

RISE-UP 2025 - Project Details

Project ID	Faculty Name	Title of the Project	No. of Interns to be hired	Description of the Project
P2501	Aditya Shankar Sandupatla	Production of Hydrogen and Carbon Nanotubes	One	Production of Hydrogen and Carbon Nanotubes by the decomposition of methane. The project is about making catalyst and studying the reaction to develop best catalyst for industrial use.
P2502	Ajeet Sharma	Understanding Information Transfer in Gene Expression Using Information Theory	Two	Gene expression is a complex process influenced by various regulatory mechanisms. This project applies principles from information theory to quantify and analyze the efficiency of information transfer in gene expression. By exploring entropy, mutual information, and channel capacity, students will investigate how gene expression systems can optimize information flow under biological constraints. The project involves mathematical modeling, computational simulations, and potential applications to real gene expression data.
P2503	Ankit Kathuria	Product Development related to Intelligent Transportation System	One	We will develop small/big products for efficient traffic management.
P2504	Anup Shukla	IoT application in power engineering	One	Monitoring and control of different IEDs using IoT application in Microgrid Network.
P2505	Archana Rajput	Wireless power transfer and energy harvesting	One	The antenna/metasurface, and rectifier will be designed at microwave frequencies under this project for the applications in communications systems.
P2506	Arun Kumar Verma	Design and development of EV chargers and Role of AI ML in autonomous E vehicle	Two	<p>EV Charger Development for Electric Vehicles The development of EV chargers is crucial for the widespread adoption of electric vehicles (EVs). EV chargers are categorized based on their power levels:</p> <p>Level 1 Charging (120V AC) – Suitable for home charging with slow charging rates. Level 2 Charging (240V AC) – Faster charging, commonly used in residential and commercial setups. DC Fast Charging (Level 3) – High-power charging (50 kW – 350 kW) for rapid charging at public stations.</p> <p>Wireless Charging – Uses inductive coupling to charge EVs without physical cables. The focus in EV charger development includes improving efficiency, reducing charging time, and ensuring smart grid integration. Key advancements include:</p> <p>Fast-charging technologies using high-power DC and ultra-fast charging stations. Bidirectional charging (V2G, V2H, V2L) to allow EVs to supply energy back to the grid. Smart charging with IoT-enabled communication for grid optimization. Renewable energy integration to support sustainable charging solutions.</p> <p>Role of AI & ML in Autonomous Electric Vehicles Artificial Intelligence (AI) and Machine Learning (ML) are revolutionizing autonomous electric vehicles (AEVs) in several ways:</p> <p>Autonomous Driving – AI-driven computer vision, LiDAR, and sensor fusion allow EVs to navigate safely, detect obstacles, and make real-time decisions. Battery Management – ML algorithms optimize battery usage, predict battery degradation, and enhance battery lifespan. Smart Route Planning – AI predicts traffic patterns, suggests optimal routes, and minimizes energy consumption for longer battery life. Predictive Maintenance – ML models analyze sensor data to predict component failures, reducing downtime and repair costs. Energy Optimization – AI assists in adaptive energy consumption, ensuring efficient power use based on driving conditions. Personalized User Experience – AI-powered assistants adjust climate control, entertainment, and driving modes based on user preferences. Cybersecurity – AI enhances EV security by detecting anomalies and preventing cyber threats in connected vehicles. The integration of AI and ML in EV charging infrastructure further enables dynamic pricing, demand forecasting, and load balancing, making EVs more efficient and sustainable.</p> <p>As AI technology advances, fully autonomous electric vehicles with self-charging capabilities and seamless grid interaction will become a reality, paving the way for the future of sustainable transportation.</p>

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P2507	B Satya Sekhar	Design of Net Zero Energy Buildings for Army Shelters	Two	Due to the extreme winter (temperatures going down to -30 °C) in Ladakh, space heating is as important as electricity for the local people. The project is proposed for the Ladakh region, where oxygen deficiency exists due to the higher elevation (3.5 to 5 km above mean sea level). The reported oxygen deficiency for this height is typically 40%. During most of the winter months, the windows and doors of the houses are almost closed fully. Under this condition, indoor cooking is done with the help of natural gas, the combustion of which reduces indoor oxygen level. Besides, space heating is done by the traditional 'Kangri', which uses coal/charcoal. Combustion of coal/charcoal in an oxygen-deficient indoor atmosphere leads to the formation of poisonous carbon monoxide, which can lead to the death of the occupants during sleep, which is frequently reported from the Ladakh region. Despite the abundant solar irradiation at Leh-Ladakh, e.g. 7-7.5 kWh/m ² day, a huge amount of diesel is still being used for meeting the daily energy demands of Leh-Ladakh. Building energy has a share of around one-third of the total energy consumption globally. Extensive research efforts are carried out to improve building performance in order to reduce carbon emissions. The focus is on the efficient design of buildings so as to achieve the objective of energy-efficient buildings (EEB).
