

## BROCHURE 2020-21

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## **RESEARCH &** DEVELOPMENT



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Indian Institute of Technology (IIT) Goa was established in 2016 by the Ministry of Human Resource and Development (GoI) as an institute of national importance. It started functioning on July 30, 2016. It offers BTech programmes in four disciplines namely Computer Science and Engineering (CSE), Electrical Engineering (EE), Mechanical Engineering (ME) and Math & Computing. In addition to undergraduate programmes, IIT Goa offers MTech in EE, ME, and CSE. The institute has been very active in its PhD programmes offered by its seven Schools namely, School of Chemical & Material Sciences, Electrical Sciences, Mathematics & Computer Science, Mechanical Sciences, Physical Sciences, Humanities and Social Sciences and Interdisciplinary Life Sciences.

IIT Goa strives to become a unique institution of higher learning, offering state of the art education, research, and training in science and technology to have impact on society, environment and global challenges. In a short span of four years since its establishment, IIT Goa has established itself in the region through its science and technology outreach activities, grants and awards to its faculty and engagement with industry. It has signed several MoUs with industry, academia and national R&D laboratories both within India and abroad for student and faculty exchange, and joint academic and research activities to have impact on society, environment and global challenges.



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## **Director's Message**



**Prof. B. K. Mishra** PhD (University of Utah, Salt Lake City) Director

IIT Goa strives for maintaining excellence in Research and development alongside teaching and learning. We focus on the current and future requirements of the country and take up selected problems commensurate with our expertise and infrastructure.

The institute supports all of its faculty to undertake world-class research and consultancy projects. We are currently executing about 25 R&D projects funded by DST, SERB, BRNS, DRDO, and other Govt. and private agencies. We have also proactively executed IMPRINT projects and other high value projects under DST-Nano Mission. Our faculty members are actively collaborating with other academic and research Institutes for pursuing collaborative research. These include Georgia State University, University of Washington, Indo-French Centre for the Promotion of Advanced Research (GOA-Atlantic cooperation programme led by Naval Group), DST-UKIERI (Indo-United Kingdom), Max Planck Society, to name a few. We have signed an MoU with M/s Goa Shipyard Limited to provide consultancy services for several projects such as ship-lifting, condition-monitoring, etc. We have also signed MoUs with various National and International agencies such Chennai Mathematical Institute, INRIA, NIWE Chennai, Alcon Labs, CDAC Pune, CSIR-NIO, CSIR-AMPRI, CSIR-IMMT, CSIR-CMERI, Siemens Ltd, Express Analytics, and RRCAT Indore. Our MoU with CDAC for "NSM Nodal Center for Training in HPC and AI" is sponsored by National Supercomputing Mission (NSM) of the Govt. of India.

Clearly our aim is to gain and maintain our reputation not only in India but also in other countries. We believe that our research should impact in enhancing the quality of life and contribute to both economic development and mitigation of societal challenges.



## **R&D** Office

#### <u>About the Office</u>

Research and development activities are the lifeline of a vibrant academic institution. The R&D Office plays a vital role in maximizing intellectual output by providing full support - from conceptualization to commercialization - to research ideas emerging within the institution. Its role and functions are as follows:

- Ensure that the right kind of environment is created and nurtured so that faculty and scientists are able to conduct research of the highest caliber. Such a research environment includes civil infrastructure such as laboratories, R&D funds and their management, inventory management, technical, administrative, and research staff, etc.
- Provide support for researchers to liaise with potential funding sources and also earmark funds to encourage early stage investigations.
- Identify opportunities for collaboration between researchers (within 11T Goa) and their counterparts in other institutions in India and abroad.
- Ensure that faculty and students are well-positioned to contribute cutting edge and state-of-the-art research to emerging areas in science and engineering.
- To find ways to attract the best talent for research in different disciplines and recognize their achievements by way of awards, honours etc.
- Identify and put in place mechanisms by which work done by researchers can be translated to address problems faced by society and industry. In this direction, licensing, commercialization, and agile processes for industry-academia partnerships must be initiated.
- To encourage participation of faculty and students in international and national conferences, seminars, workshops, etc.
- Provide administrative support on account of recruitment, financial management, procurement of equipment, availability of other infrastructural facilities, etc.

#### Vision and Objective

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- To facilitate research and development activities including technology transfer and continuing education programs initiated by faculty and other researchers of the institute.
- To provide specialized administrative and managerial support for the operation of Sponsored Research Projects, Consultancy Projects and other R&D related activities of the Institute.

