Prabin Bhandari

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Bio

Ph.D. candidate in Computer Science focused on large language models and agentic AI, with research on developing, training, and evaluating LLM-based generative agents for real-world applications.

Education

George Mason University — Fairfax, Virginia, USA

Ph.D. in Computer Science — **August 2021 – Present (Expected: December 2026)**
Advisors: Antonios Anastasopoulos and Dieter Pfoser

M.S. in Computer Science (Machine Learning Concentration) — **2024**

Pulchowk Campus, Tribhuvan University — Lalitpur, Nepal

Bachelor's in Computer Engineering — **2013 – 2017**

Research & Professional Experience

Research Assistant — **2023 – Present**
George Mason University — Fairfax, VA

- Developed **UrbanLLMind**, an LLM-powered generative agent-based model for urban mobility integrating planning, sequential decision-making, persistent memory, and reflection; demonstrated scalability to **10,000 agents using an open-weight 120B-parameter model** on local GPU infrastructure.
- Adapted open-weight LLMs through **supervised fine-tuning (SFT)** on travel-survey data and integrated them into UrbanLLMind; evaluated simulated behavior against National Household Travel Survey (NHTS) data and assessed responses to changing environmental conditions.
- Developed prompted and fine-tuned LLM methods for travel-diary synthesis; designed an evaluation framework spanning multiple levels of granularity to compare mobility patterns across cities and benchmark generated diaries against travel-survey data.
- Designed probing experiments using coordinate prediction, spatial prepositions, and geographic reconstruction to evaluate the spatial knowledge and reasoning capabilities of pretrained LLMs.
- **Ongoing:** Extending UrbanLLMind to model multi-agent interactions and coordination within households and communities, alongside further SFT and reinforcement learning to improve agent behavior.

Research Intern — **May 2024 – May 2025**
Oak Ridge National Laboratory — Oak Ridge, TN & Remote

- Developed an LLM-based pipeline to extract structured epidemiological events—including disease outbreaks, case counts, dates, and locations—from scientific literature and reports.
- Combined LLM reasoning with geographic reference data to resolve ambiguous place names in context and geotag extracted epidemiological events.

Teaching Assistant — **2021 – 2023**
George Mason University — Fairfax, VA

- Supported graduate and undergraduate courses in Advanced Natural Language Processing, Natural Language Processing, and Database Concepts.

Senior Software Engineer — **2020 – 2021**
Assurance IQ, LLC — Remote

- Developed full-stack applications and scalable backend microservices for insurance policy matching, automated customer onboarding, and integrations with insurance carriers.

Co-founder and Software Engineer — **2015 – 2020**
TechKunja Pvt. Ltd. — Pulchowk, Nepal

- Co-founded the company, developed backend systems for client and in-house products, and led engineering teams and software development projects.

Publications

Peer-Reviewed

Bhandari, P., Reia, S. M., Pfoser, D., & Anastasopoulos, A. (2026). UrbanLLMind: Scalable LLM-Powered Urban Mobility Simulation with Open-Weight Models. In *Proceedings of the Third Conference on Language Modeling (COLM 2026)*. openreview.net/pdf?id=jaK0A4Dzf2

Bhandari, P., Anastasopoulos, A., & Pfoser, D. (2026). Behaviorally Realistic Urban Mobility Synthesis via Fine-Tuned Large Language Models. *ACM Transactions on Spatial Algorithms and Systems (TSAS)*, 12(4), Article 19, 33 pages. doi:10.1145/3816246

Publications (continued)

Bhandari, P., Anastasopoulos, A., & Pfoser, D. (2024). Urban Mobility Assessment Using LLMs. In *Proceedings of the 32nd ACM International Conference on Advances in Geographic Information Systems (SIGSPATIAL '24)*, 67–79. doi:10.1145/3678717.3691221 **[Best Paper Award]**

Harrod, K. K.*, **Bhandari, P.***, & Anastasopoulos, A. (2024). From Text to Maps: LLM-Driven Extraction and Geotagging of Epidemiological Data. In *Proceedings of the Third Workshop on NLP for Positive Impact (NLP4PI @ EMNLP 2024)*, 258–270. aclanthology.org/2024.nlp4pi-1.24
[Outstanding Paper Award] (*Equal contribution)

Bhandari, P., Anastasopoulos, A., & Pfoser, D. (2023). Are Large Language Models Geospatially Knowledgeable? In *Proceedings of the 31st ACM International Conference on Advances in Geographic Information Systems (SIGSPATIAL '23)*. doi:10.1145/3589132.3625625

Bhandari, P., & Brennan, H. (2023). Trustworthiness of Children Stories Generated by Large Language Models. In *Proceedings of the 16th International Natural Language Generation Conference (INLG '23)*, 352–361. doi:10.18653/v1/2023.inlg-main.24

Preprints

Bhandari, P. (2024). A Survey on Prompting Techniques in LLMs. arXiv:2312.03740

Bhandari, P., & Paudel, A. (2024). Using Contextual Information for Sentence-level Morpheme Segmentation. arXiv:2403.15436

Adhikari, B., & **Bhandari, P.** (2023). Estimation of Vehicular Velocity based on Non-Intrusive stereo camera. arXiv:2304.05298

Technical Skills

- **LLM Training and Evaluation**: Supervised fine-tuning (full fine-tuning, LoRA, QLoRA), reinforcement learning (PPO, GRPO), prompting, capability probing, and LLM and agent evaluation.
- **Agent Systems**: Generative agent-based modeling, agent planning, sequential decision-making, persistent memory, reflection.
- **ML and LLM Frameworks**: PyTorch, Hugging Face Transformers, NVIDIA NeMo, verl, Axolotl, vLLM, TensorFlow.
- **Programming Languages**: Python, SQL, C/C++, Java, JavaScript, Ruby, MATLAB.
- **Scientific Computing & Simulation**: NumPy, pandas, scikit-learn, Matplotlib, Repast4Py, OSMnx.
- **Systems and Infrastructure**: HPC/Slurm, Singularity, Docker, Kubernetes, Git.
- **Databases and Search**: PostgreSQL, MySQL, MongoDB, Neo4j, Elasticsearch.

Honors & Awards

Outstanding PhD Student Award — GMU CS Department	**2025**
Distinguished Academic Achievement Award — GMU CS Department	**2025**
Best Paper Award — ACM SIGSPATIAL	**2024**
Outstanding Paper Award — NLP4PI @ EMNLP	**2024**
SIGSPATIAL NSF Travel Award	**2024**
GMU Graduate Student Travel Fund	**2023, 2024**
Civil Employee Children's Scholarship for undergraduate education	**2014**

Professional Service & Leadership

Reviewer: ACL Rolling Review (ARR); Workshop on NLP for Positive Impact (NLP4PI); Journal of the American Medical Informatics Association (JAMIA); International Journal of Geographical Information Science (IJGIS); Cities.
Judge: TJHSST Science and Engineering Fair (2026).
Marketing Manager: LOCUS (2017).
Board Member: Sano Sansar Initiative (2015–2017).