Full time PhD Scholarship under Royal Melbourne Institute of Technology (RMIT) - University of Peradeniya (UOP) Joint PhD Programme

Title: Explainable and Uncertainty-Aware Artificial Intelligence for predicting compound Flood–Drought transitions under Climate Change

Brief Description:

Climate change is altering the frequency and intensity of hydro-climatic extremes such as floods and droughts, creating growing risks for water resources, agriculture, ecosystems, infrastructure, and communities. Although floods and droughts are commonly studied separately, they can occur sequentially as drought-to-flood or flood-to-drought transitions, producing complex and potentially amplified impacts. Predicting these compound events is challenging because they are influenced by nonlinear interactions among precipitation, temperature, evapotranspiration, soil moisture, groundwater, streamflow, antecedent conditions, land use, and atmospheric processes, while climate change introduces further non-stationarity. AI methods offer strong potential for modelling these complex relationships, but their black-box nature limits understanding of the factors driving predictions. The application of Explainable AI (XAI) to compound flood–drought events remains relatively underdeveloped, particularly in identifying whether their dominant drivers differ from those of individual floods and droughts. In addition, uncertainties associated with climate projections, input data, AI models, and parameters need to be addressed. Therefore, the study aims to develop an explainable and uncertainty-aware AI framework for predicting and understanding compound flood–drought events under historical and future climate conditions with four specific objectives. The four objectives are to; characterize the spatiotemporal dynamics of flood, drought, and compound events, develop and evaluate AI models for their prediction under non-stationary climate conditions, identify and quantify the key climatic and hydrological drivers using XAI and compare them with those of isolated events, and quantify predictive uncertainty and assess the robustness of AI-based predictions under climate change.

Supervisors:

- UOP supervisors: Dr Gouri De Silva, Dr Panduka Neluwala, Dr Upul Jayasinghe
- RMIT Supervisor: Dr Brian Considine, Dr Muhammed Bhuiyan

Commencement date: May 2027

Features of the PhD:

- Duration of the PhD is 3-3.5 years on a full-time basis and the candidate will spend maximum period of one year at RMIT, Australia and the remaining time in Sri Lanka.
- The tuition fee is fully waived, and the selected applicant will be considered for the standard scholarships for living stipend during the stay in Sri Lanka and Australia.
- There will be at least one principal supervisor each from RMIT and UOP.
- Degree will be awarded from both institutions acknowledging the joint supervision. You will get two separate degree certificates, one each from RMIT and UOP.

Successful candidates should have the following:

1. BSc Engineering (Specializing in Civil Engineering) with Second Class Upper division or higher
2. IELTS overall band of 6.5 with each band above 6.0

We are looking for a dynamic candidate who meets the above qualifications.

If you are interested in this PhD research, apply via the following link on or before 25th September 2026

https://forms.gle/M9AmbViH9343jJMe6

Note: Only the shortlisted candidates will be called for the interview.
If you have any queries, contact Dr. Panduka Neluwala [Email: pandukaneluwala@eng.pdn.ac.lk]