

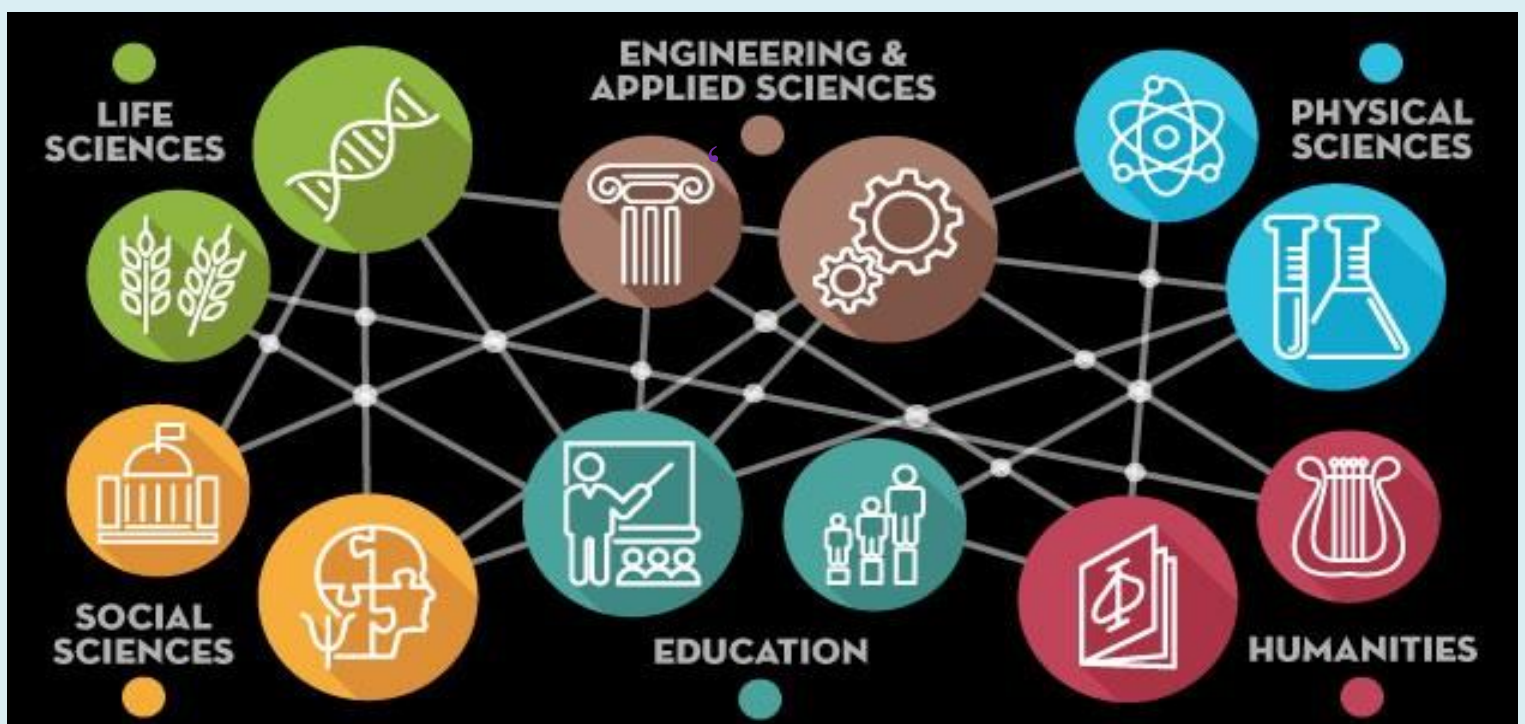
Indian Institute of Information Technology Design and Manufacturing Kurnool



Information Brochure

Ph.D. admissions June 2026 Session

PhD Programs under Centre for Interdisciplinary Programs (CIP)



About the Centre for Interdisciplinary Programs (CIP):

The Centre for Interdisciplinary Programs (CIP) at IITDM Kurnool announces Interdisciplinary (ID) PhD programs for enthusiastic aspirants exploring the interface of various science and engineering disciplines. The ID PhD Program involves rigorous course work (12 or 24 credits depending on the academic background of students) followed by research work in an interdisciplinary research topic leading to a doctoral thesis.