P2508	Badri Narayan Subudhi	Document Image Forgery Detection using Machine and Deep Learning	Two	<p>In today's fast-paced digital economy, the recruitment landscape is undergoing a massive transformation. Companies are increasingly leveraging online platforms to attract talent, while job seekers are submitting applications from across the globe. However, this shift brings significant challenges in verifying the authenticity of applicant credentials, ensuring identity security, and preventing fraud. The job market is increasingly digitized, yet identity verification and fraud prevention remain critical challenges. Recruiters often face difficulties in manually verifying resumes, academic qualifications, and identity documents, leading to inefficiencies, delays, and potential errors in the hiring process.</p> <p>Fraudulent practices such as falsified resumes, manipulated certificates, and identity theft not only jeopardize the credibility of recruitment processes but also result in significant financial and reputational losses for employers. With fraudulent resumes and identity theft incidents on the rise, the recruitment industry demands innovative solutions to maintain trust and transparency. These issues emphasize the urgent need for an automated, reliable, and scalable solution that addresses the gaps in identity verification and fraud prevention.</p> <p>This project proposes an AI-powered plugin designed to enhance the recruitment process for HR companies, public institutions, and private organizations. Leveraging large verified resume datasets, the system employs advanced machine learning techniques to create an adaptive and scalable solution for identity verification and fraud prevention. This tool will offer seamless integration with existing HR management systems globally. The system will leverage large amount of verified resume datasets and advanced AI technologies to create a plugin that seamlessly integrates with HR platforms, public institutions, and private organizations worldwide.</p>
P2509	Chandan Yadav	2D material based Semiconductor Device Modeling and Simulation	One	Two-dimensional (2D) materials in channel of a MOS transistor promise excellent gate control on channel and extreme device scaling. However, numerous issues faced by 2D material-based FETs need to be addressed to enable the lab-to-fab transition. In order to address different issues in semiconductor devices, modeling and simulation plays important role. Focus of the work is to develop an analytical model of a novel 2D material-based devices and to perform circuit simulation.
P2510	Chembolu Vinay	Laboratory experiments on flow-vegetation interactions	Two	The intern will conduct experiments on flow vegetation interactions in a large open channel flume.
P2511	Deepak Yadav	Mathematical model of dampers	One	Parameter optimization using MATLAB. Candidate must be proficient in using MATLAB.
P2512	Dharitri Rath	Smart Sensors for Healthcare Applications.	One	<p>Affordable healthcare solutions are the need of the hour. In this context, smart diagnostic devices are catching up in the race, with the aid of digital solutions such as IoT based sensors as well as the use of artificial intelligence and machine learning platforms.</p> <p>Microfluidics plays an important role in designing these miniaturized devices. Therefore the basic fabrication of the devices, as well as tailor them towards various applications would be the focus of this internship.</p>

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P2513	Vijay Kumar Pal	AI based robotic skin	Two	1) Fabrication of soft robotics 2) collection of data from real human body 3) AI and ML enabling in the device
P2514	Ambika Prasad Shah	Hardware Implementation of AI Models for Edge Computing	Two	Hardware implementation of AI models is crucial for achieving high-performance, energy-efficient, and real-time processing in edge applications. Interns needs to explores various AI hardware accelerators, including FPGAs, ASICs, and neuromorphic computing, optimizing architectures for deep learning inference and training. Key considerations include parallelism, memory access patterns, and power consumption. By leveraging hardware-aware AI design, this internship aims to enhance processing speed, reduce latency, and improve overall system reliability, making AI deployment feasible in resource-constrained environments like IoT, robotics, and autonomous systems.
P2515	Ankit Tyagi	Green Hydrogen Synthesis	Two	Development of electrolyzers and electrocatalyst for green hydrogen production
P2516	Padmini Singh	Development of Drone Controllers for Quaternion Models	One	Developing drone controllers for quaternion-based models involves designing control algorithms that handle orientation and stability efficiently while avoiding singularities associated with Euler angles.
P2517	Shiva S	Fabrication of Magnetic materials using additive manufacturing	One	Different types of magnetic materials are to be fabricated using additive manufacturing technique for BLDC motor applications. The intern is expected to work with the research scholars in the lab to contribute in the process mentioned.
