

AREAS OF RESEARCH:

S. No.	Faculty Name	Suggestive title of projects/research area	Short description
1	Ankit Dubey Assistant Professor Electrical Engineering https://iitjammu.ac.in/ankit-dubey	ML for communication, SDR for Defence Applications, and IoT Security	Application of ML algorithms for improving Communication System's performance such as BER, Data Rate, and Physical Layer Security. SDR is one of the key technologies that improves the development time and also provides flexible operation. Designing new algorithms and codes for various applications.
6	Dr. Sudhakar Modem Assistant Professor Electrical Engineering https://iitjammu.ac.in/sudhakar-modem	Radio frequency based energy harvesting, 5G, IoT	Performance analysis of RF energy harvesting networks. Prototype design of IoT modules which can operate based on harvested energy.
12	Joby Varghese Assistant Professor Humanities and Social Sciences	Values in science and technology; Testimonial knowledge in pharmaceutical research and clinical	The role of non-epistemic values such as ethical, social, political values in scientific research; The problems and feasibility of testimonial scientific knowledge claims;

	https://iitjammu.ac.in/jo-by-varghese	trials; Ethics; Bioethics	Addressing the problem of epistemic risk which encroaches through funding effect, lack of freedom and preference bias during a scientific research so that to a certain extent the scientific knowledge claims which are gained through testimony can be made more plausible; Normative and applied ethics
13	B. Satya Sekhar Assistant Professor Mechanical Engineering https://iitjammu.ac.in/b-satya-sekhar	Hydrogen Energy, Renewable Energy Systems	Research and development of hybrid renewable energy storage system. Numerical and experimental studies on thermally driven hydrogen compressor.
14	Sukanya Mondal Assistant Professor Humanities and Social Sciences https://iitjammu.ac.in/sukanya-mondal	South Asian Subaltern Studies, Voices from the margin, Masculinity Studies	Literature that represents the underprivileged sections of society, Literature that defines various aspects of normative masculinity or problematizes those norms, colonial war literature and masculinity
15,	Pankaj Chauhan Assistant Professor Chemistry https://iitjammu.ac.in/pankaj-chauhan	Asymmetric Synthesis, Organocatalysis Photocatalysis and Electrocatalysis	Development of novel asymmetric methods for procuring potentially bioactive molecules by employing, chiral organocatalyst and merging them with Photo- and Electrocatalysis

16.	Dr. Gaurav Varshney Assistant Professor Computer Science & Engineering https://iitjammu.ac.in/gaurav-varshney	Anti Phishing, Anti Spying, Data Protection and Data Tracking over Internet, Security Policies and Protocols, Application Layer Security Mechanisms, Memory Forensics and Security, Digital Payments Security.	PhD positions are available for applied security enthusiasts in the area of Network and Application layer security. You are expected to have a basic understanding of protocol stack and the working of the Internet and Web as a whole. Knowledge of Crypto is a plus. Solutions will be developed in the area of Anti Phishing, Spying, data protection, data tracking on the Internet.
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17.	Dr. Alok Kumar Saxena Assistant Professor Electrical Engineering https://iitjammu.ac.in/alok-kumar-saxena	Finite-Difference Time-Domain (FDTD) Method and Multi-band Microwave Devices	1. Development of novel FDTD methods with low numerical dispersion error, and their implementation for different practical simulations 2. Development of Multi-band Microwave Devices for the 5G technology
18.	Dr. Rimen Jamatia Assistant Engineering Civil Engineering https://iitjammu.ac.in/rimen-jamatia	Constitutive modeling of quasi brittle materials under cyclic loading	Effect of coupling between damage and plasticity on Size effect in concrete materials under active and passive confinement

19.	Suman Sarkar Materials Engineering https://iitjammu.ac.in/suman-sarkar	(Non-Equilibrium Materials Processing) Precipitation of microscopic shape memory particles in the crystalline copper matrix Evolution of novel pseudo elastic effects. Areas: Rapid Solidification, Electron Microscopy, Phase-transformations, Alloy Development.	The shape memory effect (SME) has attracted more and more attention in recent years. A few shape memory related new phenomena have also been identified. The interesting part of this project is that the first time we will try to introduce some moderate volume fraction of precipitate particles with shape memory alloy composition (Fe-Mn-Si) in the crystalline copper matrix. As we know that the copper does not show the shape memory effects but those shape memory precipitate particles embedded in the copper matrix will introduce pseudo-elasticity or super elasticity effect in the Cu-Fe-Mn-Si alloy system. This project will be the first novel approach of shape memory particle precipitation in crystalline matrix. One can expect of new and exciting property evolution in copper based alloys by the introduction of this mechanism.
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20.	Saurabh Biswas Assistant Professor Mechanical Engineering https://iitjammu.ac.in/saurabh-biswas	Geometrically nonlinear flexible beams undergoing large rotations.	Beams undergoing large rotations but small strains are found in many engineering applications, e.g., robotics, aircraft structures, precision machines. Large rotation of beams introduces geometric nonlinearity in the system. The goal of this study is to develop a computational model of a multibody system of beams undergoing large rotations. Subsequently, reduced order models from the full computational model will be developed.

