

Gagan Bhusal

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Education

Bachelor of Engineering in Electronics, Communication and Information

Expected 2027

Institute of Engineering (IOE), Pulchowk Campus

Nepal

Experience

Robotics Association of Nepal (RAN)

May 2026 – Present

Research & Development Intern

- Developing sim-to-real legged-locomotion systems for the Unitree Go2 quadruped and G1 humanoid using Mujoco and Genesis Simulator
- Deployed a trained locomotion policy on the physical Go2, achieving stable and fairly reliable walking gait while resolving observation-space mismatches, two-phase Kp/Kd gain scheduling, and simulation-to-hardware joint mapping
- Developed a motion-imitation pipeline for the G1 (GVHMR pose estimation to GMR retargeting to skilled PPO teacher to distillation into a student policy), achieved partial sim-to-real transfer and continue to improve gait quality and stability

Third World Nerd

June 2025 – September 2025

Machine Learning and Robotics Engineer (Part-Time)

- Co-developed an open-source 8-DOF Quadruped Robot STEM Kit, contributing to hardware integration, servo calibration, and mechanical assembly
- Implemented inverse kinematics for real-time gait generation and real time leg trajectory control in Arduino hardware
- Trained a wake-word detector on a custom voice dataset and integrated it into the robot by deploying it into the ESP-32

Research Projects

Ghost-Net: Edge AI for Acoustic Forest Monitoring | *PyTorch, TinyML, ESP32*

March 2026

- Co-developed a bioacoustic monitoring system using a lightweight CNN and MFCC features to classify 12 environmental sounds, including chainsaws, gunshots, rain, and wind
- Built the data-to-deployment pipeline and achieved 74.6% INT8 accuracy, integrating the quantized model into an ESP32 TensorFlow Lite Micro prototype for on-device inference

Satellite Image Super-Resolution (Research Assistant) | *Python, PyTorch*

June 2026 – Present

- Contributing the deep-learning component of a satellite image super-resolution pipeline, upscaling satellite imagery to higher spatial resolution
- Processed large-scale UAV data used as high-resolution ground truth, and designed geographic train/test splits to prevent spatial leakage
- Comparing super-resolution model architectures spanning CNN-based, GAN-based, and transformer-based approaches

Physics-Informed Neural Networks for Differential Equations | *PyTorch, Streamlit*

March 2025

- Implemented PINNs for arbitrary ODEs and PDEs without labeled data and validated the approach against the analytical solution of the 1D heat equation
- Deployed a Streamlit research tool supporting user-defined equations, constraints, and interactive 3D solution visualization

Self Play Reinforcement Learning with AlphaZero | *Python, PyTorch, MCTS*

November 2025 – Present

- Implemented the full AlphaZero algorithm from scratch (Monte Carlo Tree Search, self-play data generation, and a shared policy-value network with no pre-training)
- Validated on Connect4 against a Minimax agent up to depth 10 and studied how MCTS simulation counts and temperature schedules affect playing strength

Technical Skills

Programming Languages: Python, C, C++

ML & Research: PyTorch, Reinforcement Learning, Computer Vision, MFCC, MCTS

Deployment & Tools: Streamlit, TinyML, TensorFlow Lite Micro, OpenCV, ROS2, MuJoCo, Genesis, Git

Research Interests

Multimodal Learning, Computer Vision & Perception, Reinforcement Learning for Robotics