P2518	Gaurav A Bhaduri	Intensification of phytochemical extraction	One	The student has to optimise the extraction of phytochemicals form biomass
P2519	Gurubrahamam Ramani	Photochemical Insertion of Alkynyl Carbenes into C-H bonds	One	Photochemical decomposition of alkynyl diazoacetates into alkynyl carbenes and their insertion into different kinds of bonds will be executed.
P2520	Harish Pothukuchi	Physics Informed Neural Networks (PINNs)	One	The reliability and robustness of Machine learning models depend on the size of data set. Using the laws of physics that govern the engineering problems, the accuracy of the ML model predictions can be improved.
P2521	Jayaramulu Kolleboyina	Upcycling Waste Materials for Efficient CO ₂ Reduction	Two	The continuous accumulation of anthropogenic CO ₂ has led to severe environmental consequences, including global warming and ocean acidification. Addressing this challenge requires innovative materials for CO ₂ capture and conversion. Porous materials derived from waste sources have emerged as cost-effective and sustainable candidates due to their hierarchical pore structures, high surface area, and excellent catalytic performance. These materials enhance catalysis by facilitating reactant access to active sites, thereby improving CO ₂ adsorption and reduction efficiency. This project highlights recent advancements, challenges, and future directions in designing scalable porous carbons for practical CO ₂ mitigation applications.
P2522	Karan Nathwani	Speaker Localization using Machine Learning	One	Speaker Localization using Machine Learning

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P2523	Kishore Kumar Jagini	Development of a Microcontroller-Based Toolkit for Cognitive Science Research	One	<p>This project aims to develop a custom microcontroller-based toolkit designed to precisely trigger and monitor multisensory stimuli (visual, auditory, and tactile) with high temporal accuracy. The toolkit will be seamlessly integrated with psychological experiments running on platforms such as MATLAB and Python, enabling researchers in Cognitive Science to study perception, attention, and response dynamics with millisecond precision.</p> <p>The project aims to achieve two key objectives.</p> <p>Objective 1: Monitoring and Timestamping of Sensory Events</p> <ul style="list-style-type: none"> - Capture and log critical experimental events, including stimulus presentation onset, off-set, response initiation, and response duration. - Implement high-resolution timestamping to ensure precise synchronisation of stimuli and responses. <p>Objective 2: Triggering Multiple Sensory Stimuli</p> <ul style="list-style-type: none"> - Use a microcontroller-based system to control and trigger sensory stimuli (visual, auditory, tactile) with precise timing. - Allow for customisable stimulus parameters such as intensity, duration, and inter-stimulus interval, ensuring flexibility for different experimental paradigms. <p>By integrating real-time control and synchronisation mechanisms, this toolkit will provide a robust and cost-effective solution for multisensory research, enhancing the accuracy and reproducibility of cognitive science experiments.</p> <p>Who Can Apply for the Internship? We are looking for interns with a background in electronics who have experience in Arduino/Microcontroller programming and interfacing with sensors, are interested in psychology and cognitive science, enjoy working on interdisciplinary projects that mix technology and human behaviour research.</p> <p>Benefits to the Intern: This internship is an excellent opportunity for anyone interested in bridging technology and human behaviour research while developing practical skills in electronics, programming, and cognitive science.</p>
P2524	Kushmanda Saurav	Microwave Structures for Communication/Sensing Applications	One	<p>The project is intended for the design and characterization of microwave structures which can find application in communication/sensors. The designs of antenna/periodic structures in microwave frequency bands can be explored. The knowledge of electromagnetic simulators is desirable.</p>

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P2525	Mithu Baidya	Structure and Function of GPCRs	One	This project will elucidate the structural and functional dynamics of GPCRs, exploring how ligand binding induces conformational changes that activate G proteins and initiate downstream signaling cascades. We will investigate the diverse ligand-binding modes and receptor activation mechanisms of various GPCRs, using a combination of biochemical, biophysical, and computational approaches. Our research will also examine the dynamic regulation of GPCR signaling, including receptor desensitization, internalization, and biased agonism.
P2526	Moni Kumari	Elliptic curves and modular forms	Two	Elliptic curves and modular forms are two profound concepts in modern number theory that have deeply interconnected structures. An elliptic curve is a smooth, projective algebraic curve of genus one, defined over a field, with a specified point serving as its identity. These curves are described by cubic equations of the form $y^2 = x^3 + ax + b$, and they possess a group structure that makes them central to areas such as cryptography, algebraic geometry, and the proof of Fermat's Last Theorem. Modular forms, on the other hand, are complex analytic functions on the upper half-plane that exhibit a high degree of symmetry under the action of the modular group. They can be expressed as q-series and have Fourier expansions with rich arithmetic properties. The surprising and deep connection between these two objects is encapsulated in the Modularity Theorem, which states that every rational elliptic curve is modular.
