Title of the project	Name and affiliation of the PI	Names and affiliations of each of the collaborating faculty.	Summary of the project
Development of Angular Shaped High Strength Artificial Aggregates for the Utilization in Pavement Base and Sub-Base	Bhupendra Singh Department of Civil and Infrastructure Engineering	Dr. Anand Krishnan Plappally, Associate Professor, Mechanical Engineering, IIT Jodhpur	The present research project aims at utilizing fly ash, mine tailing, and other additives to develop high-strength artificial aggregates for road construction. This will help to solve the problem of waste disposal and also helps in reducing adverse environmental effects related to the mining of new aggregates
Radiation hard Gallium Nitride transistor for IoT enabled dosimeter	MAHESH Kumar EE, IIT Jodhpur	Satyajit Sahu, Department of Physics	The objectives of the project are as follows, 1. Deposition and characterizations of thin films by RF Sputtering 2. Fabrication of GaN high electron mobility transistors using photolithograph 3. Electrical characterizations of the fabricated transistors. 4. Deposition of high-k dielectrics on the Gate 5. Radiation studies of the transistor 6. Integration with IoT platform
Conversion of wastewater and exhaust gas CO_2 into algae biomass-Scaling up	Meenu Chhabra BSBE/CETSD	Dr. Prasenjit Sarkar (Assistant Professor, CE/CETSD), Dr. Hardik Kothadia (Assistant Professor, ME/CETSD)	The proposal 'Conversion of wastewater and exhaust gas CO_2 into algae biomass-Scaling up' will involve chemical capture followed by biological conversion of CO_2 to algae biomass. The process is aided by an integrated Microbial Fuel Cell. The study will address optimization and understanding of operational parameters such as gas-liquid mass transport, reactor design, mathematical modeling, and synchronous interaction of unit operations. In addition, a study on algae harvesting and water recycling rates will be undertaken. Another objective of the proposal will be to undertake sustainability analysis at a 1000 l scale and present a demonstrable unit for industrial operations.
Prospecting for novel nanosystems from Thar-desert's extremophiles for healthcare and environmental application	Dr. Indranil Banerjee Department of Bioscience and Bioengineering, Secondary affiliation: IDRP, Smart Healthcare, IIT Jodhpur	1. Dr. Raviraj Vankayala, Department of Bioscience and Bioengineering, Secondary affiliation: IDRP, Smart Healthcare, IIT Jodhpur 2. Dr. Neha Jain, Department of Bioscience and Bioengineering, Secondary affiliation: Emerging Technologies for Sustainable Development (CETSD), IIT Jodhpur 3.Dr. Shankar Manoharan, Department of Bioscience and Bioengineering, IIT Jodhpur 4.Dr. Ritu Gupta, Department of Chemistry, IIT Jodhpur 5.Dr. Pranay Ranjan, Department of Metallurgical and Materials Engineering, Secondary affiliation: IDRP, Smart Healthcare, IIT Jodhpur	The project aims to explore the extremophiles of the Thar desert of India to discover a broad class of microbial nanomaterials with novel compositions and multi-functionalities. Further, it is to exploit the bioengineering machinery of those extremophiles for fine-tuning the production and properties of those nanomaterials for healthcare and environmental applications. The project is aligned with the multi-institutional collaborative research among IIT Jodhpur, University of Buffalo, and IIT Delhi. The project needs a comprehensive knowledge and expertise of microbial nanosystems, nanosystem characterizations, and molecular biology.
Mathematical modeling and parametric design for Point-of-care (POC) devices	Dr. Sukhendu Ghosh Department of Mathematics	Dr. Sudipto Mukhopadhyay, Department of Mechanical Engineering & Dr. Tara Chand Kumawat, Department of Chemical Engineering	Point-of-care (POC) or near-patient testing enables acquiring real-time diagnostic results at or near to the patient site providing timely diagnostics at a lower cost. Microfluidics play an important role in the development of POC or lab-on-chip devices. Research under this proposal will involve Effective mathematical modeling, Hydrodynamic analysis and CFD simulations. The analysis and modeling techniques can further be applicable to explore many other physical and real world problems. The project is purely interdisciplinary and collaborative in nature.

Flexible Electronic Devices for Sustainable Electronics	Shree Prakash Tiwari Department of Electrical Engineerin	i.Dr. Shree Prakash Tiwari, Department of Electrical Engineering ii.Dr. Arpit Khandelwal, Department of Electrical Engineering iii.Dr. Ankur Gupta, Department of Mechanical Engineering	This project will involve extensive exploration of novel and flexible electronic devices for sustainable electronics in which the main focus will be on using biodegradable material components. The efforts may include design, simulation, fabrication, and characterization of emerging devices with new materials. The candidate will be involved in fabrication of multifunctional devices and integrating them for E-textile and wearable systems. The eventual aim is to demonstrate functional system prototypes for flexible electronics while contributing to scientific knowledge in the area of sustainable electronics.
Investigation of biofilm disruption by mechanical and electromagnetic waves: A novel approach to reduce antimicrobial resistance due to biofilms	Neha Jain Bioscience and Bioengineering	Arani Ali Khan; Electrical Engineering and Arun Kumar R; Mechanical Engineering	The project aims to investigate and establish the use of shock waves and microwaves to disrupt resilient biofilms. The proposal involves optimization of frequencies for the microwave to disintegrate preformed biofilms, assembly and standardization of shock tube for biofilm disruption and determination of efficacy of microwaves and shock waves to break pre-formed biofilms on catheters and in vitro biofilm models.
The Scalar Auxiliary Variable (SAV) Scheme for Coupled General Gradient Flow Systems with Non-local Free Energy and its application	Dr. Moumita Mandal Department of Mathematics, IITJ	Dr. Durgamadhab Mishra, Assistant Professor, Department of Physics, IIT Jodhpur	The proposed work aims to design unconditionally energy-stable highly efficient Scalar Auxiliary Variable (SAV) scheme for coupled gradient flow systems driven by nonlinear non-local free energy to assess the structure and stability of various physical dissipative systems describing quasicrystal generation in nanotechnology, formation of heterostructures in semiconductors, and fracture mechanics in peridynamics etc.