21.	Sayantan Mandal Assistant Professor Humanities and Social Sciences https://iitjammu.ac.in/sayantan-mandal	Sociology of Education, ICT and Education, Teaching Learning, Social development, Higher Education, Education Policy, NQF, Ladakh.	Innovative Teaching-Learning approaches, ICT and its uses in Education - integrating ICT and Teaching Learning in Indian Higher Educational Institutions; Higher education - issues related to policy, international and transnational policy analysis; Qualification Frameworks, Teacher Professional Development - focusing on school and higher education, Government Schemes and programmes; Social research on High Altitude Himalayas, Ladakh.
22	Ravikant Saini Assistant Professor Electrical Engineering https://iitjammu.ac.in/ravikant-saini	TeraHertz Communication, Cooperative NOMA	Terahertz band is a band of opportunities with data rates in the range of Tbps. However, the band has serious issues with wave propagation, as waves get absorbed. We wish to develop a channel model and investigate suitable modulation/coding scheme for Terahertz link. NOMA is a promising option being considered for next generation communication network. We wish to investigate cooperative NOMA.
23	Surendra Beniwal Assistant Professor Civil Engineering https://iitjammu.ac.in/surendra-beniwal	Ultrasonic Nondestructive Evaluation, SHM of Civil Structures, Micromechanical Modeling	Ultrasonic bond mapping of rebars and corrosion signature detection with body and surface waves, Structural condition and in-situ strength assessment of steel joints with guided wave based monitoring.

24	<p>Subhas Samanta Assistant Professor Chemistry https://iitjammu.ac.in/subhas-samanta</p>	Bio-mimetic oxidation catalysis	The project aims to develop first row transition metal complexes mimicking the reactivity of biologically relevant enzymes and metalloproteins for oxidation reactions
25	<p>Shivnath Mazumder Assistant Professor Chemistry https://iitjammu.ac.in/shivnath-mazumder</p>	Computational Design of Photo Catalytic Water-Splitting Complexes	The project targets to rationally design novel photo-catalytic water-splitting complexes for production of hydrogen gas. The H ₂ can be used as an alternative fuel for transportation.
26	<p>Kankat Ghosh Assistant Professor Electrical Engineering https://iitjammu.ac.in/kankat-ghosh</p>	Analytical modeling of ISBT (Intersubband Transition) based Al(In)GaN/GaN heterostructure devices for IR (infrared) and THz applications	<p>Intersubband (ISB) transitions are electronic transitions between confined levels in the conduction band. III-nitride semiconductors present a large conduction band offset (≈ 1.8 eV for GaN/AlN). Therefore, it becomes feasible to fabricate ISB devices operating in the near-IR spectral range, particularly in the 1.3– 1.55μm wavelength window for fiber-optic communications. Also due to its large LO phonon energy (91meV), GaN has the potential to operate at higher temperature than GaAs and to cover the whole THz domain.</p> <p>Devices: Quantum Cascade Laser, THz quantum-well photodetector.</p>

27	Satyadev Ahlawat Assistant Professor Electrical Engineering https://iitjammu.ac.in/satyadev-ahlawat	Effective Testing of Integrated Circuits for Automobiles; Security issues in modern day chips.	Automobile/autonomous-vehicles require reliable integrated circuits which can be ensured by proper testing. Security is another issue in integrated circuits which needs to be addressed.
28	Tanmay Sarkar Assistant Professor Mathematics https://iitjammu.ac.in/tanmay-sarkar	Analytical and numerical study of certain partial differential equations.	1. Devise efficient numerical schemes of the fractional KdV equations along with error analysis. 2. Study the optimal control problems arising in production systems and subsequently, perform the sensitivity analysis.
29	Sartaj Ul Hasan Assistant Professor Mathematics https://sites.google.com/site/sartajulhasan/	Finite Fields and Applications	1. To study c -differential uniformity and boomerang uniformity of certain known classes of planar and almost planar functions over finite fields. 2. Study of permutation polynomials over finite fields. 3. Study of linear recurring sequences of maximum possible period over finite fields.

			liner for MSW storage, flexible storage reservoir, etc.) 7. Pilot study on Bio-sewerage treatment Plants, Bio-gas, Grey/Rain water harvesting using Vetiver grass, Typha
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31	<p>R T Durai Prabhakaran Associate Professor Mechanical Engineering https://iitjammu.ac.in/R.T.DuraiPrabhakaran</p>	<p>Fibre/matrix interface design and its effect on Fatigue Strength of Polymer Composites</p>	<p>The interface between the reinforcing agent and the matrix plays a pivotal role in determining the mechanical properties of composite materials. A strong interface creates a material that displays exemplary strength and stiffness but is very brittle in nature with easy crack propagation through the matrix and fibre. A weaker interface reduces the efficiency of stress transfer from the matrix to the fibre and consequently the strength and stiffness are not as high, but in contrast, toughness is increased.</p> <p>An experimental study and numerical simulations is planned to evaluate the effect of fibre/matrix interface over the fatigue and impact strength of polymer composites modifying fibre sizings.</p> <p>This work will have collaboration with IIT Delhi</p>
		<p>Design and manufacture of Carbon/Carbon Composites for brakes and discs applications</p>	<p>The need of efficient use of energy & materials is being felt strongly because of diminishing resources in the present times. There has been an important role of materials in the development of civilizations. In the transportation sector when earlier large bulky automobiles are compared with today's lightweight, technologically superior vehicles. Carbon-carbon composites are a new class of engineering materials that are ceramic in nature but exhibit</p>