P2527	Mrinmoy Bhattacharjee	Movie Genre Classification	Two	The project aims to develop a system that extracts the music type and speech emotion cues from the movie trailer audio and uses them to perform movie genre classification
P2528	Nalin Kumar Sharma	Development of a Socially Aware Navigation and Control for Autonomous Wheelchairs	Two	This internship focuses on developing a socially aware navigation model for autonomous wheelchairs, ensuring safe movement in crowded environments like airports and hospitals. The intern will implement an Empathic Social Force Model (ESFM) that considers human body posture, field of view, hand gestures, and social interactions to predict crowd motion. The project involves integrating ESFM into a robotic framework, and testing its effectiveness. The intern will gain hands-on experience with ROS, Gazebo, and Python-based simulations and experiments. The expected outcome is an improved control of autonomous wheelchair that enhances wheelchair adaptability and acceptance in real-world settings.
P2529	Navneet Kumar	Patterns in salt deposition	One	Salt precipitates in several mysterious ways when a droplet is allowed to evaporate. NaCl forms crystals while MgSO ₄ forms the so-called 'Mikado' pattern. Additionally, the way salt precipitates in the presence of a porous network is even more interesting particularly with respect to Desalination techniques and in agricultural sciences. The project aims to explore pattern recognition across several scenarios that can eventually be useful across these applications.
P2530	Nitin Kumar	Modelling and analysis of machine repair problem with disasters	One	In queuing theory, a "machine repair problem" refers to a scenario where multiple machines in a system can fail at random intervals, creating a queue of broken machines waiting to be repaired by a limited number of repair technicians, essentially modelling the situation as a queuing system where the "customers" are the failing machines and the "servers" are the repair personnel. It is a classic application of queuing theory to analyse system efficiency and potential bottlenecks in manufacturing environments. In this project, we will model a machine repair problem and analyse the effect of various types of disasters on this model.

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P2531	Pankaj Chauhan	Designing and Developing New Substrates for Asymmetric Reactions	One	This project aim to develop new substrates for asymmetric transformations, mainly the domino reaction leading to complex molecular structures.
P2532	Pratik Kumar	Bioremediation of Wastewater	One	Removal of persistent organic pollutants of emerging nature from domestic wastewater. A novel adsorbent and bioculture combination for offering a sustainable solution to the (bio) remediation purpose.
P2533	Prof Anurag Misra	Development of low carbon cementitious binder using graphene oxide	One	Ordinary Portland cement is responsible for high carbon dioxide emission. To address this issue in production of OPC, IIT Jammu is working on developing low carbon cement formulations. Engineered graphene oxide could be used as performance improver in these low carbon formulations, which are highly efficient and give far less carbon emission as compared to OPC. The present project would explore the possibilities of using waste derived graphene oxide for the development of low carbon cement formulations and the durability of concrete prepared with such cements
P2534	Rajendra Varma	Development of Precast PSC panels for Roads	One	Development of Precast PSC panels for Roads will be there. The student will make these panels and test them under various loading condition. The numerical and experimental simulation will be done for PSC panels.
P2535	Rajkumar V	Functionally graded 3D printing of multi-functional components	One	<p>This project focuses on the advanced fabrication of functionally graded materials (FGMs) using 3D printing techniques to develop multi-functional components with tailored properties. FGMs enable a gradual transition in material composition and structure, enhancing mechanical strength, thermal resistance, and electrical conductivity for high-performance applications in aerospace, biomedical, and automotive industries.</p> <p>Interns will work on: Designing and optimizing functionally graded structures Experimenting with multi-material 3D printing techniques Conducting mechanical and thermal property evaluations Exploring potential industrial applications of FGMs</p> <p>This is an excellent opportunity for students interested in additive manufacturing, materials science, and engineering applications.</p>
P2536	Ravi Kumar Arun	Microfluidic batteries for biosensors	One	The project is to develop microscale batteries for miniaturized devices such as sensors, wearable electronics and healthcare devices. The energy device would be integrated with such energy consuming devices for practical application.