Facilitate interaction with national and international agencies supporting research and development. In addition, it also intends to promote academia-industry interactions and collaboration with other R&D laboratories, and liaise between the institute and funding agencies.

Support faculty members in filing of patents and documenting IPR generated through research activity of the Institute.

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## **R&D Activities at IIT Goa**

- Sponsored Research Activities
- Creating Facilities for Research
- Institute Lecture Series
- Centralized Equipment Facility
- Testing and Consultancy
- IPR (Patents)
- Continuing Education Programs
- Organizing Conferences/Seminars/Symposiums/Workshops
- MoUs and Collaborations

#### **BUDGET AT A GLANCE**

- Total Budget approved by parent ministry for FY 2020-21 under Capital Budget Head (equipment for setting up of various academic and research labs): Rs 12.50 Cr.
- Total Funds Sanctioned under for Sponsored Research Grants upto FY 2020-21 (Major Funding Agencies: SERB, DST, Other Government Bodies): Rs 9.38 Cr.
- Total Funds Approved for Consultancy Services upto FY 2020-21: Rs1.16 Cr.

### Dean's Message



**Prof. Bidyadhar Subudhi** PhD (Sheffield), FNAE, FIET Professor, School of Electrical Sciences

Indian Institute of Technology (IIT) Goa, an Institute of National Importance (INI), is one of the 23 IITs in the country. Since its establishment in 2016 by the Government of India, it has strived to become a unique institution of higher learning, offering state-of-the-art education, research, and training in science and technology. It greatly emphasizes the creation of human resources and technology to generate an impact on society, industry, environment and tackle global challenges.

IT Goa offers BTech, MTech and PhD programmes in all its seven academic schools, namely Chemical & Materials Sciences, Electrical Sciences, Humanities & Social Sciences, Interdisciplinary Life Sciences, Mathematics & Computer Science, Mechanical Sciences and Physical Sciences The courses of the academic programmes are designed to meet the current requirements of industry and academia. It has three centres of excellence namely Center for Appropriate Technology for Rural Sectors, Center of Excellence in Particulates, Colloids and Interfaces and Center of Excellence on Industrial Automation.

The institute is proactive in developing various well-equipped laboratories to cater to teaching at BTech and MTech levels whilst facilitating its faculty and research scholars at doctoral and post-doctoral levels for pursuing innovative and pioneering research in engineering and technology. The faculty members are very ambitious in pursuing both national and international collaborative research.

In addition to offering formal doctoral, MTech and BTech programs, IIT Goa encourages its faculty to undertake sponsored research and consultancy projects. IIT Goa provides high-end research laboratory facilities to its faculty to conduct cutting-edge research and address challenges in industries. The institute emphasizes research and development activities that lead to tangible products and solutions to societal problems. The endeavour of the institute's faculty has resulted in a significant output of high-impact publications.

IIT Goa possesses state-of-the-art technological expertise spanning several disciplines. It is equipped with accomplished and creative faculty and a rich laboratory infrastructure. To fully maximize the potential inherent within its facilities and human resources, the institute has been undertaking research and consultancy projects for a diverse range of industries and organizations. On behalf of IIT Goa, I take this opportunity to call upon industries to collaborate with our institute in research and development activities to propel our nation to new heights in economic and technological progress.

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#### **ABOUT THE SCHOOL**

The School of Chemical and Materials Sciences (SCMS), formerly the School of Chemical and Biological Sciences, is among the first academic units of the institute. The school currently offers three theory courses and a laboratory course to the freshmen on campus. The courses are designed to stimulate a scientific attitude which would help to inculcate a methodical approach towards learning. While undergraduate teaching remains our primary focus, the school also runs a PhD program in Chemistry. SCMS is also committed to steadily expanding its research. Its current faculty members are working in diverse fields of the discipline, such as advanced spectroscopy, synthetic organic chemistry and medicinal chemistry, organometallic chemistry and theoretical chemistry. The school is constantly looking forward to working with people who can make productive contributions towards scientific exploration and teaching. SCMS believes in working in coherence with all other schools and centers of the institute as well as national and international academic and industrial units beyond IIT Goa.

