# INTERDISCIPLINARY RESEARCH WORKS SUCCESSFULLY UNDERTAKEN DURING THE YEAR 2023

| Sl.No. | Title of the Interdisciplinary Research Work |
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| 1 | Polyvinyl alcohol based nanocomposites films for intelligent packaging applications-A green step towards sustainability |
| 2 | Fabrication of C3N4 based photocatalytic membranes for water treatment |
| 3 | Label-Free SERS multiplex detection and relative quantification of creatinine and uric acid |
| 4 | Establishment of a centre for sensor devices |
| 5 | Novel heterocyclic hole transport material (HTM) for perovskite solar cell application |
| 6 | Investigation on the dipolar cyclo addition reaction reactions of azomethine imines with 1,2-diones, 1,4-diones and bisarynes; Synthesis of novel structurally important heterocycles |
| 7 | Catalytic conversion of carbohydrates as green raw materials to CMF,FDCC and key platform chemical using novel metal supported on core shell hollow and nanosponges structures |
| 8 | BOPAHY based materials for organic photovoltaic devices |
| 9 | "Fabrication of interdigitated dopant free carrier selective c-Si solar cell by scalable process with open circuit voltage above 700mV |
| 10 | Laser assisted fabrication of interdigitated dopant free carrier selective silicon heterojunction solar cells |
| 11 | Development of 2D Heterojunction Solar Cells |
| 12 | Ultrafast laser beamlines for Multidisciplinary, Multitasking Research Programmes |
| 13 | EXAFS studies anode materials to find the Li intercalation mechanism in Li-ion battery |
| 14 | Studies on the effects of geometry and dynamics on many-particle aggregation |
| 15 | Magnetic skyrmions on sphericlly curved surfaces |
| 16 | Development of an electrically controllable antiferromagnet based device for spintronic memristor applications |
| 17 | Development of ferromagneticAntiferromagnet Hybrid spintronic Devices |
| 18 | Study of giant dipole resonance in hot and rotating nuclei |
| 19 | Extreme value statistics in granular matter |
| 20 | Modelling and Analysis of Lifetime Data using Quantile Based Measures |
| 21 | Design and Implementation of instrumentation for Characterizing and Visualizing Cryogenic Two-Phase Flow through Transfer Lines |
| 22 | "Design and Development of a Planar Multi-Layer Inductor based RRRmeasurement for thin film coated Niobium SRFCavities |
| 23 | SYNTHESIS AND CHARACTERIZATION OF CRYO-COMPATIBLE PIEZO MATERIAL AND ITS APPLICATIONS IN CRYOGENIC INSTRUMENTATION" |
| 24 | Menstrual cup for plastic free periods and environment |
| 25 | Advanced Research in Tactical Oceanography, Modern Sensors, Signal Processing and Telemetry |
| 26 | Wearable wireless triboelectric nanogenerator sensor for respiratory rate and sleep monitoring. |

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| 27 | LIFE - Leveraging Integrated systems for Future Energy: Triboelectric Nanogenerators- powered Electrocatalytic Hydrogen Production and Health Monitoring |
| 28 | Fabrication of ternanry hybrids of Ag-MoS2- carbon nanostrctures for waste water treatment |
| 29 | Establishment of centre for sensor Devices |
| 30 | Carbon dioxide selective membrane creation using hydrophobic and hydrophilic polymer for the recovery of methane as an energy carrier form biogas |
| 31 | Association of air pollutants to protein aggregation disorders |
| 32 | The impacts of climate change on the genesis and intensification of the North Indian Ocean low pressure systems |
| 33 | Polyaromatic hydrocarbon (PAH) pollution in Cochin estuary and its ecotoxicological impact on shrimp fishery stock |
| 34 | Development of a decentralized technique for the bioremediation of plastic waste using plastic eating insects larve |
| 35 | Distribution, characterisation and risk assessmrent of microplastics in mangrove ecosysytems of Kerala with emphasis on food chain bio-accumuion of faunal commies and carbon sequestration potential using environmental forensic methods |