			<p>brittle to pseudoplastic behaviour. Carbon-carbon is a unique all carbon composite with carbon fibre embedded in carbon matrix and is known as an inverse composite. Due to their excellent thermo-structural properties, carbon carbon composites are used in specialised application like re-entry nose-tips, leading edges, rocket nozzles, and aircraft brake discs apart from several industrial and biomedical applications. Present works aims to develop experimental set-up at IITJammu campus for processing carbon/carbon composites and expand the work towards design and manufacture of carbon/carbon discs and brakes for automotive/aircraft applications. This work will have collaboration with IIT Delhi and Scottish Research laboratory (LMC/AFRC, Glasgow).</p>
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		<p>Green Buildings and Indoor Air Quality</p>	<p>Sustainable or “green” building design and construction is a method of wisely using resources to create high quality, healthier and more energy efficient homes and commercial buildings. A green building is more than the sum of its parts (think resource conservation)—its process and impacts matter, too.</p> <p>This work involves developing innovative applications of building physics research tools and, in a broader context, systemic modelling and assessment of future green buildings and indoor environment.</p> <p>This work will have collaboration with JNTUA and Bangor</p>
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		<p>Design for X abilities of Wind Turbine Structures (Optimization to improve turbine efficiency using lightweight materials)</p>	<p>Rotor designs suffer from the accumulation of minor losses resulting from: Tip losses, Wake effects, Drivetrain efficiency losses, Blade shape simplification losses. Evaluate current aerodynamic profiles and modify blade design to account bamboo/natural fibre blade designs.</p> <p>Design and Manufacturing of Natural fibre composites based on lightweighting principles. The output of this work is enhance practical efficiency of energy output by minimizing losses and match closeby to maximum theoretical efficiency.</p> <p>Wind resource assessments will be carried nearby to campus to evaluate the possibilities for experimental wind turbine installation.</p> <p>This work will have collaborations possibly with National Institute of Wind Energy (CWET), Chennai.</p>
		<p>Design and development of ultralight, strong, superinsulating aerogel composites for water purification applications</p>	<p>Water pollution is a global problem threatening the entire biosphere and affecting the life of many millions of people around the world. Not only is water pollution one of the foremost global risk factors for illness, diseases and death, but it also contributes to the continuous reduction of the available drinkable water worldwide.</p> <p>Present work aims to develop aerogel composite membranes for purifying polluted water.</p> <p>This work will have collaborations</p>

			possibly with ACG, University of Strathclyde and MG University, Kottayam.
32	Sanat Kumar Tiwari Assistant Professor Physics https://iitjammu.ac.in/sanat-k-tiwari	Visco-elastic properties of dusty plasma medium in DC discharge based experiments.	
		Thermodynamic and transport properties of plasmas through machine learning techniques	
32	Karan Nathwani Assistant Professor Electrical Engineering https://iitjammu.ac.in/karan-nathwani	Speech Intelligibility Improvement, Speech Enhancement, Speech Recognition, Underwater Signal Processing, Adaptive Signal Processing	Pathological speech usually refers to the condition of speech distortion resulting from atypicalities in voice and/or in the articulatory mechanisms owing to disease, illness or other physical or biological insult to the production system. While automatic evaluation of speech intelligibility and quality could come in handy in these scenarios to assist in diagnosis and treatment design, the many sources and types of variability often make it a very challenging computational processing problem.

33	Sumit Kumar Pandey Assistant Professor Computer Science & Engineering https://iitjammu.ac.in/su/sumit-k-pandey	Efficient design of symmetric and asymmetric cryptographic primitives and their cryptanalysis, quantum computation, quantum cryptography and quantum cryptanalysis.	NIST is conducting a competition for lightweight cryptography to protect small electronics. These solutions mainly use symmetric cryptography. The security of symmetric key cryptographic primitives significantly depends upon the resistance against the existing attacks and thus a thorough cryptanalysis is required for each cipher before its final acceptance.
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			In recent years, there is a considerable advancement in the field of the development of quantum computers. Once the quantum computer becomes reality, factorisation and discrete log problem based public key cryptosystems will become insecure. Therefore, NIST is conducting another competition for the selection of postquantum public key encryption, key-establishment algorithms and digital signature schemes. Thus, the postquantum algorithms may be inevitable for the future. Not only that, there will be a sudden need of those cryptosystems which will be suitable for quantum computers only which leads to a deep research in the area of quantum computation and quantum cryptography.
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34.	<p>Ajay Kumar Assistant Professor Mathematics https://iitjammu.ac.in/aj_ay-kumar</p>	Combinatorial Commutative Algebra	<p>The symbiosis of combinatorics and commutative algebra have proved beneficial for many branches of mathematics. Many problems in combinatorics can be proved using tools of commutative algebra. Graphs and simplicial complexes play an important role in combinatorial commutative algebra. In order to see the relationship between commutative algebra and combinatorics, one can associate monomial ideals to certain combinatorial objects such as graphs, simplicial complexes. Thus it is always interesting to find the relationship between combinatorial invariants of a combinatorial object and algebraic invariants of the associated monomial ideal.</p>
35.	<p>Pervaiz Fathima Khatoon Civil Engineering https://iitjammu.ac.in/pervaiz-fathima-km</p>	Studies on fatigue crack propagation in reinforced concrete	<p>The research work includes experimental investigations on fatigue crack propagation in reinforced concrete specimens and develop analytical models.</p>
36	<p>Anup Shukla Department of Electrical Engineering https://iitjammu.ac.in/electrical_engineering/faculty-list/~anupshukla</p>	Renewable integration in power systems, Distributed Generations and Smart Grid, Robust and efficient system operation and planning	<ol style="list-style-type: none"> 1. Using an efficient methods and algorithms for the optimum scheduling of distribution energy resources 2. Impacts of high penetration of distributed generation (mainly renewable, non-dispatch able and highly variable resources such as PV) on the distribution system. 3. To investigate hassle-free operation of micro-grids embedded distribution systems under unwanted disturbance in grid and critical loads during abnormal conditions.

