MeitY-Visvesvaraya Post-Doctoral Fellowship for Electronics & IT

No. of Post Doctoral fellowship available: 01

Departments where seats are available: CSE, ECE, EEE, IT and MACS.

Post Doctoral Application Deadline: **22 August, 2025.**

The highlights of the **Visvesvaraya PhD Scheme for Electronics and IT: Phase II Post Doctoral Fellowship (PDF)** for AY 2025-26 are as follows:

1. Duration of the fellowship is 12 months. It is a full-time, non-transferable, temporary position tenable in India only.
2. The PDF awardee, enrolled & verified by the institution, is eligible to receive a monthly fellowship, which will be transferred directly to the bank accounts of the awardee.
3. Financial highlights:
   PDF Fellowship @ Rs. 1,08,393/- per month
   PDF Contingency @ Rs. 1 Lakh per Year
   A travel support up to Rs. 2.10 Lakhs is available, for which the prior approval needs to be obtained from PhD Cell.
4. PDF applicants currently in regular employment will not be considered. However, scientists or researchers with temporary positions in academia or research institutions would be considered, but they would be required to relinquish their current roles if selected for the fellowship.
5. The PDF applicant must have obtained a PhD degree from a recognized University with first class (in terms of grades, etc.) in all preceding levels and a good academic record throughout.
6. The eligible participating institution must ensure that the PDF applicant should have completed PhD within the past 5 years on the last date of submission of application to the institution.
7. PDF applicants should not have completed their PhD at the same institution (host institution) where the PDF fellowship is to be awarded.
8. The upper age limit for the fellowship is 40 years on the date of submission of application to the eligible participating institution (host institution).
9. Preference would be given to the PDF applicants who have active industry linkages and their research proposal is directed towards industry specific problems
10. The topics for the postdoctoral programme are given in Annexure 1.

Eligibility: PhD degree in a relevant topic.

Application Portal: https://iris.nitk.ac.in/admission/application/login

For more information visit https://phd.dic.gov.in/

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Annexure 1

NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA, SURATHKAL				
Postdoc Topics - Visvesvaraya PhD Scheme - Phase II				
S.No	Faculty Name	Department	Postdoctoral Research Title	Abstract for Postdoctoral Research
1	Dr P. Santhi Thilagam	CSE	Analyzing the security and privacy of server APIs of mobile applications	With more and more applications following REST-based architecture , these web services are exposed to clients through Application Programming Interfaces (APIs). The service is running on a remote system, and exposes all functionality through a REST API. Not only is all functionality exposed, it is well documented and available for public viewing, so that anyone can integrate with the service at any time. Additionally, as organisations embrace the services provided by other organisations, they are also exposing their clients to code which was not written or tested by them. Due to this, they cannot provide any security assurance related to it as well. Thus, ensuring the security of APIs is crucial - for the developers themselves, and the consumers of the API who integrate them into their application. Failure to do so invites a wide array of attacks on systems. This research aims at developing a deep learning based automated security testing approach for analyzing the security and privacy of server APIs of Mobile applications. The use of both static and dynamic analysis techniques will be investigated in order to improve the effectiveness of security analysis of mobile App server APIs.
2	Dr. Manjanna B	CSE	Computational Geometry, Facility Location Theory	The focus of the research is on exploring the algorithmic and complexity aspects of geometric grouping, dispersion and obnoxious facility location problems in the Euclidean plane, with strong motivation from real-world applications in network design, risk minimization, ansad industrial planning. The postdoctoral researcher will contribute to the study of various geometric facility location problems, particularly those involving obnoxious facility dispersion. These problems seek to maximize distances between facilities and/or between facilities and demand points, thereby minimizing negative externalities such as interference, pollution, or congestion. The objectives of interest include both MaxMin (maximize the minimum distance) and MaxSum (maximize the total pairwise distance) dispersion models. While MaxMin problems are well-explored, MaxSum formulations remain relatively under-studied and present fresh challenges, which usually require application of techniques from continuous optimization such as Weiszfeld's algorithm, Centroidal Voronoi tessellations, Difference of Convex functions (DC) programming. The researcher will aim to investigate the computational complexity of these problems and their variants, and to develop exact, approximation, and parameterized algorithms. The overarching goal is to advance algorithmic methods for geometric optimization and, through this work, foster a deeper engagement with theoretical computer science, optimization, and operations research—laying a foundation for broader academic and industrial impact.