| 36 | Accelerating biodegradation of recalcitrant plastic wastes using waxworms, Galleria mellonella and Achroia grisella: Mechanistic insights and technological prospects |
| 37 | Scientific Assessment of microplastics in personal care products and machine learning assisted consumer perception study to aid policy formulation in India |
| 38 | Organic Geochemical Characterisation of Ashtamudi Ramsar Wetland: A Biomarker Approach |
| 39 | Electric Propulsion System for Energy Efficient House Boats"sanctioned by Ministry of Electronics and Information Technology (MEITY) . |
| 40 | Basic Hydrodynamic Research Using OpenFOAM |
| 41 | CFD Analysis of a self-propelled AUV with ducted Propeller |
| 42 | Physical model studies on the wave-structure interaction of Cylindrical structures subjected to regular waves |
| 43 | Model Based Adaptive Controller for Maximize the Energy Efficiency of Oscillatory Surge based Wave Energy Converter |
| 44 | European Union Project- "FRACTION" |
| 45 | Understanding the motivators of moonlighting intention among IT Sector employees |
| 46 | Life of Mothers of Differently Abled Children: Special Focus on Children with ASD and Bedridden |
| 47 | Sustainable and Affordable Healthcare: Investigating the Effectiveness of Jan Aushadhi Yojanas across Selected States” |
| 48 | Sustainable menstruation and menstrual cups: An exploratory study on awareness and attitudes in the state of Kerala |
| 49 | India's Twin Deficit Problems: An Econometric Investigation |
| 50 | Reproductive Health Rights & Gender Equality |
| 51 | Automated Validation of Aneurysm in Brain (AVAB) using Machine Learning Techniques |
| 52 | Human Behaviour Analysis with Artificial Intelligence and Machine Learning |
| 53 | DSP and Al workload tuned Embedded RISC-V Processors |
| 54 | Establishment of Bioinformatics Centre(BIC) for Marine Bio-resource Conservation and Sustainable Utilization |

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| 55 | Metagenomics Exploration of the Deep Ocean Viruses: Taxonomic Assignment and Bioprospecting |
| 56 | "International Network for Image-based Diagnosis" (INID-PART) |
| 57 | DSP and AI workload tuned Embedded RISC-V Processors |
| 58 | Role of PACAP in adult neurogenesis and neural plasticity under oxidative stress |
| 59 | Isolation and characterization of Bacillus phages and phage encoded endolysins: Evaluation of their potential as phage therapeutics, biocontrol and biodefence agents and understanding their role in industrial fermentation failure. |
| 60 | DST – DAAD Project- based Personnel Exchange Programme “Indo-German Joint Research Collaboration |
| 61 | Improving Learning And Memory In Adult Brain: A Study About The Role Of Ciliary Neurotrophic Factor In The Regulation Of Synaptic Plasticity Through Glutamatergic Pathway In The Adult Neural Stem Cells |
| 62 | The role of neurons in the formation of metastatic and primary tumour niches |
| 63 | Exploring the human gut microbiome and metabolome in health and Parkinson’s disease -a window to the gut microbiota brain axis alterations in Parkinson’s disease |
| 64 | Screening and Identification of high efficiency genome wide SSR markers in true mangroves of Rhizophora sp. for taxonomic identity and population structure from West coast of India |
| 65 | Phenology and spatial genetic structure of Kandelia candel (Rhizophoraceae) a rare viviparous mangrove species endemic to Kannur district of Kerala |
| 66 | Target-specific stealth delivery of clusters of inherently immunostimulatory nanogranules incorporating an immunomodular with chemotherapeutics improved breast cancer therapy |
| 67 | Developing strategies to target altered glycosylation against drug resistance in advanced heterogenous breaast cancers |
| 68 | Marine Microbiome to Ascertain the Role of Microbes in Biogeochemical Cycling in The Eastern Arabian Sea |
| 69 | Utilisation of marine algae Chaetoceros sp. In Microbial fuel cell |
| 70 | Developing chitosan based membrane materials for supecapacitor applications |
| 71 | Porous polymer electrolyte membrane from blends of polybenzimidizole with polyamic acid and polyimide |
