Saurav Bastola

Computer Engineering Graduate · AI/ML Researcher

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LinkedIn · GitHub · Website

Research Interests: World models and generative modeling for medicine, trustworthy vision–language models, reinforcement learning and planning.

Education

Bachelor of Engineering in Computer Engineering *Nov 2019 – Apr 2024*

Pulchowk Campus, Institute of Engineering, Tribhuvan University First Division (78.3%)

- Full merit-based scholarship; ranked **43rd nationwide** in the entrance examination among ∼18,000 candidates
- **Relevant Coursework:** Data Structures & Algorithms, Discrete Mathematics, Artificial Intelligence, Digital Signal Processing, Big Data Analytics, Database Management Systems, Operating Systems, Computer Networks, Computer Graphics, Software Engineering

GRE: 336 (Quantitative 170 · Verbal 166 · AWA 3.5) **IELTS:** 8.0 (R 9.0 · L 8.5 · W 7.5 · S 7.0)

Research Experience

Research Assistant *Nov 2024 – Present*

Multi-Modal Learning Lab, NAAMII · *Supervisor: Dr. Binod Bhattarai* Kathmandu, Nepal

- **Surgical world models:** Adapted the Genie (Generative Interactive Environments) framework to surgical video for action-controllable simulation; resulted in a MICCAI 2025 workshop paper
- **Synthetic spatial proteomics:** Worked on a diffusion-model pipeline to generate synthetic Imaging Mass Cytometry (IMC) images for data-scarce settings
- **Hallucination in medical VLMs:** Developing methods to detect hallucinations in vision–language models applied to medical images
- **Epigenetics:** Investigated epigenetic biomarkers in cord blood from diabetic pregnancies through statistical analysis to identify potential autism risk factors

Publications

Surgical Vision World Model. Saurabh Koju, **Saurav Bastola**, Prashant Shrestha, Sanskar Amgain, Yash Raj Shrestha, Rudra P. K. Poudel, and Binod Bhattarai. *MICCAI 2025 Workshop on Data Engineering in Medical Imaging (DEMI), 2025.* *arXiv:2503.02904*

Extractive Nepali Question Answering System. Yunika Bajracharya, Suban Shrestha, **Saurav Bastola**, and Sanjivan Satyal. *KEC Journal of Science and Engineering, vol. 9, no. 1, pp. 95–102, 2025.* *DOI*

Professional Experience

Associate Game AI Developer *Jun 2024 – Sep 2024*

Bhoos Games Kathmandu, Nepal

- Implemented deep RL agents from scratch (DQN, PPO, A3C, SAC, DDPG) for autonomous play in multi-turn strategy games
- Implemented Monte Carlo Tree Search and Information Set MCTS for decision-making under hidden information
- Integrated self-play training pipelines and adaptive AI opponents into the company's in-house game engine
- Worked with designers and engineers to tune agent strength and play style to match game-design and player-experience goals

Selected Projects

SB-AIframework [Reinforcement Learning] GitHub
RL testbed supporting single- and multi-agent environments (OpenAI Gym, PettingZoo) with implementations of PPO, DQN and A3C, plus a benchmarking suite for comparing algorithms across task categories. *Python, PyTorch*

Nepali Question Answering System [Natural Language Processing] GitHub · Paper
Fine-tuned MuRIL on a Nepali dataset to build an extractive question-answering system for a low-resource language. *Python, Hugging Face Transformers*

Gandiv [Programming Language Design] GitHub
Interpreter for a custom programming language, with lexer, parser and runtime written from scratch. *C++*

Apollo | DungeonRush [Game Engine Development] GitHub
2D game engine built on an Entity Component System (ECS) architecture, used to develop a complete 2D platformer. *C++*

Teaching Experience

- **Workshop Instructor, Software Engineering** — LOCUS 2023 (Nepal's largest tech festival), Pulchowk Campus. Development methodologies, design patterns and best practices.
- **Workshop Instructor, Competitive Programming** — ECAST, Thapathali Campus, 2022. Data structures, algorithmic paradigms and problem-solving techniques.
- **Workshop Instructor, C Programming & Git** — IT Club, Pulchowk Campus, 2021. C fundamentals and collaborative Git workflows for incoming students.

Technical Skills

Languages: Python, C/C++, JavaScript, SQL, Common Lisp, MATLAB
Machine Learning: Generative Models (Diffusion Models, GANs, World Models), Vision–Language Models, Reinforcement Learning (PPO, DQN, MCTS/ISMCTS), Deep Learning (CNNs, RNNs, Transformers), NLP
Frameworks: PyTorch, PyTorch Lightning, TensorFlow, Hugging Face Transformers, NumPy, Pandas, FastAPI, Weights & Biases
Tools: Linux, Git, Docker, SLURM, SSH, shell scripting, Vim, Emacs

Awards & Achievements

- **International Mathematical Olympiad (IMO) 2019, Bath, UK:** Member of Nepal's six-student national team (112 participating countries)
- **Nepal Physics Olympiad 2019:** Selected among the top 25 students nationally for International Physics Olympiad training
- **Programming Competitions:** First Runner-Up, Yomari CodeCamp 2022; First Runner-Up, LOCUS Code-Jam 2021