3	Dr. Radhika B S	CSE	Strengthening Access Control in Android Operating System	Android is one of the most widely used Operating Systems. It uses a multilayered access control approach to protect its system resources and user's privacy. It mainly uses User ID (UID) and permissions for regulating access. The Android permissions system has evolved over the years and has introduced various features such as runtime permissions, permission groups, and role-based permissions. An access request from an application goes from the application layer to framework layer and finally reaches the kernel layer. Along this path, various components such as Framework APIs, Activity Managers, System Services, Permission Manager Service, and Binders perform access checks. While this complex, layered permission checks helps in providing fine-grained access control, it makes it difficult to ensure that there are no circumvention of checks. One of the main reasons for this is that a resource can be reached through multiple paths and any inadequate access check along any one of these paths lead to unauthorized access to the resource. Our goal is to analyse Android's permission systems in the Application and Framework layers to ensure that an access request flow doesn't lead to any unauthorized accesses.
4	Dr. Abhilash M H	CSE	Design of Practical Lattice-Based Authentication Schemes for Post-Quantum Security	The increasing capabilities of quantum computers threaten the foundations of classical cryptographic systems, which largely depend on number-theoretic assumptions such as integer factorization and discrete logarithms. These assumptions are no longer considered secure against quantum attacks, largely due to Shor's algorithm, which efficiently solves these problems on a quantum computer. Lattice-based cryptography has emerged as one of the most promising candidates for post-quantum security. Several cryptographic schemes based on lattices have already been standardized by NIST due to their strong theoretical security and practical efficiency. This research will explore the design and development of a quantum-resistant authentication scheme using lattice-based cryptographic primitives. The goal is to achieve robust security capable of resisting quantum attacks while maintaining the computational efficiency necessary for practical deployment. This approach has potential applications in areas such as secure communications, digital signatures, and identity verification.

5	Dr. Venkatesa Perumal Balasubramanian	EEE	DC-DC converters for Electric Vehicle (EV) and Photovoltaic (PV) applications	The increasing global push towards electrification and renewable energy integration has placed DC-DC converters at the forefront of power conversion systems, particularly for Electric Vehicles (EVs) and Photovoltaic (PV) systems. In both applications, the DC-DC converter plays a critical role in efficiently stepping up or stepping down voltage levels to ensure optimal power transfer, energy storage management, and load regulation. However, these systems face several technical challenges including wide input/output voltage variation, stringent efficiency requirements across variable loads, size constraints, electromagnetic interference (EMI), and the need for bidirectional power flow in EVs. Conventional converter topologies often fall short in simultaneously meeting high efficiency, compactness, and thermal performance. Furthermore, EV and PV systems demand dynamic power management capabilities and high reliability under fluctuating environmental and load conditions. There is a growing need for the development of advanced converter architectures incorporating soft-switching techniques, wide bandgap semiconductor devices (like SiC or GaN), and intelligent control algorithms to improve overall system performance. This research proposes the design, modelling, and implementation of high-efficiency, high-power-density DC-DC converters tailored for EV and PV integration. The work will focus on novel topologies, adaptive control strategies, and real-time digital control implementation to optimize performance across a wide operating range. The outcome of this research will contribute to the development of next-generation energy systems that are more compact, efficient, and reliable, thereby supporting the transition to sustainable transportation and energy infrastructure.
6	Dr. Dharavath Kishan	EEE	Reliability-oriented Design and Development of Reconfigurable Off-board EV Charging Systems	Transitioning to electric vehicles (EVs) is crucial for reducing carbon emissions, improving air quality, and enhancing energy security. As the number of EVs increases, the demand for a robust, scalable, and reliable charging infrastructure becomes critical. Currently, there is a transition from 400V to 800V battery systems, which can significantly reduce charging time, power loss, and cable size. Additionally, existing commercial chargers, typically rated from a few kW to 220 kW and designed for unidirectional power transfer, result in a wide diversity of specifications among EV chargers. Consequently, a major barrier to EV adoption is the diversity of charging requirements and the lack of accessible and interoperable charging stations. This proposal aims to develop reliable, interoperable off-board charging systems to ensure seamless and efficient access to charging infrastructure, thereby accelerating the adoption of sustainable transportation.