Eligibility Criteria for Full-Time Ph.D.:

Applicants holding Master's degree:

Minimum Education Qualifications:

- Applicants with a postgraduate degree (M. Tech. / M.E. / M.Sc. /M.S. (Research) or equivalent) in a relevant branch/specialization from any institute with a CGPA of 6.5/10 or 60% for UR/OBC/EWS category and CGPA of 6.0/10 or 55 % for SC/ST/PwD category.
- **Screening and Selection:** Entrance Test* and/or Interview. (* based on the number of applications received)

Direct admission to PhD with Graduation (B.E. / B. Tech. /B.S.):

Minimum Education Qualifications:

- Applicants with a Bachelor's degree (B. Tech. / B.E. / B.S. or equivalent) in a relevant branch/specialization from any CFTI with a CGPA of 7.5/10 or 70% for UR/OBC/EWS category and CGPA of 7.0/10 or 65 % for SC/ST/PwD category. (**GATE Qualification is not Mandatory**)
- Applicants with a Bachelor's degree (B. Tech. / B.E. / B.S. or equivalent) in a relevant branch/specialization from any **non-CFTI** with a CGPA of 7.5/10 or 70% for UR/OBC/EWS category and CGPA of 7.0/10 or 65 % for SC/ST/PwD category. (**GATE Qualification is Mandatory**)

Screening and Selection:

- a) The Academic Section will conduct the shortlisting and selection process.
- b) Eligible candidates possessing the minimum educational qualifications and satisfying additional criteria set by the institute from time to time only will be called for the written test and/or Interview.
- c) An entrance examination shall be conducted for all the applicants (Full-Time) who does not have GATE or NET qualification.
- d) The syllabus for the written test and/ or Interview is **GATE 2026 syllabus in respective subject (Station Department)**.
- e) Applicants with a valid GATE or CSIR/UGC-NET qualification will be directly eligible for the interview.
- f) The question paper for written exam will consist of 50 MCQ based on the GATE/NET syllabus.
- g) Each question will carry 2 marks, with a negative marking of 0.5 marks for every incorrect answer.
- h) The cut-off marks shall be determined in line with the GATE 2026 standards.
- i) The exam will be conducted either in CBT (Moodle) mode or offline based on number of applications.
- j) Based on the academic record and the performance of the candidates in the written test and/or Interview test, the selection committee will finalize the applicants for admission to the Ph.D. programme.

Problem Statements

1.	Graph-based deep audio features capturing temporal and non-euclidean relationships
2.	Drone design and heavy payload delivery considering UAV swarm
3.	Hybrid quantum-classical communication system.
4.	LLM-Based Analysis of 3D Genome Organization.
5.	Numerical methods of wave propagation in structures
6.	AI assisted designing of quantum dot solar cells
7.	Autonomous Path Planning Algorithm for Mobile Robots
8.	Deep learning model based navigation for snake robot
9.	Algebraic Codes in Communication Security
10.	Design and development of broadband IR photodetectors
11.	Drug molecular communication in viral diseases
12.	Influence Maximization with Social Network Analysis
13.	Quantum algorithm and it's application
14.	Countermeasure design in cache template attack in CPS
15.	Code-based cryptography
16.	ASR for automatic assessment of dyslexia in school going children
17.	Inverse problems in remote sensing via neural-numerical fusion
18.	Secure post-quantum cryptographic protocols

19.	Post-quantum cryptographic protocols and FPGA implementation
20.	Design and implement a hardware accelerator for PQC algorithms

Convener/coordinator of Ph.D. admissions and contact details:

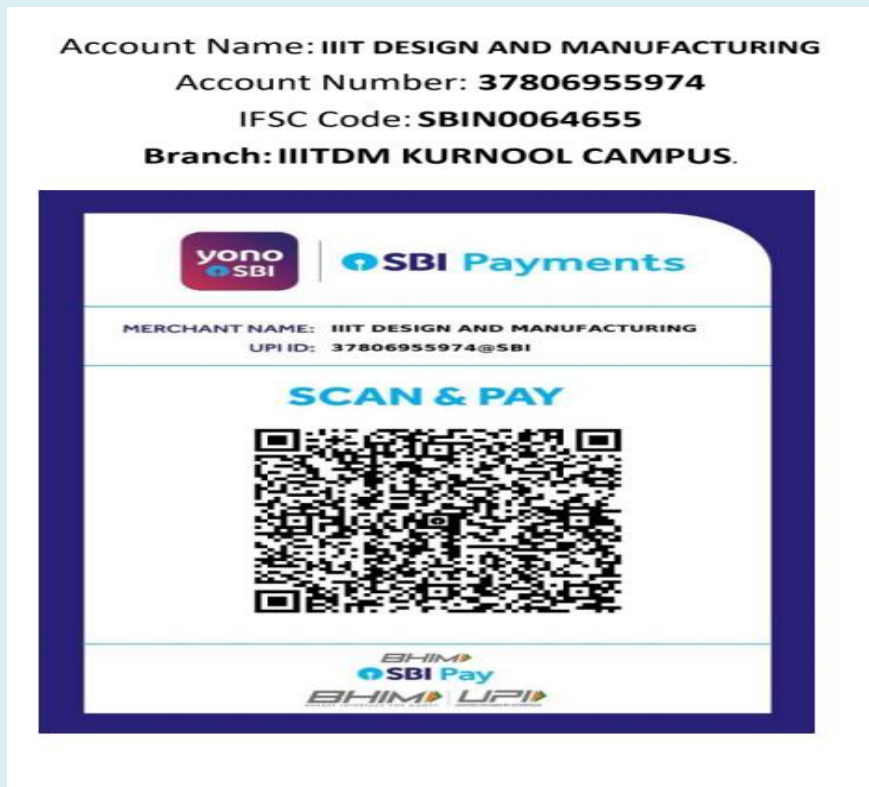
- Dr. Pawan Kumar, Ph: 08518-289100 (Ext: 212)

Online application portal link: <https://iiitkadm.samarth.edu.in/>

Scan for Online Application:



Bank Account Details and Payment QR Code:



Important Dates:

Web notification of the PhD Advertisement	8 th April 2026
Online application registration process start date	13 th April 2026
Last date for the submission of online Application form	17 th May 2026
Notification of shortlisted candidates for Interview/Written Test	20 th May 2026

Institute Website link: <https://iiitk.ac.in>

The detailed information on research areas, Title, Abstract, and faculty details are provided at the end of this document.

PhD Programs under Centre for Interdisciplinary Programs

S.No.	Faculty Name	Faculty Dept. Name	Associated Faculty Name	Associated Faculty Dept. Name	Problem Statement	Abstract
1	Dr. M Kiran Reddy	ECE	Dr. Anup Kumar Halder	CSE	Graph-based deep audio features capturing temporal and non-euclidean relationships	This research proposes a framework that integrates deep audio feature extraction with graph-based machine learning to better model complex speech patterns. Deep models capture rich temporal and spectral characteristics of audio signals, while graph representations encode relationships between speech segments or feature components in a non-Euclidean space. By combining these approaches, the method aims to improve the modelling of structured dependencies and temporal dynamics in audio data. The proposed approach is expected to enhance performance in tasks such as speech classification and pathological speech analysis.
2	Dr Sreenivasa Reddy Yeduri	ECE	Dr Anand Kumar Subramaniyan	ME	Drone Design and Heavy Payload Delivery considering UAV Swarm	This work focuses on designing drones to carry heavy payloads using 3D printing. Then, integrate different sensors such as cameras, LiDARs, and radars for environmental sensing and efficient payload delivery. Finally, deploy a swarm (a large number) of drones for coordination and communication in large-payload delivery.
3	Dr V Siva Prasad	ECE	Dr Putha Kishore	Physics	Hybrid quantum-classical communication system.	The rapid evolution of next-generation communication systems necessitates the integration of quantum technologies with classical wireless frameworks to achieve

