

Possible PhD Topics from Faculty Members (For prospective PhD Applicants)
Department of Electronics and Computer Engineering, Pulchowk Campus, IOE

Topics from Dr. Arun Kumar Timalisina (t.arun @ pcampus.edu.np)

SN	Topic	Possible Support/Collaboration
1	Optimizing robotic motion planning using Deep Reinforcement Learning (DRL) framework The research is to develop safe, simulation-trained and transferable Deep Reinforcement Learning (DRL) frameworks for robotic motion planning, navigation and manipulation.	IEEE and its associated societies - including IEEE Computer Society (CS), Signal Processing Society (SPS), and Robotics and Automation Society (RAS)
2	Code Mixed Language processing: Nepali English Social Media Text Analysis Fine-tune a multilingual model to understand Nepali-English mix used in Facebook/TikTok comments with target task as fake news detection or hate speech detection on social media	
3	LLM powered Nepali essay evaluation and feedback system Develop an automated essay scoring tool trained on human-graded Nepali essays, Fine-tune a transformer model for coherence, grammar, and argument quality	
4	Optimizing for Nepali and local language based TTS Research focuses on developing and optimizing Text-to-Speech (TTS) systems for Nepali and other local languages of Nepal (low-resource language cases) to achieve natural, intelligible, and context-aware speech synthesis. In particular, data augmentation, acoustic modeling, and deep learning techniques such as transformer-based architectures with emphasis on improving prosody, pronunciation accuracy, and speaker adaptability to better reflect regional variations and natural expression.	

Topics from Dr. Sanjeeb Prasad Panday (sanjeeb @ ioe.edu.np)

SN	Topic
1	Digital Preservation and Synthesis of Endangered Traditional Instruments Using Acoustic Modeling
2	Building Nepal's Food knowledge using Artificial Intelligence
3	A Novel Alzheimer Disease Detection using Deep Feature Fusion Integrating CNN and Transformer Models
4	Explainable AI for Diabetic Retinopathy Detection
5	Translating Clinical Gestalt into Machine Learning in Emergency Department using Video-Based Triageing
6	Accelerating Image Enhancement Through Advanced Layout Designs: A Performance Study of Fast Automatic Color Equalization
7	Interpretable Multimodal Deep Learning for Retinal Diagnosis and Biomarker Discovery
8	Development of Disaster Communications Information System Advancing Scientifically Sound Disaster Management Process
9	Any topic related with the application of Artificial Intelligence, Machine Learning, Computer Vision as well as Disaster Communications for making a world safer place to live

Topics from Dr. Aman Shakya (aman.shakya @ ioe.edu.np)

SN	Topic	Possible Support/Collaboration
1	Analysis of Sentiments and Insights from Nepali Social Media and News Contents for Data-Driven Governance	UGC Collaborative Research Grant Award supported
2	Speech and Natural Language based Augmentative and Alternative Communication Systems to Facilitate Interaction for People with Disabilities in Nepal	Applied for TU excellence research grant

Topics from Dr. Babu Ram Dawadi (baburd @ ioe.edu.np)

SN	Topic	Possible Support/Collaboration *
1	Extending V2X Performance Evaluation to NFV and NDN-Based Architectures	Prospective Supervisor(s): Dr. Babu R. Dawadi, IOE and Prof. Dr. Pietro Manzoni, UPV, Spain
2	Towards Quantum Enabled Network Infrastructure: Challenges, Opportunities and Approaches of Transition	Prospectives Supervisor(s): Dr. Babu R. Dawadi and Prof. Dr. Shashidhar R. Joshi
3	Energy-efficient Resource optimization in SDN enabled 5G V2X network	Prospectives Supervisor(s): Dr. Babu R. Dawadi, and
4	5G/6G communication for UAV cross border service Continuity	Prof. Dr. Bishnu Gautam, Wakkanai Hokusei Gakuen University Japan
5	SDN-Driven Quality of Service-Based Adaptive Control and Packet Recovery System for Real Time Multimedia over Next-Generation Networks	

* Support from UGC grants available and applied for TU Excellence MRG for these topics

Topics from Dr. Basanta Joshi (basanta @ ioe.edu.np)

SN	Topic	Possible Support/Collaboration
1	Marker-based system for static and dynamic tests for civil infrastructures Structural health monitoring is essential for maintaining the safety and durability of civil infrastructure such as bridges, buildings, and historic structures. These systems are exposed to static and dynamic loads, including environmental factors, traffic, and seismic events, that can lead to deterioration or failure. Recent advances focus on low-cost, non-contact technologies using marker-based tracking enhanced by deep learning. These systems enable precise measurement of displacements and rotations in both static and dynamic tests. Applied to scaled models and real structures, this approach supports early damage detection, informed maintenance, and improved resilience, marking a key step toward smart, data-driven infrastructure management. Reference to the application context: https://ieeexplore.ieee.org/document/10721566	University of Sannio
2	Detection of damages and eavesdropping in data cables The aim of the work is the development of a microcontroller-based instrument for the detection of anomalies (damages or taps) in data cables, by analysing the amplitude histogram of the received signal. The work required programming of 32-bit microcontrollers (STM32) in C language. Reference to the application context: https://ieeexplore.ieee.org/abstract/document/10884898	
1	Explainability of Large Language Models Understanding how LLMs make decisions through mechanistic interpretability, verifying explanation faithfulness, and developing methods to detect and quantify uncertainty.	Ekbana Solution
2	LLM-Based AI Agents and Memory Mechanisms Developing memory architectures for agents that enable long-horizon task execution, including episodic memory systems with learned forgetting and multi-agent coordination.	
3	Reconstruction of Dynamical Systems Using Neural Networks Learning dynamical systems from partial observations, discovering interpretable governing equations, and building physics-informed models for scientific applications.	
1	End to End Model for Nepali Speech Recognition	Personal Projects
2	End to End Model for Nepali TTS	
3	Grievance Classification with Fully Open Large Language Models	
4	Fine-grained Speech Sentiment Analysis	