<p>37</p>	<p>Badri Narayan Subudhi Department of Electrical Engg.</p> <p>https://sites.google.com/view/badrisubudhi/home</p>	<ol style="list-style-type: none"> 1. Underwater Video Surveillance 2. Multi-camera Video surveillance 	<ol style="list-style-type: none"> 1. Surveillance is one of the key issues in computer vision. A surveillance system can be used in various fields including: sports to transport, farming to exploration of wildlife, and monitoring the nuclear reactor to study the cell and tissue behaviors. Although lots of work has already been done in visual tracking, but most of them have focused on outdoor environment. It is interesting to note that contrary to the aforementioned, a very less work is done for underwater surveillance, whereas almost three fourth of the globe is covered by water bodies. Thus, the demand of the time is to design and develop systems that can be used for the surveillance of underwater environments. Object detection and tracking are the key activities of an underwater surveillance system. Tracking in underwater scenario is quite challenging because of number of reasons, such as: dense haze, decolorization, improper lighting, poor contrast, etc. The underwater objects are mostly deformable, and keep on changing their shape. Besides these issues, camouflage and occlusion are two conventional challenges in tracking. 2. 'Smart cities' uses distributed camera sensor platforms from video surveillance to provide securities at several important scenarios that includes: meteorological stations, monitoring flows from traffic to sewerage and providing information in real-time or in anticipation of risks. Smart cities are required to develop smart and robust information sharing and communication technologies
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			<p>to improve the efficiency and sustainability of urban spaces while reducing costs and resource consumption. In the context of surveillance, smart cities monitor citizens through strategically placed sensors around the urban landscape, which collect data regarding many different factors of urban living. From these sensors, data is transmitted, aggregated and analyzed by governments and other local authorities in order to extrapolate information about the challenges the city faces in sectors such as crime prevention, traffic management, energy use and waste reduction. This serves to facilitate better urban planning and allows governments to tailor their services to the local population.</p>
38	<p>Satyadev Ahlawat Dept. of Electrical Engineering https://iitjammu.ac.in/faculty-page/~satyadevahlawat</p>	<p>Side Channel Analysis of Cryptographic chips</p>	<p>Cryptographic algorithms are often implemented on dedicated hardware for high throughput. These algorithms are resistant to known cryptanalysis attacks, however, the cryptographic chips are vulnerable to side channel attacks. Side channel analysis of these chips is very critical to ensure system integrity.</p>
39	<p>Ankur Bansal (Electrical Engineering) https://iitjammu.ac.in/faculty-page/~ankurbansal</p>	<ol style="list-style-type: none"> 1) Radio over FSO (RoFSO) Communication System 2) Quantum Communication 3) IRS-Assisted Hybrid VLC-RF Communication System with Simultaneous information and power transfer 4) Energy Efficient UAV communication for IRS-Assisted IoT Network 	<ol style="list-style-type: none"> 1) A technique of simultaneous transmission of a wide spectrum of RF signals in both directions over an FSO link is known as RoFSO. 2) Quantum communication is related to quantum information processing. It is useful in protecting information channels against eavesdropping by means of quantum cryptography. 3) Intelligent reflecting surface (IRS) is an emerging technology for next-generation wireless communications with the aim of improving the spectral/energy efficiency of the wireless networks.

			4) Unmanned aerial vehicles (UAVs) can act as aerial base stations for offloading traffic, relaying, broadcasting, and collecting information from IoT networks.
40	<p>Ambika Prasad Shah Discipline of Electrical Engineering</p> <p>https://iitjammu.ac.in/faculty-page/~ambikaprasadshah</p>	<ol style="list-style-type: none"> 1) Radiation hardened circuit designs for space applications. 2) BTI aware and soft-error tolerant circuit designs 3) Quantum-dot cellular automata based fault tolerant and cost-efficient circuit designs 	<ol style="list-style-type: none"> 1) Radiation hardening is the process of making electronic circuits resistant to damage or malfunction caused by high levels of ionizing radiation (particle radiation), especially for high energy environments like space. The proper radiation hardened circuit designs are useful to improve the circuit performance. 2) Bias temperature instability (BTI) is one of the most significant reliability issues for new generations of CMOS devices. The origin of BTI is due to single defects in the oxide or at the semiconductor interface, which can get charged under normal operating conditions. The degradation can become accelerated and more pronounced at raised temperatures. The trapped charges in both kinds of devices may increase the transistors' threshold voltage and degrade the device transconductance and mobility. As a result, BTI causes a degradation of device performance over time, which may lead to timing errors, Jitter and reduced noise margins in logic and memories. 3) Quantum dot Cellular Automata (QCA), owing to its high density, small size and ultra-low power dissipation in the nano regime while operating at high frequencies (in the range of few THz) has made it as an emerging technology to design digital