#### CHEMISTRY

#### FACULTY

Faculty	Research Areas
Dr. E. Siva Subramaniam Iyer PhD (IIT Bombay)	Physical Chemistry, Time Resolved Spectroscopy, Femtochemistry
Dr. Mantu Santra PhD (IISc Bengaluru)	Theoretical and Computational Biophysical Chemistry, Structure and Dynamics of Fluids, Phase Transition and Polymorphism, Statistical Mechanics, Mathematical Modeling in Systems Biology
Dr. Rishikesh Narayan PhD (WWU Münster)	Synthetic Organic Chemistry, Enantioselective Catalysis, Medicinal Chemistry
Dr. Raja Mitra PhD (IISc Bengaluru)	Organometallic Chemistry, Mechanically Interlocked Molecules (MIMs), Catalysis



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## CHEMICAL AND MATERIALS ENGINEERING

#### FACULTY

Faculty	Research Areas
Dr. B. K. Mishra PhD (University of Utah, Salt Lake City)	Particulate Materials, Discrete Element Methods (DEM), Appropriate Technology.
Dr. Dhirendra Bahadur PhD (IIT Kanpur)	Nano Structured Materials, Magnetic Materials, Nano- Biotechnology, Magnetic Materials at Nano-Scale for Biomedical and Other Applications, Photomagnetism, Magneto Resistive Materials, Dilute Magnetic Semiconductors, Electronic Ceramics, Novel Synthetic Methods including Self-Assembly and LBL techniques
Dr. Sharad Bhartiya PhD (Oklahoma State University)	Optimization and Control Theory and theirApplications to Processes of Industrial Relevance and Systems Biology.
Dr. Sourav Pal PhD (IACS Kolkata)	Theoretical Investigation of Hard-Soft Acid-BaseRelation, Study of Electron-Molecule Scattering, Development and Application of Molecular Dynamics, Density Functional Response Approach for Molecular properties, Magnetic properties, Application to Problems of Chemical Physics, Computational Material Science.
Dr. G. V. Prabhu Gaonkar PhD (University of Paris-XI, Orsay, France)	Nanomaterials

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#### **MAJOR FACILITIES**



Instrumentation lab



Workbench



Wet Lab



HPLC-MS

Shimazdu LCMS2020 Perform reactions in inert atmosphere



Gas Chromatography

Shimazdu GC-2014ATF With FI and TC detectors

#### **MAJOR FACILITIES**





#### Schlenk Line

Customised Perform reactions in inert atmosphere



Spectrofluorimeter



UV-Vis-NIR Spectrometer

JASCO V770 Liquids 200-3200 nm, 4 to 90 degree Celsius Solids: 200 to 2500nm



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#### SPONSORED PROJECTS

Title of the Project	Sponsoring Agency	Name of the Faculty
Cationic 4(Pi)- Electrocyclization Cascade for the Expedient Synthesis of Biologically Relevant Pyrrolidine Derivatives with Multiple Stereogenic Centers	Science and Engineering Research Board	Dr. Rishikesh Narayan
Electrochemical Reduction of CO2 using a Mechanically Interlocked Molecule(MIM) as Catalyst	Science and Engineering Research Board	Dr. Raja Mitra
Proton Transfer Dynamics in Nanochannels of Nafion	DST-INSPIRE	Dr. E. Siva Subramaniam Iyer
Training Technical Staff and Providing Consultancy Services on Mill Liner and Hydrocyclone Design	Tega Industries	Dr. B. K. Mishra
Structure-Based Design, Synthesis and Biological Evaluation of Novel Mpro Inhibitors for Targeting COVID-19	IIT Goa	Dr. Rishikesh Narayan
Copper Based Enantioselective 'Assisted Tandem Catalysis' from the Expedient Synthesis of Natural-Product and Natural Product like Scaffolds	IIT GOA	Dr. Rishikesh Narayan
Mechanical Motion in a Molecule Driven by External Stimuli	IIT GOA	Dr. Raja Mitra
Spectroscopic Studies on Luminescent Aluminosilicate Materials	IIT GOA	Dr. E. Siva Subramaniam Iyer
Molecular Mechanism of Photo-Induced Channel Opening of Na+ Pumping Rhodopsin	IIT GOA	Dr. Mantu Santra

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#### **RESEARCH SCHOLARS**

Name	Area of Research
Mr. Krishna Mhaske	Organic Chemistry
Mr. Shon Gangai	Organic Chemistry
Ms. Shriya Saha	Inorganic Chemistry
Mr. Vikas Kumar Jha	Physical Chemistry
Mr. Angulimal G. Kamble	Organic Chemistry
Ms. Abhilasha Kumari	Theoretical Chemistry
Ms. Siddhali Girkar	Organic Chemistry
Mr. Deepak D Gaonkar	Organic Chemistry