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P2537	Riya Bhowmik	Rockfall Hazard Susceptibility Mapping in Himalayan Region using Machine Learning Models and GIS	One	<p>This project focuses on developing a rockfall susceptibility map for the Himalayan region using machine learning models. The study aims to create predictive models and hazard risk maps that identify areas most vulnerable to rockfalls. The models will be based on both regular triggering factors (e.g., precipitation, slope aspect, slope angle, weathering, lithology, etc) and specific parameters (e.g., RQD, Qslope,etc.), as well as historical rockfall incidents.</p> <p>The candidate for this project should possess a strong understanding of fundamental geotechnical engineering concepts, with expertise in slope stability. Additionally, proficiency in GIS tools such as ArcGIS or QGIS, along with a solid grasp of machine learning models, is essential for successful project execution.</p>
P2538	Roshan Udaram Patil	Hydrogen Permeation and Its Effect on Fracture Behavior of Engineering Alloys	One	<p>Hydrogen permeation into materials can significantly alter their mechanical properties, leading to embrittlement and premature failure. This project focuses on understanding the diffusion of hydrogen in engineering materials and its role in fracture mechanisms. The study will explore how hydrogen interacts with microstructural features and influences crack initiation and propagation.</p>
P2539	Samaresh Bera	Implementation of Use-Case Scenarios and Network Performance Evaluation using 5G Lab Testbed at IIT Jammu	Two	<p>IIT Jammu is one of the recipients of 100 5G use case labs funded by Govt. of India. The lab is set up, and it is fully functional. The objective of this project is to evaluate the network performance, such as throughput, latency, and packet drop, of the core network for different use-case scenarios. The candidate must have a strong understanding of Linux commands, virtual machines, and docker containers. By executing the objectives, the candidate has the opportunity to work on a production-ready 5G network environment and implement different use-case scenarios integrated with Drones, AR/VR, and IoT devices.</p>
P2540	Sameer K S P	Tensile testing of UHPC specimen	One	<p>A low weight high strength construction material is being developed at IIT Jammu which is to be used for defence purposes. The aim is to test this material in uniaxial tension to evaluate its mechanical properties.</p>
P2541	Sanat Kumar Tiwari	Improving seed germination using plasma Activated Water	One	<p>This project aims to enhance seed germination and improve crop resilience to biotic and abiotic stresses using plasma-activated water (PAW). A plasma jet, powered by a radio-frequency (RF) source, will generate dielectric barrier discharge (DBD) plasma, which will activate water by introducing reactive nitrogen and oxygen species (RNS & ROS). These reactive species, with varying lifetimes and biological effects, will be utilized to treat seeds from local crop varieties by soaking them in PAW and analyzing their germination rates and early growth performance. Additionally, PAW will be used during the plant growth phase to evaluate its role in strengthening resistance to environmental stresses such as drought, heatwaves, and strong winds. By leveraging plasma technology, this study aims to develop a sustainable, chemical-free approach to enhancing crop productivity and stress tolerance, offering a promising solution for resilient agriculture.</p>
P2542	Santhilal Subhash	Unraveling Tissue-Specific RNA Profiles in Female Reproductive Organs via NGS-Based Computational Analysis	One	<p>The female reproductive system exhibits complex tissue-specific gene expression patterns essential for physiological function and disease progression. Next-generation sequencing (NGS) technologies have revolutionized transcriptomic studies, enabling precise characterization of RNA profiles across different tissues. In this study, we leverage computational approaches to analyze tissue-specific RNA expression in female reproductive organs using publicly available RNA sequencing data from The Cancer Genome Atlas (TCGA). Our analysis focuses on key reproductive tissues, including the ovary, uterus, and cervix, to identify tissue-enriched transcripts, and potential regulatory networks.</p> <p>By employing robust bioinformatics pipelines, including quality control, normalization, statistical methods, and functional enrichment, we uncover distinct RNA signatures that define each organ's transcriptional landscape. Furthermore, we integrate pathway and gene ontology analyses to elucidate the biological roles of these tissue-specific transcripts. Our findings highlight key molecular players involved in reproductive organ function and provide insights into potential dysregulation in malignancies such as ovarian, endometrial, and cervical cancers.</p> <p>This study underscores the power of NGS-based computational profiling in decoding tissue-specific transcriptomic landscapes and identifying candidate biomarkers for reproductive health and disease. By utilizing TCGA's vast dataset, our research contributes to a deeper understanding of gene expression dynamics in female reproductive organs, paving the way for future investigations into precision medicine and targeted therapies.</p>

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P2543	Sarada Prasad Gochhayat	Analysing Post Quantum Algorithms for QUIC Protocol	One	With the growing advancements in quantum computers and quantum cryptography, traditional algorithms like RSA, ECDH, etc., become vulnerable to attacks caused by quantum computers and algorithms like Shor's algorithm or Grover's quantum search. While current systems are not capable of breaking the traditional algorithms and to prevent attacks like store-now/decrypt-later, companies like Google and Cloudflare have already shifted their current communication protocols to post-quantum cryptography. Communication protocols such as TCP, TLS, SSH, and QUIC widely use traditional and post-quantum cryptographic algorithms to perform key exchanges for handshake protocols and certificate signing. Among these is the QUIC protocol, which is developed by Google. It is a newer protocol and is gaining a lot of popularity due to its characteristics like fast, connectionless, scalable, fewer requests, and useful for time-sensitive transmissions like Video Streaming or DNS lookup. The project aims to develop a framework or tool that can analyze and evaluate websites using post-quantum algorithms in their QUIC protocol and provide an analysis of vulnerabilities if they are not using post-quantum algorithms or the algorithms are not complying with the NIST standardization.