			circuits in the sub nano regime where CMOS is facing its limitations. Over the last decade, it has been exhaustively used to design various logic circuits with improved performance.
41	<p>Amit Kumar Singh Assistant Professor Department of Electrical Engineering,</p> <p>https://iitjammu.ac.in/electrical_engineering/faculty-list/~amitkumarsingh</p>	<p>Millimeter Wave High Gain Beam Steerable Meta-Antenna Design, Massive MIMO Antenna for 5G and beyond, Drone Detection and Anti-Drone Systems, Radars, Software Defined Radio Based Solutions and Electromagnetic warfare.</p>	<p>Designing and Development of Millimeter Wave High Gain Antennas using Microwave Radiator and Metasurface Lens, Designing and Development of Easy Deployable High Gain Reflector Antenna for Microsatellite Using Metamaterial.</p> <p>UAVs are one of the major technologies for electronic warfare. Designing and Development of Drone Detection System for Millimeter Wave Band and Designing of Anti-Drone Systems will be the major part of this project.</p>
42	<p>Dr Gaurav A Bhaduri Assistant Professor Chemical Engineering https://iitjammu.ac.in/gaurav-bhaduri</p>	<p>Process Intensification, Environmental Engineering, Biochemical Engineering, Food Engineering, Plasmonics, Nanotechnology, Process Design and Scale-up.</p>	<p>Development of intensified processes for sustainable chemical and material synthesis or separation. Optimization of equipment design parameters as well as process design parameters will be studied. Process intensification techniques like, static mixers, oscillatory baffled reactors, microwave reactors, sonochemical reactors would be studied. Application to various areas of Engineering.</p>

43	Dr Sameer Kumar Sarima Pachalla	Impact Behaviour of concrete panels made out of Ultra High Performance concrete (UHPC)	UHPC is a relatively new material with superior properties than that of regular concrete. Very high strength steel fibers are used to improve the tensile strength and performance of elements made out of such concrete. Impact behaviour of such elements is very critical when used in structures like nuclear plants etc. The research work experimentally evaluates the impact behaviour of UHPC slabs.
44	Venkata Sathish Akella Department of Physics	Soft Matter Physics (Experimental and Computational Active Matter Physics)	Active matter is an ensemble of agents with each agent consuming energy (either from surroundings or from within) to carry out various tasks and thus remains out of equilibrium at all times. Usually, the interaction/communication among the “active” agents results in interesting collective dynamics and these dynamics are usually not observed at a single agent level. Furthermore, the underlying causes for these overall dynamics are diverse. Common examples of active matter are bird flocks, fish schools, bacterial colonies etc. Several experimental, theoretical and computational studies aim to understand these dynamics from basic principles.
45.	Debolina Ghatak Department of Computer Science and Engineering	Statistical Data Security	The uses of statistical data sets is not new in the world of research or industrial purposes but if any publicly available data set contains some sensitive information about a specific person it becomes unfair to release it in its raw form publicly. In such a situation the data set needs to be protected before any information is released. The mechanisms that deal with the purpose of maximising utility of released data-set after ensuring

			privacy guarantee is studied in the problem of Data Obfuscation. We try to build ideal mechanisms to meet the purpose.
46.	Dr. Shiva S Department of Mechanical Engineering	Additive manufacturing of metals, Material Characterizations	Mechanical components are to be fabricated using two different types of additive manufacturing. The respective materials characterizations are to be carried out and their properties analyses are to be done with both experiment and modelling.
47	Dr V Rajkumar Department of Mechanical Engineering	1. Selective laser sintering of composite materials	<ul style="list-style-type: none"> ● Identification of various composition of polymer based composite materials ● Thermal, physical and microstructure analysis of the candidate material ● Laser sintering responses of the candidate material ● Numerical modelling of SLS process ● Post processing investigation of laser sintered samples. ● 3D printing for the final end use component.
	https://iitjammu.ac.in/mechanical_engineering/faculty-list/~vrajkumar	2. 3D auxetic lattice structure fabrication by selective laser sintering process: metamaterials evaluation and process optimization	<ul style="list-style-type: none"> ● The systematic approach of powder evaluation and process optimization for the SLS system. ● Fabrication of 3D auxetic lattice structures by selective laser sintering of metamaterials. ● The 3D-printed metamaterials with negative Poisson ratios are capable of retaining such unusual deformations at large strains and withstanding repeated compression cycling of deformations.

		3. Synthesis of polymer/nanofillers nanocomposite powders for the selective laser sintering process	<ul style="list-style-type: none"> ● To design and fabrication product or component with high mechanical properties using nanocomposite on SLS process ● Powder particles analysis to look at the feasibility for the SLS process ● Pre-processing material characterization ● SLS of nanocomposite material ● Post processing ● 3D printing of final end use component
		4. Machine learning for real time optimization of Selective laser sintering process	To develop a framework in which machine learning could be used to predict and optimize parameters SLS machines. More specifically this research focuses on optimizing parameters for density prediction and developing framework which can be used for further optimization of various other material characterizations.
48	<p>Dr. Navneet Kumar</p> <p>Mechanical Engineering</p> <p>https://iitjammu.ac.in/mechanical_engineering/faculty-list/~navneetkumar</p>	<p>(a) Evaporation considerations in Young-Laplace equation applied to a wick in cooling devices</p> <p>(b) Boiling of a liquid in another liquid</p>	<p>The classical Young-Laplace equation does not consider the phase change at the meniscus. If the liquid rise velocity is of the order of phase change speed, the Young-Laplace equation changes drastically. Due to the same reason, this concept cannot be applied to liquid rising in a wick or an evaporator, the most crucial component in the heat pipes and other cooling devices. The focus here will be on understanding such fundamental limits but also applied to the cooling sectors.</p> <p>It is a very interesting configuration. Ideally, using this setup, we can achieve the desired heat transport quite easily at much lower heat load as compared to a single liquid. The problem is of fundamental nature as</p>

(c) Soil-less agriculture or aeroponics

(d) Possibility of the formation of ice from water and water from air purely based on mass transfer.

well. Here, we will try to address the nucleation dynamics and bubble growth followed by bubble forest development. There would exist a plethora of new regimes of convection in this configuration, ready to be explored and unearthed.