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#### **ABOUT THE SCHOOL**

School of Electrical Sciences (SES) aims to impart quality education in wide areas of electrical engineering. The academic and research focus of the school includes Power and Control Systems, Communication and Signal Processing, and VLSI and Micro-engineering. Various laboratories have been set-up for the undergraduate program, such as Electronic Devices and Circuits Lab, Analog Circuits Lab, Digital Systems Lab, Control System, and Microprocessor Lab, Electrical Machines Lab and Communications Lab. The dynamic faculty of the school are active in undertaking open-ended research problems in their fields of interest. Advanced research facilities like VLSI software tools, PCB prototyping machine, 3-D printer, regenerative dynamometer test-bench and Microgrid Control etc. are available to facilitate faculty and research scholars in their pursuit of research in cutting-edge technologies. The school offers world-class training to students, including hands-on experience, imparting knowledge and skills pertinent to industry demands.

#### FACULTY

Faculty	Research Areas
Dr. Bidhan Pramanick PhD (IIT Kharagpur)	MEMS and Microsystems, Carbon MEMS, Microfabrication, Nano-energy, Drug delivery, Lab-on-a-CD
Dr. Bidyadhar Subudhi PhD (University of Sheffield, U.K.)	Control & Automation, Smart Grid, PV System, Underwater vehicles, Condition of Monitoring of Machines, Wide Area Control of Power System
Dr. Kuntal Deka PhD (IIT Guwahati)	Probability and Random Process, Digital Communication, Information Theory and Coding, Error Correcting Codes, Detection and Estimation Theory
Dr. Nandakumar Nambath PhD (IIT Bombay)	Integrated Circuits and Systems, VLSI for Communicationand Optical Communications Systems
Dr. Neelakandan Rajamohan PhD (IIT Madras)	Compressive Signal Processing for 4G/5G, Beamforming in Massive MIMO Networks, Underwater Communication, Wideband Spectrum Sensing
Dr. Sashidhar Sampathirao PhD (IIT Bombay)	Design and Finite-element Modelling of Electrical Machines, Motors for Renewable Energy and Electric Vehicle Applications, Permanent Magnet Motor Drives, Motors for Aircraft and Marine Applications.

SES

#### FACULTY

Faculty	Research Areas
Dr. Sheron Figarado PhD (IISc Banglore)	Induction Motor Drives, Multilevel Inverters, PWM Techniques for VSIs, Real-Time Suspension Control for Vehicles, Motor Control for Robotic and Exoskeleton Applications.
Dr. Shakthi Prasad D. PhD (IISc Banglore)	High Voltage Engineering, Insulation Engineering, Image Processing for Electrical Discharges, Plasma Physics, Electromagnetic Transients in Power Systems
Dr. Sujit Kumar Sahoo PhD (NTU Singapore)	Signal/Image Processing, Sparse Representation,Compressing Sensing, Computational Imaging.
Dr. Taraknath Kobaku PhD (IIT Bombay)	Robust Control, Control of power electronic converters and power systems

#### **MAJOR FACILITIES**

#### AC Machines Laboratory







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#### MAJOR FACILITIES

#### Analog Circuits Laboratory









#### DC Machines Laboratory











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#### SPONSORED PROJECTS

Title of the Project	Sponsoring Agency	Name of the Faculty
A Harmonic Elimination Scheme with Reduced Switching Losses For a 3-Phase Open-End Winding Induction Machine Using Only Conventional Two-Level Inverters in the Entire Modulation Range.	Science and Engineering Research Board	Dr. Sheron Figarado
Direct Drive Doubly Salient Permanent Magnet Machine for Roof Top Wind Energy Application	National Institute of Wind Energy	Dr. Sashidhar Sampathirao
Development of Control and Power Electronics schemes for a Smart Micro Grid with high penetration of PV Generation and Electric Vehicles	Department of Science & Technology	Dr.Bidyadhar Subudhi
A Smart Bidirectional Electric Vehicle Charging System connected to PV Integrated Micro Grid	Science and Engineering Research Board	Dr. Bidyadhar Subudhi
Evaluation and Expert Opinion for Providing Technical Clarification for Specifications of First Electric/ Solar Hybrid Ferry Boat	River Navigation Department Government of Goa	Dr. Sashidhar Sampathirao
Design and Development of Low Cost Electrochemical Sensor for Rapid Detection of SARS-CoV-2	IIT Goa	Dr. Bidhan Pramanick
Understanding Surface Charging of the Polymeric Insulators using Corona Discharges	IIT GOA	Dr. Shakthi Prasad
Sparse Signal Processing and Applications	IIT GOA	Dr. Sujit Kumar Sahoo