| 72 | Studies on the blue carbon and carbon fluxes of Cochin Land Ecosystem and estuary and its contribution to Global Carbon Cycling |
| 73 | Brain Gain Program involving Dr. Subha Sathyendranath |
| 74 | Induced biosynthesis of cryptic natural products by marine actinomycete |
| 75 | Sea water Quality Criteria and Ecological Risk Assesment |
| 76 | Bioprospecting of Marine microbial diversity for various products under the Marine Bioresource and Biotechnology Network Programme |
| 77 | Antimicrobial peptides in aquaculture organisms: Discovery and applications |
| 78 | Metagenomics Exploration of the Deep Ocean Viruses: Taxonomic Assignment and Bioprospecting |
| 79 | Understanding the climatic influence on the harmful algal blooms along the south west coast of India- an ecophysiological approach |
| 80 | Ecophysiology and bloom dynamics of potentially toxic cyanobacteria of the genus Microcystis from the aquatic ecosystems of Kerala |
| 81 | Taxonomy, community assemblage and genetic characterization of gelatinous zooplankton from the Marine habitats of the South West Coast of India |

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| 82 | Microbiome in Cochin Estuary and its functional attributes to pollutants with special reference to Antibiotics. |
| 83 | Modelling coastal oceanographic features in the Southeastern Arabian Sea |
| 84 | Nutritional Profiling and Utilisation of Silver Pompano ( Trachinotusblochi) for Sustainable Rural Economy |
| 85 | Study on the effectiveness of Swachh Bharath Abhiyan Schemes in Containing Plastic Pollution in the Backwaters of Kerala and the scope of extending these Schemes to Control the Infestation by Water Weeds |
| 86 | Challenges and Prospects of Sustainable Shoreline and its Impact on Fishing Communities with special reference to Chellanam. |
| 87 | Stock Assessment of three species of deep-sea shrimp from Kerala |
| 88 | International Travel Scheme awarded by the ANRF (SERB) to Dr. S. Sabu for attending and presenting at Food and Agricultural Organization (FAO) of the United Nations, Rome, Italy |
| 89 | Quantifying The Role Of Various Cloud/Rain Processes On The Variability Of Stable Oxygen And Hydrogen Isotopes Of Tropical Rainfal |
| 90 | Equatorial Testbed for Atmospheric Observation, Modeling and Technology Development (ATMOSTECH)Project |
| 91 | “Thunderstorm Understanding and Experimental Realtime Prediction(THUNDER)” |
| 92 | Variability of the upper-level ASIAN monsoon anticyclone and mechanisms of its coupling with<br>tropospheric monsoon convection. Indo-French Centre for the Promotion of Advanced Research |
| 93 | Mesoscale Convective Cloud System over the Monsoon Region: Studying the long-term changes in its characteristics and impact on cloud burst events and stratospheric water vapour |
| 94 | Feasibility Study of skill Development Program for Educated Urban Women |
| 95 | Expanding Girls' Horizons in Science 'Workshop for High School Students |
| 96 | Exploring the human gut microbiome and metabolome in health and Parkinson’s disease -a window to the gut microbiota brain axis alterations in Parkinson’s disease |
| 97 | Targeting the Lung-Brain Axis in Bronchopulmonary Dysplasia: Assessing the Efficacy of Choline in Mitigating Hyperoxia-induced lung and brain injuries |
| 98 | Monitoring the environmental health of coastal Ernakulam using microfossil as a proxy: A case study implying sedimentological and hydrological parameters |
| 99 | Growth, structure and evolution of Coorg-Nilgiri blocks and associated suture zones, southern India; an integrated approach using geological and geophysical data |
| 100 | Pseudotachylites in the Satyamangalam Group, Southern Granulite Terrain (SGT). |
| 101 | Tectonics and crustal structure of Southern Granulite Terrain (SGT), South India using potential field methods |
| 102 | High-pressure Granulites in the Archean crustal blocks of Southern Granulite Terrain, Southern India |