						<p>enhanced security, spectral efficiency, and robustness. This work proposes a hybrid quantum-classical communication architecture that synergistically combines quantum key distribution (QKD) with classical OFDM-based wireless systems implemented over software-defined radio (SDR) platforms such as USRP. The classical layer ensures high data rate transmission using advanced modulation, MIMO techniques, and adaptive resource allocation, while the quantum layer provides provably secure key exchange leveraging quantum entanglement and photon polarization states. The proposed system investigates practical challenges including synchronization, channel impairments, Doppler effects, and hardware constraints in real-time SDR environments. Furthermore, the integration is extended toward 6G paradigms, enabling ultra-reliable low-latency communication (URLLC) and secure IoT networks. Experimental validation using SDR testbeds demonstrates the feasibility of hybrid architectures in bridging the gap between theoretical quantum communication and deployable wireless systems. This approach opens new avenues for secure, scalable, and high-performance communication networks</p>
4	Dr. Anup Kumar Halder	CSE	Dr. M KIRAN REDDY	ECE	LLM-Based Analysis of 3D Genome Organization	<p>Understanding long-range chromatin interactions is fundamental to uncovering the regulatory principles governing gene expression, epigenetic modulation, and the three-dimensional (3D) organization of the genome. These interactions enable distal regulatory elements, including enhancers, silencers, and insulators, to establish spatial contacts with their target genes, thereby orchestrating complex transcriptional</p>

					<p>programs. Although high-throughput chromatin conformation capture techniques such as Hi-C have enabled genome-wide mapping of such interactions, their resolution, sparsity, and experimental cost pose significant challenges for comprehensive characterization.</p> <p>This research aims to develop computational methodologies for the accurate prediction and analysis of long-range chromatin interactions by leveraging multi-modal genomic data, including sequence features, epigenetic marks, and structural information derived from 3D genome organization. Advanced machine learning approaches, including deep learning and large language models, will be explored to capture complex dependencies and contextual relationships within genomic sequences. The proposed framework seeks to enhance predictive accuracy, improve interpretability, and provide mechanistic insights into genome architecture.</p> <p>To address scalability and long-range dependency modelling, this work will incorporate transformer-based architectures augmented with efficient attention mechanisms such as Flash Attention. Large language models will be utilized to encode genomic sequences and capture contextual representations, enabling the integration of sequence and structural signals for improved prediction of chromatin interactions. The outcomes of this work are expected to contribute to a deeper understanding of gene regulatory mechanisms and facilitate applications in disease genomics, functional annotation, and precision medicine.</p>
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5	Dr Pawan Kumar	ME	Dr Anirban Majumdar	Sciences	Numerical Methods of Wave Propagation in Structures	<p>Wave propagation analysis is critical in providing assurance of structural and operational integrity in modern engineering systems. This abstract outlines the development of numerical techniques, from conventional techniques like Finite Element Method (FEM), finite difference method, Spectral Element Method (SEM) through to innovative ones that incorporate machine learning algorithms, particularly emphasizing their applications within aerospace, smart materials, and metamaterials.</p> <p>The need for precise Structural Health Monitoring (SHM) within the aerospace industry has led the numerical technique towards high-frequency wave propagation analysis. The SEM provides the foundation for its superior ability to model thin walls and composite shells and thus can be used to detect micro-delamination. The inclusion of smart materials, including piezoelectric sensors and actuators, requires the use of multiphysics solvers that can integrate the mechanics of wave fields with electrical potential fields. One recent development that shows promise in this regard is the implementation of Isogeometric Analysis (IGA).</p> <p>The most revolutionary developments are being made in the field of acoustic and elastic metamaterials. The current trend in numerical methods focuses on modeling and analyzing bandgaps and topological wave transport. Emerging studies exploit ML-enhanced numerical algorithms and PINNs to forecast wave phenomena in intricate periodic lattices, thereby circumventing the expensive computational costs of traditional simulation methods. Moreover, data-driven models are</p>
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						<p>being applied to determine the optimal shape of the unit cell of metamaterials for vibration mitigation and energy harvesting. This synergy results in real-time wave steering and cloaking simulations, which represent a remarkable step forward from static to dynamic material analysis.</p> <p>In summary, the synergistic application of high-order numerical methods and AI has paved the way for future innovations in advanced and smart structural design.</p>
6	Dr Pandiyarajan T	Department of Sciences	Dr N Srinivas Naik	CSE	AI assisted designing of quantum dot solar cells	<p>Photovoltaic (PV) technologies have garnered significant attention for their ability to convert sunlight directly into electrical energy, offering a promising pathway toward sustainable energy generation. However, critical challenges such as long-term stability, scalable fabrication, and material recyclability continue to hinder their widespread deployment. In addition, conventional approaches for material discovery and device optimization largely rely on time-consuming trial-and-error methodologies. In this context, artificial intelligence (AI) has emerged as a powerful tool to accelerate innovation by identifying hidden patterns in complex datasets, enabling predictive modelling, and guiding data-driven design strategies. This work proposes the integration of ML techniques to assist in the design and fabrication of quantum dot-based solar cells. Specifically, ML models will be employed to evaluate material suitability, optimize device parameters, and enhance overall performance metrics. The proposed approach aims to reduce experimental efforts, improve efficiency, and facilitate the</p>