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#### SPONSORED PROJECTS

Title of the Project	Sponsoring Agency	Name of the Faculty
Virtual Prototyping of Hybrid Machine For Wind Turbine Generator	IIT GOA	Dr. Sashidhar Sampathirao
Investigations On ADMM Decoding Of LDPC Codes	IIT GOA	Dr. Kuntal Deka
Investigations on Variable Switching Frequency Pulse Width Modulation Schemes for Voltage Source Inverters to Improve Harmonic Performance and Reduced Losses.	IIT GOA	Dr. Sheron Figarado

#### **RESEARCH SCHOLARS**

Name	Area of Research
Mr. M. Israyelu	Single-Stage Converter based Control of FRM
Mr. Anupam Sharma	Design and Modelling of Magnetic Gear based FRM for Roof-Top Wind Generators
Mr. Gowtham V.	SyRM for Inverter Driven Air-Conditioner Compressors
Mr. M. C. Lavanya	Hybrid Micro-Grids
Mr. Guru Prasad Reddy	PM Motor Drives
Ms. Sanila K. S.	Signal Processing for Massive MIMO and mmWave Communication Systems
Mr. Shafrin K. S.	Spatial Multiplexing and Cooperative Communication in 5G Communication and Signal Processing



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#### **RESEARCH SCHOLARS**

Name	Area of Research
Mr.Shubham S.	Wireless Communication
Mr. Srijib Banerjee	Degradation Studies on Polymeric Insulators
Ms. Shelly Saini	Surface Charging of Polymeric Insulators
Ms. Kranthi Panuganti	Multilevel Inverters for Motor Drives
Mr. Rohan Burye	Multilevel Inverters for Motor Drives
Ms. Ria Rashid	Optimisation of Analog Circuits using Evolutionary Algorithms
Mr. Krishna Kummarapalli	High Speed Low Precision Analog to Digital Converters
Mr. Rajeev Kumar K.	Circuits and Systems for Underwater Optical Communication
Mr. Md. Saiful Islam	MEMS based Noninvasive Health Monitoring System
Ms. Anushka Gupta	Development of Neural Probes for Brain Signal Recording
Mr. Naresh Mandal	MEMS and MICROSYSTEMS
Mr. Maraka Israyelu	Wind Energy Conversion System
Mr. Upputuri Rajendra Prrasad	Charging System for Electric Vehicles
Dr. B. Das	Co-operative Control of Autonomous Underwater Vehicles
Ms. Arunima S	Multiagent Based Control of Microgrid
Dr. Niyan Morchan, Post Doctoral Fellow	Bio-medical Signal Processing

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## School of Humanities and Social Sciences

#### **ABOUT THE SCHOOL**

The School of Humanities and Social Sciences (SHSS) at IIT Goa aims to familiarize students with the world we inhabit, by engaging them in current debates on different issues concerning our nation and the world at large. The goal of SHSS is to equip students with tools necessary to examine and learn from various contexts and environments, ask fundamental questions and form deliberated opinions on matters ranging from the economy, the environment, politics and society, language and media, among others. SHSS plays an increasingly important role in enabling students to understand the changing contexts within which they find themselves. The curriculum followed by the school not only provides the background for any field of employment or continuing study, but also for practical life skills. The courses offered are critical designed to enhance thinking and analytical skills in students.

#### FACULTY

Faculty	Research Areas
Dr. Sabiha Hashami PhD (JNU New Delhi)	Sociolinguistics, Contact Linguistics, Language Variation & Change, Emergence of new Varieties, Areal Linguistics, Language Endangerment, Sociology of Language, Culture Study and Gender Study.
Dr. Sunil Paul PhD (Pondicherry University)	Macroeconomics, Monetary economics and Applied time series econometrics.
Dr. Nida Sajid PhD (University of Western Ontario)	Postcolonial Literature; Transnational Intellectual History, Global Eighteenth Century; Gender and Material Culture, Translation Studies and Modern Indian Literature.
Mr. Rajesh Pandit	Entrepreneurship, Business Incubation Centres, Strategy Planning, Management
Dr. Varun Sahni D.Phil. (University of Oxford, UK)	Nuclear Deterrence, Regional Security, Changing Power balance in the Asia-Pacific, Evolving Security Concepts, Emerging Powers, IBSA and BRICS, Indian Foreign Policy, International Relations Theory, Latin American Politics, Technology in Education