| 103 | Estimation of the contemporary kinematics and interseismic strain rates along the eastern Himalayan region using Space Geodetic Techniques |
| 104 | Exploring Machine Learning (ML) techniques for satellite image fusion for hyperspectral and multispectral images |
| 105 | Support for ST Radar Facility at ACARR |

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| 106 | Monitoring the crustal and dam deformations induced by the seasonal loading ang unloading of Idukki reservoir in Kerala, South India using ground and space geodetic techniques |
| 107 | Estimation of the contemporary kinematics and interseismic strain rates along the eastern Himalayan region using space geodetic techniques |
| 108 | Magnetic spin vortices on Curved geometrics |
| 109 | Development of super continuum-based Transient Absorption System for time-resolved laser produced plasma diagnostics |
| 110 | Inspire Faculty Award |
| 111 | Towards the Microscopic Understanding of the Thermodynamic Properties of Atomic Nuclei |
| 112 | Probiotic modulation of<br>immune response,gut diversity and gut brain axis in inflammatory/ stress models of Danio rerio(Zebra Fish)" |
| 113 | Designing and Development of GBA1-L444P mutation corrected cells using CRISPR- Cas 9 tool as a potential therapy for Gaucher disease |
| 114 | Elucidating the role of CNTF/BDNF signaling on adult neurogenesis and synaptic plasticity under neuroinflammation mediated by gut dysbiosis |
| 115 | "RES-NRSC-2022-002: Development of Fluorescence Line Height (FLH) based algorithm for chlorophyll and phytoplankton blooms detection" |
| 116 | Development of visible light responsive Microreactor systems for water purification |
| 117 | Vaccine development for Streptococcus agalactiae and Streptococcus Iniae in tilapia and hybrid grouper |
| 118 | "Synerestic action of Fucoidan-Alkoxyglycerol complex and their implications in the management of Cognitive dysfunctions" |
| 119 | DST-INSPIRE Faculty Fellowship |
| 120 | "A Report on the University Ecosystem in Driving Science&Technology Innovation and the extent of its Dissomination for enhancing women productivity and wellbeing" |
| 121 | LIE groups,LIE Algebras their categories and Application |
| 122 | Integrated genomic and metabolomic approach for the discovery of novel small molecules with anticancer activity from marine microorganisms |
| 123 | Partnering Academic Industrial Research (PAIR) scheme |
| 124 | Diagnostic Biopolymer Based High Performance Acoustic Gels for Enhanced Ultrasound Transmission and Sonography |
| 125 | Development of Technology for the manufacture of latex stage filter incorporated dry rubber |
| 126 | "A report on ICT Tools Catering to wide range<br>of learners, including children with special needs" |
| 127 | "Reprogramming primary cells of Penaeus monodon for invitro transformation by way of simultaneous modulation of inhibitors and enhancers through ectopic expression of transcription factors and inhibition of p53 gene" |
| 128 | *Vaccine development for Streptococcus agalactiae and Streptococcus iniae in tilapia and hybrid grouper* |
| 129 | *Synergestic action of Fucoidan-Alkoxyglycerol complex and their implications in the management of Cognitive dysfunctions* |
| 130 | Challenges and new opportunities in vaccine development for aquaculture |

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| 131 | Enhanced vaccine efficacy against Streptococcus agalactiae by molecular adjuvants for tilapia aquaculture in Low and Middle-Income Countries (LMICs)" |
| 132 | Development of Highly Efficient Thin Film Solar Cells with Organic and Inorganic Materials |
| 133 | Development of Metal Dichalcogenides, Nanocomposites and Polymer Materials for Energy Storage Applications |
| 134 | Development of Functional Materials/Systems for Artificial Photosynthesis |
| 135 | Development of Cerium Oxide Nanoparticle Approach for Enhancing Radio Iodide Avidity in Papillary Thyroid Carcinoma by Augmenting the Expression of the Sodium Iodide Symporter |