						development of robust and sustainable quantum dot photovoltaic systems.
7	Dr. Ravi Kumar Mandava	ME	Dr. K. Krishna Naik	ECE	Autonomous Path Planning Algorithm for Mobile Robots	This research proposal focuses on the development of autonomous path planning algorithms for mobile robots operating in both indoor and outdoor environments. The aim is to design intelligent navigation strategies that enable robots to move efficiently, safely, and autonomously in structured and unstructured settings. The proposed work integrates sensor data, environment mapping, and decision-making techniques such as simultaneous localization and mapping (SLAM) and heuristic-based path planning algorithms. The system will address challenges such as dynamic obstacles, varying terrains, and real-time adaptability. Indoor navigation will emphasize accuracy within confined spaces, while outdoor navigation will consider environmental uncertainties and scalability. The performance of the developed algorithms will be evaluated using simulation tools and real-time experiments. The expected outcome is a robust and efficient path planning framework that enhances navigation accuracy, reduces computational complexity, and supports applications in logistics, surveillance, and smart city systems.
8	Dr. Ravi Kumar Mandava	ME	Dr. N. Srinivas Naik	CSE	Deep learning Model based Navigation for Snake Robot	This research focuses on developing a deep learning-based navigation system for a snake robot operating in complex and constrained environments. Snake robots, due to their flexible and segmented structure, are well-suited for tasks such as search and rescue, pipeline inspection, and exploration of uneven terrains. The proposed approach utilizes deep learning models, such as convolutional neural networks (CNNs) and

						<p>recurrent neural networks (RNNs), to enable intelligent perception and adaptive motion control. Sensor data from cameras and inertial measurement units are processed to understand the surroundings and predict optimal movement patterns. The model learns to navigate through obstacles, narrow passages, and irregular surfaces by capturing spatial and temporal features. The system is designed to improve path efficiency, stability, and real-time decision-making. Performance will be evaluated through simulations and experimental validation. The proposed framework aims to enhance autonomous navigation capabilities of snake robots for real-world applications in hazardous and inaccessible environments.</p>
9	Dr Mani Shankar Pandey	Department of Sciences	Dr Vinay Kumar Tiwari	ECE	Algebraic Codes in Communication Security	<p>Algebraic Coding Theory plays a fundamental role in ensuring reliable and secure data transmission in modern communication systems. This research aims to investigate the development of algebraic codes and their applications in information security and cryptography. The study focuses on constructing new classes of codes using algebraic structures such as groups, rings, and modules, and analyzing their structural properties, including minimum distance, duality, and decoding efficiency.</p> <p>A key aspect of the research is to explore the application of these codes in designing secure cryptographic schemes. In particular, code-based cryptographic systems such as the McEliece cryptosystem will be studied and extended to address challenges related to security, efficiency, and scalability. The work will also examine resistance to classical and</p>