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#### SPONSORED PROJECTS

Title of the Project	Sponsoring Agency	Name of the Faculty
Impact of Microeconomic Shocks on Macroeconomy	IIT Goa	Dr. Sunil Paul
Hindi as Contact Language in Goa-An enquiry into Variation,Linguistic Vitality and Identity	IIT Goa	Dr. Sabiha Hashami

#### **RESEARCH SCHOLARS**

Name	Area of Research
Mr. Tinu lype Jacob	Macro-dynamics of Market Power
Mr. Stanley James	Issues in Macro Prudential Policies
Mr. Avid Ali	Language Contact Situation in Garhwa (Jharkhand)- Emergence of a New Variety
Mr. Suraj Kumar Das	Issues in Macroeconomics and Economic Growth

## School of Mathematics and <u>Computer Science</u>

#### **ABOUT THE SCHOOL**

The School of Mathematics and Computer Science focuses majorly on imparting research-based instruction training at all levels. The school consists of the Department of Mathematics and the Department of Computer Science Engineering.

The Department of Mathematics shares with IIT Goa the vision of achieving excellence in teaching and research. At present, the Department offers a B.Tech. in Mathematics and Computing as well as a PhD program. It is committed to excellence in mathematical teaching and research and aims to communicate the inherent beauty of mathematics across other areas of science and technology. Since its inception, the department has made vigorous efforts to grow not only within its own discipline but also make forays into multiple interdisciplinary areas to enable deeper interactions with applications in science and engineering.

The Department of Computer Science & Engineering aims to become one of the top three departments in the country for research in the foundational areas of computer science and systems engineering. The department dedicates itself to the implementation and dissemination of research-based instructional strategies for computer science training at all levels. It is also committed to the development and promotion of free or open-source software in engineering education. Presently, the Department offers B.Tech, M.Tech and PhD programs in CSE and also runs a program in Mathematics & Computing in collaboration with the Department of Mathematics.

#### MATHEMATICS

#### FACULTY

Faculty	Research Areas
Dr. Abhitosh Upadhyay PhD (GGSIP University, New Delhi)	Differential Geometry
Dr. Lok Pati Tripathi PhD (IIT Kanpur)	Numerical Analysis, Computational Finance
Dr. Rajeev Gupta PhD (IISc Banglore)	Operator Theory, Grothendieck Inequality, Dirichlet Type Space
Dr. Sandipan De PhD (IMSc Chennai)	Quantum Algebras, Operator Algebras and Operator Theory



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#### FACULTY

Faculty	Research Areas
Dr. Shiv Prasad PhD (IISER Mohali)	Hyperbolic Geometry, Mapping Class Groups of Surfaces, Topological Graph Theory
Dr. Saumya Bajpai PhD (IIT Bombay)	Numerical Analysis, Finite Element Control and Stabilization

## **COMPUTER SCIENCE ENGINEERING** FACULTY

Faculty	Research Areas
Dr. Amaldev Manuel PhD (IMSc Chennai)	Logic, Automata, Algebra and Games
Dr. Arpita Korwar PhD (IIT Kanpur)	Theoretical Computer Science, Computational Complexity, Arithmetic Circuits
Dr. Clint Pazhayidam George PhD (University of Florida)	Machine learning, Statistical Inference, Graphical Models
Dr. Satyanath Bhat PhD (IISc Banglore))	Game Theory, Mechanism Design, Incentive Compatible Machine Learning
Dr. Sharad Sinha PhD (NTU Singapore)	Computer Architecture, Heterogeneous Computing, High Perfor- mance Embedded Computing, Computing Systems Architecture, Design, Verification, Security, Applications of Com- puting Systems and Principles

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#### FACULTY

Faculty	Research Areas
Dr. Somenath Biswas	Computational Complexity Theory, Randomized Algorithms,
PhD (IIT Kanpur)	Computational Biology, Logic in Computer Science
Dr. Sudakshina Dutta PhD (IIT Kharagpur)	Formal Verification, Static Analysis
Dr. Sreejith A V	Logic, Descriptive Complexity, Automata Theory, Algebraic
PhD (IMSc Chennai)	Automata Theory
Dr. Neha Karanjkar	Modeling, Simulation and Optimization of
(IIT Bombay)	Discrete-event Systems