‘Space’ is the main concern everywhere. In this project, we will explore the feasibility, benefits, and issues related to soil-less agriculture starting from edible crops like potato to cash crops like English cucumber (Kheera), Shimla Mirch, etc. This project has a locational impact as well. Plus, it would be of great help in Urban and Periurban agricultural practices. Thermodynamics-based characteristics of various parts of the plants would be given initial impetus, which would be followed by a thorough heat and mass transfer analysis.

In early times (1000 years back), humans used to produce ice purely through radiation heat transfer in a clear night sky. Though the process was time consuming, it still is a classical example of mechanical engineering. In this project, the idea is to produce ice through a different mechanism viz. mass transfer, like how a pitcher cools water. On the other hand, a passive device would also be explored which can produce water from air. This method of producing purest forms of water may be beneficial to remote areas of India especially in arid zones.

49	Dr. Jayaramulu Kolleboyina Department of Chemistry http://jrams.in/index.php	Hybrid Porous Materials-2D Materials for various environmental (water purification, gas storage/separation, catalysis) and energy (water splitting, CO2 capture/reduction, Battery) applications.	To conduct interdisciplinary research on structure-property and characterisation of various porous materials, low-dimensional nanomaterials, including graphene, other two-dimensional layer materials for energy storage/conversion, catalysis applications
50	Dr Vijayan Pallippattu Krishnan	Energy systems, nuclear, solar and Renewables	Thermal hydraulics of nuclear and solar thermal systems, natural circulation systems, stability, thermosyphon heat transport devices, nuclear reactor safety, diverse passive fuel cooling systems, mini solar thermal plant, solar space heating and indoor cooking.
51	Manmohan Vashisth, Department of Mathematics https://manmohanvashisth.github.io/	<ol style="list-style-type: none"> 1. Inverse Problems 2. Partial Differential Equations 3. Integral Geometry 4. Direct and inverse scattering theory 	My research area includes inverse problems related to partial differential equations (PDEs), integral geometry and scattering theory. These problems have a wide range of applications in the various fields of science and technology. For example these problems arise in the study of seismic imaging, thermo acoustic and photo acoustic tomography, ultrasound imaging, vibrating string, piezoelectricity, radar imaging, quantum mechanics, cosmic strings etc. We are interested in inverse coefficients and shape identification problems for PDEs.

52	Varsha Singh Assistant Professor Humanities and Social Sciences	Image Studies, Culture Studies, Translation Studies, Popular and Folk Literature, Gender Studies, Science Fiction, Media Studies and Literary Theory	Visual and Graphic Narratives, Adaptations and Retelling of epics, Vernacular and Oral Traditions Gendered Identities and their representation in Literature
53	Ajay Singh, Department of Electrical Engineering	<ol style="list-style-type: none"> 1. Molecular Communications 2. Wireless Powered Communications 3. Physical Layer Security 	Secrecy performance analysis of molecular communications and wireless powered communications systems.
54	Sahil Kalra Department of Mechanical Engineering	Control System Design, Robotics and Control, Applications of Finite Elements in Static and Dynamic systems, Mechanical Vibration (Modal Analysis), Pattern Reconfigurable Antennas, Shape Memory Alloys	<p>Research Interests:-</p> <p>Control theory and its applications to the Engineering problems</p> <p>Structural Health Monitoring</p> <p>Robotics and Automation</p> <p>Smart Materials and structures</p> <p>Reconfigurable space structures</p>
55	Amlan Kumar Pal, Department of Chemistry	Solid state lighting (OLED, LEEC, TADF), Photo- and Electro-catalytic Hydrogen evolution, Renewable Energy research, Photoredox Catalysis, Design and Development of Solar Cell (dye sensitized and perovskite), NIR Emitters and Applications, Electrochemistry and Molecular modelling	Synthesis of organic materials and coordination complexes for solid state lighting applications and photoredox catalysis. Synthesis and applications of light harvesting transition metal complexes for near Infra-red emission and fabrication of dye-sensitised solar cells. Synthesis, structure-property relationship study and applications of earth-abundant metal complexes for photo- and

			electro-catalytic hydrogen evolution mimicking an artificial photosynthetic system.
56	Srishilan C, Materials Engineering	Process Metallurgy	<p>1) Modelling of Iron and Steel making processes</p> <p>2) Alternative routes of iron making</p> <p>3) Utilization of metallurgical wastes</p>
57	<p>Shanmugadas K. P. Department of Mechanical Engineering.</p> <p>https://iitjammu.ac.in/mechanical_engineering/faculty-list/~shanmugadaskp</p>	<p>Research interests: Atomization, combustion, experimental fluid dynamics.</p> <p>Project titles:</p> <p>(1) Development of micro gas turbine combustors for power generation and UAV applications.</p> <p>(2) Development of liquid rocket fuel injection systems</p> <p>(3) Spray/droplet wall interaction and collision dynamics</p>	<p>(1) This project aims to develop a compact low emission microgas turbine combustor technology suitable for unmanned aerial vehicles and for small scale power generation. Experiments will be conducted using 3D printed combustor hardware to investigate the operability, multi-fuel capabilities, emissions and stability profiles of the combustor.</p> <p>(2) This research program involves the development of coaxial throttleable fuel injectors for reusable liquid rocket engines. The internal atomization and two-phase flow characteristics will be investigated experimentally using various laser diagnostic facilities such as PIV, PDPA and LIF.</p> <p>(3) Interaction of the liquid drop/spray on solid surfaces is an important collision phenomenon which finds various applications in</p>

