

Hiring: JRF / PhD Position in Photonic Neuromorphic Edge Perception

Project Theme:

The project aims to develop a photonic structured-illumination neuromorphic perception architecture, where engineered optical fields are used not merely for illumination, but as an active front-end transform layer for sensing and inference. Instead of acquiring a conventional full-frame image and then performing computationally expensive digital preprocessing, the system will use structured/speckle illumination to generate compressed, information-rich optical signatures that can improve task separability for downstream neuromorphic inference. The broader research direction includes:

- ✓ Photonic structured illumination using coherent light, diffuser/MMF-based speckle fields, and coded optical patterns
- ✓ Optical transform-domain sensing for micro-texture, anomaly, defect, and surface-sensitive perception tasks
- ✓ 2D-material/optoelectronic sensing concepts for compact perception architectures
- ✓ Spiking neural network models, especially leaky integrate-and-fire neuron architectures
- ✓ Spike encoding, event-based representation, and neuromorphic signal processing
- ✓ FPGA / programmable digital hardware implementation of SNN-based edge inference
- ✓ Hardware-aware benchmarking against conventional uniform-illumination and frame-based sensing pipelines

About the Role:

The selected candidate will contribute to the development of an end-to-end photonic-neuromorphic sensing framework, combining optical front-end experimentation with FPGA-based realization of neuromorphic inference blocks. The project is particularly suitable for students interested in building a research profile across photonics, embedded intelligence, edge AI hardware, and neuromorphic systems.

Qualifications:

B.E. / [B.Tech](#) / M.E. / [M.Tech](#) in Electrical and Electronics Engineering, Electronics and Communication Engineering, Instrumentation, Embedded Systems; MSc Photonics, Optics, Physics or closely related areas.

Stipend: Upto INR 40000/month