#### **MAJOR FACILITIES**

S.N.	NAME OF THE EQUIPMENT	PURPOSE
1	Camera Modules	Camera Based Systems Design
2	Arduino Engineering Kit	Embedded Systems
3	Raspberry Pi 3	Embedded Systems
4	Xilinx Zed Boards	FPGA, System on Chip Design

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#### SPONSORED PROJECTS

Title of the Project	Sponsoring Agency	Name of the Faculty
Development of Remote Sensing Based Method for the Rapid Reconstruction of Time Series of Formative Water Discharges of the Ganga and Bhramaputra Rivers in the Himalaya foreland.	Ministry of Earth Scienc- es, Gol	Dr. Sreejith A V
The SENTINEL– Active Intelligent Agent for Actionable Intelligence on Cybercrime Control and Prevention.	DG, BPR&D	Dr.Sharad Sinha and Dr. Clint P. George
Amazon Educate Grant	Amazon Web Services (AWS)	Dr. Sharad Sinha
Al Workshop for School Students	ACM-SIGAI Grant	Dr. Sharad Sinha and Dr. Clint P. George
ARM Architecture and System on-Chip (SoC) Design	CEERI	Dr. Sharad Sinha
IoT Based Contactless / Touchless Smart Entry – Exit & Attendance System for Per- sonnel	IIT Goa	Dr. Sharad Sinha
Varieties of Formal Languages & Function	IIT GOA	Dr. Amaldev Manuel
Parallelizing Sampling (MCMC) Methods for Topic Models	IIT GOA	Dr. Clint P. George
High Performance Mobile Computing, Associated Design Methodologies & their Medical Applications	IIT GOA	Dr. Sharad Sinha
Words and Tree: Logic, Algebra and Circuits	IIT GOA	Dr. Sreejith A V

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#### SPONSORED PROJECTS

Title of the Project	Sponsoring Agency	Name of the Faculty
Theoretical and Computational Study of Boussinesq System of Equations using Finite Element Galerkin Method	IIT GOA	Dr. Saumya Bajpai
Implicit – Explicit (IMEX) H1 – Galerkin Mixed Finite Element Method for Pricing Option under Levy Model.	IIT GOA	Dr. Lok Pati Tripathi
Scalable and Expressive Dis- crete-Event Simulation Framework for IoT Applica- tion	IIT GOA	Dr. Neha Karanjkar
Shock Wave Propagation in Layered Medium	IIT GOA	Dr. Sudakshina Dutta

#### **RESEARCH SCHOLARS**

Name	Area of Research
Ms. Aditi Tomar	Fractional Parabolic PDES
Mr. Sajal Halder	Optimal Control of Fractional Elliptic PDES
Mr. Debendra Kumar Swain	Finite Element Approximation to the Boussinesq Model
Mr. Subash Chandra Behera	Construction of Pseudo-Anosov Mapping Classes and Filling the Systems of Surfaces
Mr. Rakesh Kumar	Mapping Class Groups of Surfaces
Mr. Prince Mathew	Language Equivalence of Probabilistic One-Counter Automata

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#### **RESEARCH SCHOLARS**

Name	Area of Research
Ms. Saina Sunny	Theoretical Models of Functional Programs
Ms. Prachi Pramod Kashikar	Embedded Artificial Intelligence
Ms. Akanksha Mishra	MI Models Used in Computer Vision Applications
Ms. Pavitra Prakash Bhade	Real Time Detection of Cache based Side Channel Attacks
Ms. Abhilasha Gupta	Estimation of Water Column Properties from Remote Sensing Data
Mr. Ajay Kumar	Machine Modelling and Applying MATLAB for Modeling, Simulation and Prototyping
Mr. Mahesh Barve	Federated Learning for HPC Systems



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## **School of Mechanical Sciences**

#### **ABOUT THE SCHOOL**

School of Mechanical Sciences (SMS) aims to provide quality education and training to students through rigorous coursework complemented with relevant hands-on learning, enabling them to effectively contribute to the sustainable and comprehensive development of our nation. Currently, the school offers B.Tech, M.Tech and PhD programs in the discipline of mechanical engineering. The school also intends to create a collaborative and interdisciplinary research culture that balances fundamental as well as applied research. To this end, it welcomes collaborations with industries and national labs to jointly work on problems addressing the needs and requirements of our nation through academic frameworks and expertise.

