ph.D. student in Computer Science *Jan 2021 – Aug 2026 (Expected)*
- **Relevant Courses:** Machine Learning, Autonomous Robotics, Analysis of Algorithms, Introduction to Artificial Intelligence, Theory of Computation, Theory/Application Data Mining.

Tribhuvan University *Kathmandu, Nepal*
Bachelors in Computer Engineering *Oct 2013 – Sep 2017*

Publications

Peer-reviewed Papers

Anuj Pokhrel, Aniket Datar, Mohammad Nazeri, and Xuesu Xiao. **CAHSOR: Competence-Aware High-Speed Off-Road Ground Navigation in SE(3)**. *Robotics and Automation Letters (RA-L)*, 2024.

Aniket Datar, Chenhui Pan, Mohammad Nazeri, Anuj Pokhrel, and Xuesu Xiao. **Terrain-Attentive Learning for Efficient 6-DoF Kinodynamic Modeling on Vertically Challenging Terrain**. *International Conference on Intelligent Robots and Systems (IROS)*, 2024.

Aniket Datar, Anuj Pokhrel, Mohammad Nazeri, Madhan B. Rao, Chenhui Pan, Yufan Zhang, André Harrison, Maggie Wigness, Philip R. Osteen, Jinwei Ye, and Xuesu Xiao. **M2P2: A Multi-Modal Passive Perception Dataset for Off-Road Mobility in Extreme Low-Light Conditions**. *International Conference on Robotics and Automation*, 2025 **(Under Review)**.

Chenhui Pan, Aniket Datar, Anuj Pokhrel, Matthew Choulas, Mohammad Nazeri, and Xuesu Xiao. **Traverse the Non-Traversable: Estimating Traversability for Wheeled Mobility on Vertically Challenging Terrain**. *International Conference on Robotics and Automation*, 2025 **(Under Review)**.

Mohammad Nazeri, Aniket Datar, Anuj Pokhrel, Chenhui Pan, Garrett Warnell, and Xuesu Xiao. **VertiEncoder: Self-Supervised Kinodynamic Representation Learning on Vertically Challenging Terrain**. *International Conference on Robotics and Automation*, 2025 **(Under Review)**.

Research & Work Experience

George Mason University Robotixx Lab *Fairfax, VA, USA*
Graduate Research Assistant *Jan 2023 - Present*
- Advisor: Dr. Xuesu Xiao
- Projects:
  - **Developed CAHSOR (Competence-Aware High-Speed Off-Road Ground Navigation):** This system addresses the limitations of traditional off-road navigation by enabling high-speed travel for robots. CAHSOR utilizes a learned 6-DOF kinematic model to reason about the consequences of maneuvers on different terrains, promoting both stability and maneuverability. This approach demonstrably reduces vehicle instability while maintaining a high average speed. This is achieved with the help of Terrain Representation for Off-road Navigation (TRON), a model that leverages multimodal, self-supervised vehicle-terrain interactions to capture the complexities of off-road environments.
  - **Developed Terrain-Attentive Learning (TAL) for efficient 6-DOF kinodynamic modeling:** This approach tackles the challenge of robot navigation on extremely steep terrain. TAL addresses limitations of traditional methods by focusing on the most critical aspects of the terrain for each specific robot movement. This allows for efficient real-time motion planning on resource-constrained robots and demonstrably improves the accuracy of predicting robot motion on steep slopes as compared to existing methods.
  - **Designed and built the multi-modal sensor suite for Passive Perception Dataset**: Designed a multi-modal sensor suite including thermal, event, stereo RGB cameras, GPS, IMUs, and LiDAR for ground truth. Implemented a novel calibration procedure to unify multi-sensor streams into a common coordinate system. Collected and annotated 10 hours of data over 32 km of varying terrain and lighting conditions. Demonstrated successful obstacle avoidance using end-to-end learning and classical planning with passive perception.

George Mason University *Fairfax, VA, USA*
Graduate Teaching Assistant *Jan 2021 - Dec 2022*
- Teaching Assistant:
  - (Spring 2021) Introduction to Low-Level Programming (CS 262) & Essentials of Computer Science (CS 110)
  - (Fall 2021) Introduction to Cryptography (CS587/CS487)
  - (Spring 2022) Blockchains and Cryptofinance (CS 499)
  - (Fall 2023) Secure Programming and Systems (CS 468)

Los Alamos National Laboratory *Los Alamos, NM, USA*

Intern: Applied Machine Learning School *Jun 2022 - Aug 2022*

- Developed a semi-supervised BERT-based Named Entity Recognition (NER) model for explainable topic analysis of materials science research. The model analyzed titles of published papers, extracting key entities and enabling researchers to understand research trends in a more interpretable way. Additionally, a web application was built to facilitate user interaction and efficient extraction of NERs from the dataset, using the developed model in the backend.

Tekvortex Pvt. Ltd. *Lalitpur, Nepal*

Full Stack Software Developer *Jan 2018 - Dec 2020*

- Projects:
  - Worked on the design and development of CloudChomp, a web application that streamlined the AWS migration for organizations, utilizing Ruby on Rails for the back-end, AngularJS for the front-end, and a Postgres database.
  - Designed, developed, and implemented custom Salesforce applications for various organizations, leveraging my expertise in Apex, Visualforce, and Lightning Web Components.

Languages

English Professional proficiency
Nepali Native proficiency
Hindi Medium proficiency

References

Dr. Xuesu Xiao (xiao@gmu.edu)

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Dept. of Computer Science (CS)
George Mason University
4400 University Dr, Fairfax, VA 22030

Dr. Manish Bhattarai (ceodspspectrum@lanl.gov)

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