7	Dr. Sowmya Kamath S	IT	AI-based Framework for Post-Operative Orthopedic Rehabilitation Monitoring	Conventional post-operative orthopedic rehabilitation processes rely on periodic in-person patient visits and subjective feedback, due to which day-to-day variations in patient progress are often missed, delaying necessary corrective interventions at the right time. Wearable sensors offer objective monitoring but are often expensive and inconvenient for routine use. Hence, there is a growing need for a non-invasive, affordable and automated solution that enables patients to complete rehabilitation exercises at home while still being accurately monitored by clinicians. Towards this, the development of AI-based framework for assessing patient movements from smartphone-recorded rehabilitation exercises is proposed, for tracking joint motion, posture and range of motion from video, to determine whether exercises are performed correctly. Key research elements include automated analysis of exercise videos, gait assessment from walking footage and identification of abnormal patterns for clinician review. Estimation of joint angles to analyze the degree of freedom of limb movements, correct improper or unsafe patterns and generate progress summaries that reflect recovery trends is proposed. Detecting signs of pain or swelling using facial expression analysis and visual cues from the surgical site will also need to be explored. Challenges such as variations in camera angles, lighting and occlusions, also need to be addressed. The system will incorporate personalized baselines using pre-operative or early post-operative data to enable more context-aware analysis. In addition, temporal modeling of movement sequences will be explored to distinguish between transient errors and consistent deviations in form, to support a scalable and clinically meaningful approach to remote post-operative rehabilitation monitoring.

8	Dr. Shrutilipi Bhattacharjee	IT	Spatio-Temporal Contact Graph Analysis Forecast the Super-spreaders	The idea of the project evolves around the application of contact tracing in any disease outbreak. The source could be an individual contact or a group of contacts gathered for an event. In order to understand the future movement patterns of the human contacts and find the potential super spreaders in the future in the network, the digital footprint data and the social connections of the exposed contacts must be predicted. By analyzing this future contact graph, it will be feasible for us to accurately identify the superseder individuals or events in the near future. Therefore, this work aims to trace the future super spreaders from the contact graph generated from the digital footprints data. Because this work learns the present network and predicts the future movement pattern of the contacts, the social connections of the contacts also play an important role. It is also reported that individuals with many social contacts, such as celebrities and politicians, could be the ideal sentinel nodes for epidemic outbreaks. Here, the contact's behavior learning also involves the social network data analysis alongside human trajectory prediction. Therefore, this work adopts an amalgamation approach of different techniques and datasets. The flow of the work to identify hidden spreaders is as follows: combine spatio-temporal digital footprint data and socials media data for the contact graph generation, complex network analysis for identifying the super spreaders in the network, graph neural network-based approaches to learn the spatio-temporal contact graph and the super spreaders characteristics, predict the network in the future time and identify the hidden spreaders.

9	Dr. Jidesh P	MACS	Design and Analysis of explainable AI models for restoration and enhancement of multi-model images	The advancement of AI and data science have progressively contributed to various applications in computer vision and image processing. However, restoration and enhancement still remains to be an open problem in various imaging modalities, due to the complex nature of image data and its correlation with the deterioration present therein. Even though there are several models introduced over the period of time, an effective pre-precessing remains an unresolved inverse problem. Given the fact that inverse problems manifest ill-posed characterization, the solution becomes non-trivial. A detailed theoretical analysis of the problem will be carried out and a unified framework for various distortions will be devised using explainable AI models. The main objectives of the work are to theoretically study the restoration problem as an non-linear inverse and ill-posed problem and device regularization frameworks to handle different distortions under a unified design. The convergence and computational efficiency of the model should be optimized in order to ensure its portability to real-time pre-processing environments. The current technology has progressed considerably in terms of GenerativeAI solutions to such problems. Nevertheless, the results are highly dependent on abundance of the training data, which is a hurdle in many imaging modalities. In addition to the data availability constraint, computational efficiency of such models are still a matter of concern. Therefore, the models that can perform well under the limited availability of data and ground-truth with optimal computational efficiency will be studied and designed as a part of this work. The optimal performance of the model will be ensured by optimizing the parameters of the model.