						quantum attacks, making it relevant in the context of post-quantum cryptography. Furthermore, the research aims to bridge the gap between abstract algebraic theory and practical implementation by studying encoding and decoding mechanisms suitable for real-world communication systems. The expected outcome is the development of mathematically rigorous and practically viable coding schemes that enhance both error correction and data security.
10	Dr. Putha Kishore	Department of Sciences	Dr Vijayakumar Devarakonda	ECE	Design and Development of Broadband IR Photodetectors	The design and development of broadband infrared (IR) photodetectors have gained significant attention due to their critical role in applications such as thermal imaging, environmental monitoring, optical communication, and biomedical sensing. Traditional semiconductor-based detectors, including HgCdTe and InSb, offer high sensitivity but are limited by high fabrication costs and the need for cryogenic cooling. Recent research focuses on next-generation materials such as graphene, transition metal dichalcogenides (TMDs), black phosphorus, and quantum dots, which exhibit tunable bandgaps, strong light-matter interaction, and high carrier mobility, enabling efficient broadband detection across short-, mid-, and long-wave IR regions. Hybrid device architectures, particularly graphene-quantum dot and van der Waals heterostructures, have demonstrated enhanced responsivity, reduced noise, and extended spectral range through mechanisms such as photoconductive gain, plasmonic enhancement, and photothermoelectric effects. Additionally, advances in flexible and wearable photodetectors are opening new avenues for

						portable and real-time sensing applications. However, challenges such as high dark current, material instability, interface defects, and large-scale fabrication remain significant barriers to commercialization. Ongoing research aims to address these issues through improved material synthesis, device engineering, and integration with CMOS-compatible technologies, ultimately enabling the realization of high-performance, low-power, and scalable broadband IR photodetectors.
11	Dr. Chandra Mohan D	CSE	Dr. Subba Rao S	ECE	Drug Molecular Communication in Viral diseases	This research focuses on the design and synthesis of molecular systems capable of crossing the Blood-Brain Barrier (BBB) to enable end-to-end targeted drug delivery for brain diseases through the fusion of bioinformatics and molecular communication. The objective is to engineer intelligent molecules or nanoscale carriers with the capability to penetrate the BBB, perform biological sensing, and support communication functions such as signal transmission and actuation within the brain microenvironment. Bioinformatics tools will be used to identify and model receptor pathways, protein interactions, and genetic mechanisms that regulate BBB permeability. Based on these insights, bio-inspired molecular communication frameworks will be developed to design molecules that can detect disease biomarkers, communicate biochemical information, and trigger controlled drug release at targeted neural sites. The proposed approach aims to create multifunctional molecular systems integrating BBB penetration, sensing, communication, and actuation, enabling more precise and efficient therapies for

						neurological disorders such as Alzheimer's disease, Parkinson's disease, and brain tumors.
12	Dr. Korra Sathya Babu	CSE	Dr. Kiran Reddy	ECE	Influence Maximization with Social Network Analysis	<p>Influence Maximization with Social Data Analytics</p> <p>The proposal presents a comprehensive framework that combines Social Data Analytics with Group Sociology to better understand and optimize influence in social networks. It focuses on identifying communities, influential individuals, and relationship strengths using both computational techniques (such as graph algorithms, centrality measures, and diffusion models) and sociological concepts like homophily, social capital, group cohesion, and structural holes. The methodology models social networks as graphs and enhances traditional analytics with factors like trust, tie strength, and collective behavior, while also incorporating sentiment analysis using advanced NLP methods. Expected outcomes include more meaningful community detection, socially relevant influencer identification, improved influence maximization strategies, and deeper insights into group emotions and interactions, with applications in marketing, politics, public health, and more. Additionally, the proposal is strengthened by recommendations to integrate ethnographic research and social-psychological perspectives to capture cultural nuances, informal influence, and real-world behaviors that may not be visible in digital data alone, ensuring a more holistic and ethically grounded analysis.</p>