| 136 | Optimization and Transplantation of Rat Blood Derived Stem Cells Using a Novel Biodegradable Scaffold for Treating Parkinson's Disease(PD) |
| 137 | Development of an Inherently Radiopaque, Biodegradable and Cost Hepatocellular Carcinoma Effective TACE System With Liver Regeneration Potential for the Treatment of Effective TACE System With Liver Regeneration Potential for the Treatment of Hepatocellular Carcinoma |
| 138 | Application of Bacterial Pigments as Dietary Supplements as well as Therapeutic Modules for Inflammation |
| 139 | Development of 3D Electronic Laser Speckle Pattern Interferometry Set up for Structural Testing Analysis |
| 140 | Investigation on Room Temperature Ferromagnetism in Spray Pyrolysed Doped Ceria Thin Films and Polymer Ceria Nanocomposite Films |
| 141 | Probing Cobalt Complexes Based Hole Transporting Materials for Photovoltaic Applications |
| 142 | Development of Bisbenzotriazole Based Co-Polymers Using the Donor Acceptor Approach Towards Organic Solar Cells |
| 143 | Antifouling Multi-Layered Membranes for the Removal of Micro Organisms from Water |
| 144 | National Facility for Marine Extracts and Genetic Resources for Bioactive Molecules |
| 145 | Marine Biodiversity and Bioprospecting |
| 146 | Stable Isotope Research Facility for Marine and Climate Sciences |
| 147 | Neotectonic Framework of Central Kerala Coast and its Implications on Shoreline Changes: An integrated Geological, Geophysical and Geodetic Approach |
| 148 | Development of Functional Materials and Systems for Environmental Applications with Special Focus on Pollution Reduction and Control |
| 149 | Development of Electrochemical Sensors for the Detection and Quantification of Environmental Pollutants |
| 150 | Development of 1 Tonne Capacity Unitized Composting Apparatus for the Conversion of Urban Food Waste into Manure at Community Level |
| 151 | Solving Complex Problems using High Performance Cluster |
| 152 | Membrane Bioreactor for Biological Nutrient Removal from Waste waters |
| 153 | Multi-parameter Buoy Monitoring System for Data Collection in Arabian Sea |
| 154 | Setting up of a Research Facility for Signal Analysis, Processing and Machine Intelligence with an Initial Project being Development of a Visual Vibrometer with Specific Objective of Voice Capturing and Vibration Analysis. |
| 155 | Development of Water Treatment System Based on Advanced Oxidation Process (AOP) for the Removal of Emerging Contaminants |

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| 156 | Video Content Analysis for Cybersecurity Applications |
| 157 | Big Data Weather Forecasting System Using Deep Learning Techniques |
| 158 | Design and Development of Radio Direction Finding & Localization Systems to Improve the Management of 5G Networks |
| 159 | Design and Development of a Robot Controller for Synchronized Cooperative Control of Heterogenous Industrial Robot Arms |
| 160 | Building Self Sustainable Smart Cities Through Energy Efficient Homes Using Intelligent Design |
| 161 | Material Characterisation and Defect Sizing by Tone Burst Eddy Current Thermography |
| 162 | Performance Enhancement of Renewable Energy Integrated Systems |
| 163 | Climate Change Consciousness in Law : An Overview |
| 164 | Conservation and Mangement of Forest Resources and Welfare of Tribal Populations in State of Kerala |
| 165 | Impact of IP on Agriculture, Access to Information and Promotion of Innovation in India |
| 166 | Effectiveness of Regulatory and Policy Control over Primary Health Centres in the State of Kerala |
| 167 | A Study of Subaltern Literature in India |
| 168 | Sustainable Urbanasition and IP - Study on the impact of Urbanisation on its Traditional and Collective Intellectual Property with Specific Reference to Kochi |
| 169 | Capacity Building of Women Through Entreprenurship Development Programmes : Design, Implementation and Impact Assessment |
| 170 | Circular Economy and Sustainable Development : Evidence From Cities of Kerala |
| 171 | Psychological Contract Between Female Domestic Workers and Employers : Labour Relations Perspective |