			<p>the field of spray drying, molten metal sprays, agricultural sprays, gas-turbine and IC engine fuel sprays. A good theoretical framework based on physical models needs to be established to understand the fundamental flow processes. Detailed experimental studies along with theoretical modelling are planned to capture the flow physics involved in the spray wall interaction process focusing on drop/spray impact, film dynamics, film transport processes.</p>
58	Dr. Pothukuchi Harish Discipline of Mechanical Engineering	<ol style="list-style-type: none"> 1. Subatmospheric boiling 2. Fluid Structure Interaction 3. Dispersed phase flow dynamics 	<ol style="list-style-type: none"> 1. The study of boiling at subatmospheric pressure conditions enables the derivation of two phase data for the liquid metals using scaling. 2. Study and control of FIV in fuel rod bundles. 3. Study of post-dryout heat transfer.
59	Riya Bhowmik Discipline of Civil Engineering	<ol style="list-style-type: none"> 1. Geosynthetic solutions for disasters 2. Geosynthetic behaviour under various loading conditions 3. Geoenvironmental Engineering 	<ul style="list-style-type: none"> ● Protection works against landslides (debris flow/rockfall/mudslides) in hilly regions. ● Monitoring and mapping of landslides in Jammu region. ● Shearing behaviour of geosynthetics and other reinforcing materials at the interface under various load conditions. ● Geosynthetic solutions to

			<p>stabilise landfill cover systems on steep slopes.</p> <ul style="list-style-type: none"> ● Feasibility of using low-quality soils as backfill material in reinforced slopes.
60	<p>Devesh Jinwala (Adjunct Professor in CSE, can act only as co-Supervisor, with other local main Supervisor. http://www.svnit.ac.in/dcj/)</p>	<ol style="list-style-type: none"> 1. Information Security & Privacy in Resource Constrained Environments/Cyber Physical Systems.. 2. Information Security & Privacy Issues in Cloud deployments. 3. Software Requirements Specifications and Verification. 	<ol style="list-style-type: none"> 1. Extending the existing state-of-the-art in Searchable Encryption (Simple/Inverted/Symmetric/Asymmetric key) and Key Aggregate Searchable Encryption schemes with Privacy Preservation in Cloud (w.r. to Query expressiveness/Result verification/other research gaps) with focus on EHR applications, but not limited to. /* Requires Cloud Computing , Information Security/Privacy, Cryptography and Good math skills. (With probably any/all of Subhasis Bhattacharjee, Yamuna Prasad?)*/* 2. Extending the existing state-of-the-art in Mitigating DoS Attacks on the RPL protocol in 6LowPAN for IoT with focus on applications in Environmental Monitoring, Cyber Physical Systems using Machine Learning and/or Generative Adversarial Networks /* Requires Internet of Things , Information Security/Privacy, Cryptography, Machine Learning and Good math skills. (With probably any/all of Prof M S Gaur, Subhasis Bhattacharjee, Yamuna Prasad?) */ 3. Extending the existing state-of-the-art in Identifying and Resolving Conflicts in the Non-functional

			<p>Requirements specified by the user in Natural Language. /* Requires Basic Software Engineering, Requirements Specifications, Natural Language and Formal Specifications, Soft Computing and Good math skills. (With probably any/all of Subhasis Bhattacharjee, Yamuna Prasad?) */</p> <p>4. Extending the existing state-of-the-art in identifying the Security Vulnerabilities in the User Requirements Specifications using either Model-based approach or alternative approaches. /* Requires Basic Software Engineering, Requirements Specifications, Formal Specifications, Information Security. (With Subhasis Bhattacharjee?) */</p> <p>5. Investigating the application of Static Analysis (i.e. Software Design Verification) for detecting Security Vulnerabilities in the Cyber Physical System Application Designs. /* Requires Internet of Things , Information Security/Privacy, Software Engineering/Static Analysis Techniques skills. (With probably any/all of Prof M S Gaur, Subhasis Bhattacharjee, Yamuna Prasad?) */</p> <p>6. Extending the existing state-of-the-art in the Static analysis tools for Design verification and Dynamic testing tools with a focus on integration and on Security Vulnerabilities /* Requires Information Security/Privacy, Software Engineering/Static</p>
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			Analysis Techniques skills. (With probably Subhasis Bhattacharjee?) */
61	Prof. Dinesh K Pandya, Visiting Professor, Departments of Physics and Materials Engineering	Thin Film Science and Technology, Nano-materials, Functional Materials, Nucleation and Growth, 2-D epitaxy, Electrodeposition, Chemical Bath Deposition, Sputtering, In-situ RHEED, HRTEM, FESEM, XPS, GAXRD, XRR, MOKE, FMR Characterizations & Analyses	Electronic Materials, Spintronics, Magneto-transport, Spin Dynamics, Thin Film Solar Cells, Thermoelectrics and Photoelectrochemical Energy Conversion, Transparent Conductors, Quantum Materials, Nanowires and Quantum Dots, Ultrathin Multilayers, Heterostructures
62	Goutam Dutta Mechanical Engg.	Nonlinear analysis of thermal-hydraulic instability in sub- and super-critical fluid systems and prediction of heat transfer behaviour Thermal-hydraulic instability analysis of micro-channels	The work is purely based on computational work. In-house computer program already developed is to be extended for the integration of different modules. Fast transients are to be analyzed. The work is purely based on computational work. In-house computer program is to be developed to solve nonlinear partial differential equations relevant for fluid flow and heat transfer problems. The model is