P2544	Shanmugas	Development of microgas turbine engines for combat drones (UCAVs)	One	Modern aerial warfare will be highly dominated by combat drones and turbojet engines have been identified as the ideal propulsion system for such applications. The project aims to conduct preliminary design and experiments to develop a compact micro gas turbine engine for powering combat drones. The proposed work involves the design and analysis of compressor and turbine sections and preliminary experimental studies.
P2545	Shirsha Bose	Development of silk-based hydrogels for urological applications	One	Urethral stricture is a blockage in the urethra (more common in aged male) which leads to poor passage of urine and might lead to damage of the urinary bladder and kidneys. Although it is possible to remove stricture via dilation or urethrotomy, yet, the former is a repetitive technique while the long term success of the latter is rather limited. In severe cases, the surgeons recommend opting for an urethroplasty which involves reconstruction of urethra using tissues from other body parts (e.g. buccal mucosa). However, this has sometime limitations including donor site morbidity, limited tissue etc. Hence, it is essential to develop suitable biomimetic and biocompatible scaffolds which will assist in the regeneration of the damaged urethra.
P2546	Shivnath Mazumder	Automated Discovery of a Catalyst Data Bank for C-H Activation of Biomass-Derived Platforms	One	The lignin fraction found in lignocellulosic biomass is of particular importance as it is the second most abundant biopolymer after cellulose. It is an attractive system since it is low-cost and is the principal natural source of aromatics. Although lignin is a major coproduct of cellulose production in the paper and pulp industry, it remains underused for chemical production because of its heterogeneous structure and the limited technology for its selective conversion. C-H activation is considered as one of the key strategies for cost-efficient functionalisation of naturally available biomass-derived organic feedstock. This method can enable the access to a variety of novel materials with demands in diverse fields, e.g., polymer science, pharmaceutical industry etc. There is a need for sustainable processes for conversion of biomass into chemicals that can be used as post-petroleum. In this project, we aim to develop Earth-abundant metal-based sustainable catalysts through a hybrid approach of Density Functional Theory (DFT) and Machine Learning (ML) techniques for C-H activation in biomass-derived lignin models.
P2547	Srinivasan N	Design and validation of specimen geometry for biaxial testing of composites	Two	Small-scale multi-axial mechanical testing of composites has been gaining significant importance in recent times, in order to understand the mechanical behaviour at smaller length scales. This work will focus on numerical simulation of miniature cruciform geometries of composite specimens followed by experimental validation of the proposed geometry using an biaxial test frame.
P2548	Srishilan C	Modelling of Slag flow for metal extraction process	One	Slag a by product of Metal extraction industry is composed of various oxides. The project will involve the modelling of slag flow through various geometry to analyse the velocity and temperature profile. The modeling process can involve combination of water, wax and/OR computational modelling based on interest of intern. The intern has to modify the existing setup OR existing code as per requirement and generate results. At the end of internship intern will gain knowledge about slag, chemistry, properties, utilization methods. Intern will get hands on experience on either coding platform and use it for research purpose OR fabrication of setup during modifications of existing water model. Expectation: Interest in either fabrication of setup OR Interest in coding.

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P2549	Subhas Samanta	Chemical conversion of Carbondioxide and Small molecule activation	Two	In this project chemical conversion of CO ₂ with epoxides will be studied using transition metal complexes as catalyst. In view of this, a new catalyst will be synthesized and characterized. These catalyst will also explored for other small molecule activation reaction as well as organometallic catalytic applications.
P2550	Suman Banerjee	Influence Maximization for Billboard Advertisement	One	In this project we will explore several influence maximization techniques applicable to billboard advertisement. Also, we will look into the corresponding regret analysis approaches.