13	Dr. R. Kabaleeshwaran	CSE	Dr. D. Murali	Department of Sciences	Quantum Algorithm and It's Application	<p>The efficient simulation of quantum lattice systems is a fundamental problem in condensed matter physics and quantum computing. Tight-binding Hamiltonians provide a versatile framework for describing a wide range of lattice-based systems through nearest-neighbour hopping and on-site potential terms. In this work, we explore the digital quantum simulation of one- and two-dimensional lattice models using quantum algorithms suitable for near-term quantum devices. The fermionic degrees of freedom in the tight-binding Hamiltonian are mapped onto qubits using established encoding schemes such as the Jordan–Wigner and Bravyi–Kitaev transformations. We employ both hybrid and fully digital quantum algorithms to investigate the properties of these systems. To investigate the ground state properties of lattice systems, we employ the Variational Quantum Eigensolver (VQE), a hybrid quantum-classical algorithm that utilizes parameterized quantum circuits and classical optimization routines to approximate the lowest energy eigenstates. In parallel, the dynamical evolution of the system is studied Trotter–Suzuki decomposition, which approximates the time evolution operator by discretizing it into a sequence of implementable quantum gates. These complementary approaches allow for the exploration of both static and time-dependent properties within a unified framework. Using these techniques, we compute key physical observables including ground state energies and energy spectra, which are further used to reconstruct electronic band structures. The quantum simulation results are benchmarked against</p>
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						classical tight-binding calculations to assess their accuracy and computational advantages. This work highlights the potential of quantum computing platforms to simulate lattice Hamiltonians and provides a scalable framework for studying complex quantum materials beyond the capabilities of classical methods.
14	Dr. Mohamed Asan Basiri M	ECE	Dr Mani Shankar Pandey	ECE	Countermeasure design in cache template attack in CPS	The cache template attack works on finding the secret information by exploiting the latency by predicting the cache miss and hit patterns of a crypto algorithm. In a cyber physical system (CPS), it is important to avoid the cache template attack of a crypto card by introducing a countermeasure. It protects the CPS by diluting the timing information related to the cache miss and hit patterns. Our objective is to propose a high-performance FPGA based countermeasure to protect the CPS. Also, we'll prove that our countermeasure achieves more entropy, NPCR, UACI, and Fourier spectral density as compared with the various existing countermeasures.
15	Dr. Mani Shankar Pandey	Department of Sciences	Dr. R. Kabaleeshwaran	CSE	Code-based Cryptography	Code-based cryptography is a prominent area in modern cryptographic research, known for its strong resistance against quantum attacks and its foundation in algebraic coding theory. This research aims to investigate the development of secure cryptographic schemes based on error-correcting codes, with a focus on both theoretical and practical aspects. The study will explore the construction and analysis of algebraic codes, including their structural properties, decoding complexity, and resistance to known attacks. Special emphasis will be given to designing efficient and secure encryption mechanisms inspired

						by code-based systems such as the McEliece cryptosystem. The work will also examine how algebraic structures like rings and modules can be utilized to enhance the performance and security of such schemes. In addition, the research will address challenges related to key size, computational efficiency, and implementation feasibility in real-world communication systems. By integrating algebraic theory with practical considerations, the study aims to contribute to the advancement of post-quantum cryptography and the development of robust, scalable, and secure communication protocol.
16	Dr. M Kiran Reddy	ECE	Dr. Nittala Noel Anurag Prashanth	Department of Sciences	ASR for automatic assessment of dyslexia in school going children	The scope of this research is to develop an AI-powered speech recognition system for the automatic assessment of dyslexia in school-going children. The system analyses children's speech during structured reading and speaking tasks to identify characteristic patterns associated with dyslexia, such as mispronunciations, hesitations, altered rhythm, and phonological errors. Advanced speech recognition models are employed to transcribe and align spoken input, while acoustic and linguistic features are extracted to capture both temporal and articulatory deviations. These features are then used within machine learning frameworks to distinguish between typical and dyslexic speech patterns. The proposed approach aims to provide a non-invasive, objective, and scalable tool for early screening and intervention, helping educators and clinicians identify children at risk of dyslexia.