		<p>Multi-physics problem formulation involving reactor kinetics and thermal-hydraulics</p>	<p>to be validated with the results obtained through commercial software packages.</p> <p>Nuclear coupled thermal hydraulic model is to be developed and validated against the standard benchmark. Scope might involve collaboration with DAE scientists to investigate a real nuclear reactor.</p>
63	<p>Vinay Sharma Materials Engineering</p>	<p>Bio-active nanomaterials, Biosensors, Nanopore technology, Nano-Theranostics, Bioimaging probes, Healthcare devices, Nanomedicine, Anticancer nanotechnology</p>	<p>The research is aimed at development of various nanomaterial-based biosensors for healthcare. The use of nanotechnology in gene delivery and theranostics is one of the areas of interest. The long-term goal is to harness nanopore technology in bio-medical applications.</p>

64	<p>Ashutosh Yadav Chemical Engineering</p> <p>https://iitjammu.ac.in/chemical-engineering/faculty-list/~ashutoshyadav</p>	<p>Multiphase Reactors, Computational Fluid Dynamics (CFD), Machine Learning, Process design, Petroleum Refining</p>	<p>The research work are related to advancing the knowledge and understanding of multiphase reaction engineering, reactors and processes via experimental and Computational Fluid Dynamic (CFD), modeling of transport – kinetic interactions; design, scale-up and performance of multiphase flow system for sustainable energy and environment, production of clean energy, bio-energy, fuels, chemicals, petrochemical, petroleum, biomass and coal conversion, wastes treatment, etc.</p>
65	<p>Guru Brahamam Ramani Assistant Professor</p> <p>Dept. of Chemistry</p> <p>https://iitjammu.ac.in/chemistry/faculty-list/~gurubramani</p>	<p>Asymmetric Synthesis, Hypervalent Iodine Chemistry, Organocatalysis, Photoredox Catalysis, and Frustrated Lewis Pair Catalysis.</p>	<p>Designing new asymmetric synthetic transformations relying on small-molecule catalysis and radical chemistry. The emphasis will be given on finding new disconnections using umpolung reactions and unprecedented C-H functionalization reactions. The aim is to develop enantioselective strategies towards obtaining drug-like molecules in the shortest and economical way.</p>
66	<p>Yogesh M. Nimdeo</p> <p>Assistant Professor</p> <p>Chemical Engineering Dept.</p> <p>https://iitjammu.ac.in/faculty/~yogeshmadhukarraonimdeo</p>	<ol style="list-style-type: none"> 1. Non-continuum energy and mass diffusion studies. 2. Physical behavior and dynamics of glass, gel, and sol forming colloidal suspensions. 3. Development of optical techniques for engineering and bio-medical applications. 4. Applications of optical sensing techniques for transport phenomena studies. 5. Design, optimization, and intensification of separation processes having applications in various sectors like food, biochemical, biomedical, petroleum, pharmaceutical, cosmetics, chemical 	<p>Our group is interested in understanding thermo-physical behavior and dynamics of structured fluids using optical as well as non-optical techniques. We combine expertise from Chemical Engineering, Mechanical Engineering, Physics, Chemistry, and Materials Science to understand molecular phenomena that are responsible for the flow behavior under varying deformation fields. The major thrust area of our group is to understand the effect of deformation on the variety of soft glassy materials such as concentrated suspensions, glassy polymers and polymer nanocomposites. We are also intensely involved in understanding transport phenomena in various heat transfer, mass transfer, and fluid flow processes like boiling, evaporation, crystallization, etc.</p>

		waste treatment etc..	using non-invasive optical techniques. The outcomes of the studies have great applications in the design, optimization, and intensification of several separation processes.
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67	<p>Dr. Pratik Kumar</p> <p>Assistant Professor</p> <p>Civil Engineering</p> <p>E-mail: pratik21992@gmail.com</p> <p>https://scholar.google.com/</p>	<p>Municipal and Industrial Wastewater Treatment: Membrane Bioreactor (MBR); Moving Bed Biofilm Reactor (MBBR); Granular Biofiltration.</p> <p>Drinking water treatment of surface water source: Advance Granular filtration system</p> <p>Title: <i>Advance wastewater treatment solution envisioned for smart cities in India: A decentralized and modular treatment approach</i></p>	<p>1. The project will focus on the advance wastewater treatment approaches for both MBR and MBBR systems.</p> <p>2. The application of both these systems is visioned to build a modular/decentralized treatment system for both municipal as well as industrial wastewater.</p> <p>3. The project is dedicated to the advance development of water sector in India with context to the smart city vision as proposed by the Government of India.</p> <p>#Motivation for the Project on drinking water (depending on candidate`s interest) is same as mentioned in point no. 3</p>
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