P2551	Supriyo Chakraborty	Computational study to understand void formation at the anode-electrolyte interface of all-solid-state-batteries	One	Lithium (Li) batteries play a pivotal role in energy storage for the renewable sectors such as solar and wind energy. Despite having the highest specific capacity (3860 mAh/g), Li metal anode is rarely used in practical applications due to its safety concerns. However, with the advent of all-solid-state batteries (ASSB) with solid electrolyte, there is a renewed interest in Li metal anode for high energy density applications. Although ASSBs are attractive, they are not free of concerns. Commonly reported issues in ASSBs are i) contact loss at the anode-electrolyte interface due to inhomogeneous material flow at the interface, ii) void formation at the anode-electrolyte interface, iii) dendrite growth during plating etc. Most of these issues are directly or indirectly related to the mechanical properties of the constituent material. Therefore, understanding the complex interplay among electrical, chemical and mechanical driving forces will be crucial for a safe and working battery design. This project will be directed towards developing a multi-physics modeling framework for fundamental understanding of the electro-chemo-mechanical effects and providing guidelines for safer Li metal solid-state battery design. This project will utilize phase-field and crystal-plasticity modeling techniques to achieve the goals. Interns will get hands-on experience with coding, numerical methods, high-performance computing and advanced data analysis tools.
P2552	Surendra Beniwal	Embedded Circuit for Acquisition of Ultrasonic Data	One	This project focuses on the development of an embedded circuit designed for the automatic transmission, reception, and acquisition of ultrasonic signals. The system will integrate a micro-controller to generate excitation pulses, control signal transmission, and process received echoes with high precision. The embedded circuit will handle automatic transmission, reception, and signal processing. It will incorporate programmable pulse generation and high-speed ADC for accurate ultrasonic signal acquisition. Additionally, the designed system will be later synchronized with the robotic platform, which will feature adaptive motion control, surface-conforming mechanisms, and real-time data transfer for efficient scanning.
P2553	Uma Ranjan	Diffusion Models for Indic Language Translation	Two	This project will explore the application of latent diffusion models to characterize Indic languages with the specific goal of sentiment analysis. The dataset will be from the public repository developed by AI for Bharat.
P2554	Ved Prakash Ranjan	Solid waste characterization for a Sustainable Residential Campus	One	This project aims to assess and analyze the solid waste generated within a residential institution to develop sustainable waste management strategies. The intern will conduct a systematic waste audit by categorizing waste into different streams, such as biodegradable, recyclable, and non-recyclable, and analyze seasonal or daily variations in waste generation. The data collected will help identify key waste sources and inefficiencies in the current waste management system. Additionally, the project will explore potential waste reduction strategies, recycling opportunities, and sustainable disposal methods. The findings will contribute to developing an improved waste management framework tailored to the institution's needs, promoting environmental sustainability and resource efficiency.
P2555	Vijayan Pallippattu	Influence of inventory on the steady state performance of two-phase natural circulation systems	One	The project requires a steady state analysis with different initial inventory starting from 100%. Our aim here is to obtain the following data: a) the inventory at peak steady state two-phase flow occurs, b) the inventory at which the two-phase natural circulation breaks down and c) the inventory at which heat up of the core occurs The calculations will be repeated for loops of different diameter and at different pressures. Then we will do experiments in an experimental loop currently being set up at IIT Jammu.

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P2556	Dr. Rohit Chaurasiya	VLSI-Algorithm Design, Digital VLSI Circuit Design, ASIC Chip Design and FPGA Prototyping of Post-Processing tasks for Quantum Key Distribution Systems.	One	The intern is expected to a) Focus on carrying out high-level simulation (MATLAB/ Python) of the Post-Processing tasks (or sub-task) for Quantum Key Distribution Systems. b) Carryout the Digital Design, RTL Coding and FPGA Implementation of the Post-Processing tasks (or sub-task) for Quantum Key Distribution Systems.
P2557	Dr. Rohit Chaurasiya	VLSI-Algorithm Design, Digital VLSI Circuit Design, ASIC Chip Design and FPGA Prototyping of Wideband Spectrum Sensors for Cognitive Radio Network.	One	(Either a & b / c of following): The intern is expected to a) Focus on carrying out high-level simulation (MATLAB/ Python) of the wideband spectrum sensing algorithm. b) Carryout the Digital Design, RTL Coding and FPGA Implementation of the wideband spectrum sensing algorithm for Cognitive Radio Network. c) Carry out Analog Circuit Design and Implementation of Sub-Nyquist Multi-coset Sampler.
P2558	Dr. Karan Nathwani	Infant cry analysis using machine learning	One	Infant cry analysis using machine learning : Here, it is advised to identify the reasons for cry.