17	Dr. Kushal Dhar Dwivedi	Department of Sciences	Dr. Shounak Chakraborty	CSE	Inverse Problems in Remote Sensing via Neural-Numerical Fusion	<p>Inverse problems arising in remote sensing and environmental modeling are inherently ill-posed, characterized by incomplete, noisy, and indirect observational data. Traditional numerical approaches for solving such problems, based on ordinary and partial differential equation (ODE/PDE) models, often suffer from instability, high computational cost, and sensitivity to measurement errors. On the other hand, purely data-driven methods using artificial neural networks lack physical interpretability and fail to generalize reliably in data-scarce regimes. This research proposes the development of a hybrid computational framework that integrates numerical methods for ODE/PDEs with advanced neural network architectures to address inverse problems in remote sensing. The proposed approach leverages physics-based constraints through numerical solvers while employing neural networks for efficient parameter estimation, feature extraction, and data assimilation from satellite imagery. Regularization techniques and physics-informed learning strategies will be incorporated to ensure stability, robustness, and consistency with governing physical laws. The framework will be designed to recover unknown physical parameters, boundary conditions, and hidden states in environmental systems from spatiotemporal image data. Applications include soil moisture estimation, atmospheric pollutant reconstruction, and oceanographic parameter identification. The proposed methodology aims to significantly improve accuracy, computational efficiency, and interpretability compared to existing approaches. This interdisciplinary research</p>
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						bridges numerical analysis, machine learning, and remote sensing, contributing to the development of next-generation scientific computing tools for complex real-world systems.
18	Dr. R. Kabaleeshwaran	CSE	Dr. Mani Shankar Pandey	DoS	Secure post-quantum cryptographic protocols	<p>The rapid advancement of quantum computing necessitates the development of cryptographic schemes that remain secure against quantum adversaries. This proposal focuses on the design of post-quantum digital signature schemes based on code-based cryptography, known for its strong security foundations. The research adopts an interdisciplinary approach, combining cryptographic protocol construction with insights from coding theory.</p> <p>A central contribution of this work is the development of novel code-based signature primitives, including blind signatures, ring signatures, and threshold signatures, which are largely unexplored in this domain. These primitives are crucial for enabling privacy-preserving authentication, anonymous communication, and distributed trust. The cryptographic component will emphasize rigorous protocol design and formal security proofs under standard hardness assumptions.</p> <p>In parallel, the mathematical component will focus on the construction and optimization of error-correcting codes and efficient decoding techniques to enhance both security and performance. Practical challenges such as key size reduction, efficiency, and scalability will also be addressed.</p> <p>Overall, this research aims to bridge cryptography and coding theory to develop</p>

						efficient, secure, and functionally rich post-quantum signature schemes, contributing to the advancement of next-generation secure communication systems.
19	Dr. R Kabaleeshwaran	CSE	Dr. M. Asan Basiri	ECE	Post-Quantum Cryptographic Protocols and FPGA Implementation	<p>The advancement of quantum computing necessitates the development of secure and efficient post-quantum cryptographic (PQC) implementations. Lattice-based schemes such as CRYSTALS-Kyber and CRYSTALS-Dilithium are leading candidates, but their computational and memory demands pose significant challenges for hardware realization.</p> <p>This work focuses on the design of optimized FPGA architectures for both key encapsulation and digital signature schemes. The primary contribution is the development of novel hardware optimization techniques, including an efficient Number Theoretic Transform (NTT) module, parallel processing strategies, and memory-aware dataflow designs. These approaches aim to significantly improve latency, throughput, and resource utilization.</p> <p>In addition, side-channel-aware design principles are incorporated to enhance resistance against practical attacks. The proposed architectures also explore performance–area–energy trade-offs to ensure suitability for real-world deployment. Overall, this research advances efficient and secure hardware implementations of PQC, contributing to the practical adoption of post-quantum cryptographic systems.</p>

20	Dr. Rangababu P	ECE	Dr. K Sathya Babu	CSE	Design and implement a hardware accelerator for PQC algorithms	<p>Physical verification is a critical and time-intensive stage in modern Application-Specific Integrated Circuit (ASIC) design, particularly as technology nodes scale below 5 nm and design rules become increasingly complex. Conventional verification methodologies, including Design Rule Checking (DRC) and Layout Versus Schematic (LVS), rely on deterministic rule-based engines and manually developed rule decks, which limit scalability and automation.</p> <p>This paper presents a novel LLM-assisted multi-modal layout verification framework that leverages large language models (LLMs) and vision-language models (VLMs) to enhance automation in physical verification workflows. The proposed approach enables semantic parsing of foundry design rule documentation, automated generation of verification rules (e.g., SVRF), and intelligent debugging of layout violations. Additionally, the framework incorporates multi-modal layout understanding to analyze geometric and topological features of layouts, improving verification accuracy and interpretability.</p> <p>The system is evaluated across both digital and analog design domains. For digital layouts, the framework demonstrates efficient handling of large-scale rule sets and standard cell verification. For analog and mixed-signal designs, it introduces constraint-aware reasoning to address layout symmetry, device matching, and layout-dependent effects, although challenges remain in modeling continuous electrical behavior and parasitic interactions.</p>
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