P2559	Dr. Karan Nathwani	Robust direction of arrival estimation via eigne microphone in neural network framework	One	Robust direction of arrival estimation via eigen microphone in neural network framework
P2560	Dr. R T Durai Prabhakaran	Kinematic Design and Simulation of Below Knee Prosthetics	One	Below knee prosthetics need a redesign. A new Mechanism should be designed by modifying exiting ankle foot design
P2561	Dr. R T Durai Prabhakaran	Impact Analysis of Hybrid Composites	One	Impact Modelling and Analysis of a composite is done by using Abaqus/FE models. Mainly to compare low velocity impact properties and damage simulation is done during the work.
P2562	Dr. Sidharth Maheshwari	Molecular Diagnostics for Water Quality Monitoring.	One	Conducting wet lab and dry lab experiments on ambient water samples for identifying microbial diversity of water. Conducting bioinformatic analysis of genomic data for analysis and visualization. Biotechnology/Biology/Bioinformatics background required.
P2563	Dr. Sidharth Maheshwari	Building Embedded Cluster from Scratch and implementing OpenMP based distributed computing framework using Single-Board Computers.	One	Ergonomic design and building of the cluster for Odroid N2+ boards and integrating with the network switch and power supply. Using OpenMP to deploy distributed computing framework.

Project ID	Faculty Name	Title of the Project	No. of Interns to be hired	Description of the Project
P2564	Dr. Satyadev Ahlawat	Securing the Hardware Devices against Side channel Attacks.	One	Securing Hardware Devices Against Side-Channel Attacks Side-channel attacks exploit unintended information leakage from hardware devices, such as power consumption, Scan, timing, or EM to infer sensitive data like cryptographic keys. This problem focuses on developing security mechanisms, including hardware obfuscation, secure scan, and secure circuit designs, to mitigate these vulnerabilities and protect hardware from malicious exploitation.
P2565	Dr. Satyadev Ahlawat	Deploying light weight ML models on FPGA	One	Deploying Lightweight ML Models on FPGA Field Programmable Gate Arrays (FPGAs) offer energy-efficient and high-performance computing for machine learning (ML) applications. This problem involves optimizing and deploying lightweight ML models on FPGAs, focusing on reducing computational complexity, memory footprint, and power consumption while maintaining accuracy. The goal is to enhance real-time processing for embedded and edge AI systems.
P2566	Prof. Vijayan Pallippattu	Steady state, transient and stability experiments in a rectangular loop with different orientations of the cooler.	One	The summer internship involves setting up a rectangular natural circulation loop for which all the material and the design drawings are available. The student has already made the drawings and the hardware items are purchased. During the summer internship, the loop will be fabricated and installed in the natural circulation lab. The steady state experiments will be started during this period.
P2567	Dr. Yamuna Prasad	Data collection and analysis for LLMs in Indian context	One	Data collection and analysis for Large Language Models (LLMs) in the Indian context, specifically for Dogri, Gojri, and Pashto, require a systematic approach to resource creation, annotation, and model training. These languages, spoken in Jammu & Kashmir and parts of northern India, suffer from limited digital corpora, necessitating efforts in web scraping, digitization of folk literature, and crowdsourced text collection. High-quality parallel corpora, phonetic lexicons, and syntactic datasets are essential for training robust LLMs. Additionally, sentiment analysis, named entity recognition (NER), and dialect modeling are crucial for enhancing linguistic representation. Leveraging AI-driven translation tools, government initiatives, and academic collaborations can help bridge the digital divide for these underrepresented languages.
P2568	Dr. Yamuna Prasad	Securing ML models deployed on Cloud	One	Securing Machine Learning (ML) models deployed on the cloud requires a multi-layered security approach to protect against threats like model theft, adversarial attacks, and data breaches. Key strategies include encrypting model artifacts, implementing access control policies (IAM roles, OAuth, API gateways), and using secure enclaves or confidential computing to safeguard inference requests. Regular adversarial robustness testing, monitoring for model drift and malicious inputs, and integrating homomorphic encryption or differential privacy can enhance security. Additionally, logging, auditing, and compliance with standards like GDPR and HIPAA ensure both regulatory and operational protection for cloud-based ML systems.
P2569	Dr Pervaiz Fathima Khatoun M.	Experimental investigations on corrosion of reinforced concrete	One	Corrosion of steel is one of the major drawbacks of RC structures located in extreme environments. The project aims to conduct accelerated corrosion tests on reinforced concrete to understand the phenomenon and suggest suitable measures to counter corrosion and enhance strength of corroded structures.