#### FACULTY

Faculty	Research Areas
Dr. Anirudha Ambekar PhD (IIT Bombay)	Experimental Combustion Diagnostics, Propellant Characterization, Analytic Combustion, Chemical Kinetics, Ageing of Energetic Materials, Pollution Reduction and Optimization of Energy Conversion Systems, Alternative Fuels, and Sustainable Combustion
Dr. Arindam Das PhD (University of Illinois at Chicago)	Interfacial science: Wettability, Adhesion, Nucleation and Heat Transfer at Interface. Nanoparticle and Col- loid Synthesis, Active Nano Fluids, Biomimicry, EMI Shielding, Nanoparticle Polymer Composites, Microfluidics
Dr. Ashish Bhateja PhD (IIT Kanpur)	Mechanics of Granular Materials, Computational Mechanics, Discrete and Continuum Modelling of Granular Media, Appropriate Technology
Dr. Harpreet Singh PhD (IIT Delhi)	Computational Mechanics, Impact Mechanics, Multiscale Modeling of heterogeneous Materials, Geometric Modeling of Thin Materials
Dr. Rajesh S. Prabhu Gaonkar PhD (IIT Bombay)	Fuzzy Set Applications in Reliability Engineering, Fuzzy Set Applications in Maintenance Engineering Transportation Models and its Variants, Multi-Attribute Decision Making
Dr. Rudra Narayan Roy PhD (IIT Bombay)	Turbulent Reacting Flows, Modelling of Turbulent Combustion, Conditional Moment Closure Model, Flamelet Models, Direct Numerical Simulation

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### FACULTY

Faculty	Research Areas	
Dr. Sachin Dnyandeo Kore PhD (IIT Bombay)	Advanced Welding Processes and Electromagnetic Manufacturing, Electromagnetic Pulse Welding for Nuclear Reactor Tubes	
Dr. Ponnulakshmi V. K. PhD (JNCASR Banglore)	Radiative Heat Transfer, High Reynolds Number Flows, Bio Flui Dynamics	
Dr. Sandip Haldar PhD (University of Maryland, USA)	Composite Materials, Experimental Mechanics	
Dr. Sreenath Balakrishnan PhD (IISc Banglore)	Mechanical Modelling of Biological Cells, Biomechanics, Design and Fabrication of Micro-Compliant-Mechanisms, and Inverse Problems	
Dr. Sudhakar Yogaraj PhD (Institute for Computational Mechanics, Technical University of Munich)	Computational Mechanics, Fluid-Structure Interaction, Bio- Inspired Fluid Dynamics, and Passive Flow Control	
Dr. Thaseem Thajudeen PhD (University of Minnesota, USA)	Characterization of Aerosol and Colloidal nanoparticles, Brownian Dynamics based Modeling of Analytical Ultracentrifugation, Electrical Mobility based Characterization of Nanoparticles, Population Balance Modeling, Monte Carlo Methods	

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#### **MAJOR FACILITIES**



Electromagnetic Pulse Welding Set Up



High Pressure Optical Tensiometer (400 Bar)



Differential Scanning Calorimeter



Thermogravimetric Analyzer



Universal Testing Machine



CNC- Electric Discharge Machining

#### **MAJOR FACILITIES**



CNC Turning Machine



CNC Milling Machine



Research Grade IC Engines



Olympus Research Grade Microscope (1000X)



Robotic MIG Welding Machine

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#### SPONSORED PROJECTS

Title of the Project	Sponsoring Agency	Name of the Faculty	
Feasibility Studies and Optimization of ElectroMagnetic Pulse Welding of Tubes for Nuclear Reactor Application	BRNS	Dr. Sachin D Kore	
Technology Development for 3D printing Solid Rocket Propellants and their green alternatives	Science and Engineering Research Board	Dr. Anirudha Ambekar	
Experimental Investigation on Stability of Impregnated Fluid Phase at Complex Multiphase Interface of Fluid Impregnated Surface	Science and Engineering Research Board	Dr. Arindam Das	
Kinematics and Rheology of Granular Flow in Multi-Outlet Silo	Science and Engineering Research Board	Dr. Ashish Bhateja	
Scaling up of Technology developed for Manually Operated Equipment for Bamboo Stripes Manufacturing.	DST Science for Equity Empowerment and De- velopment Division	Dr.Sachin D Kore	
Coupling of Particle based DEM and DSMC Techniques for Understanding Dusty Gas Flow Dynamics	Science and Engineering Research Board	Dr. Ashish Bhateja	
Machine Learning based Algorithm for Predicting Three-Dimensional Fractal Structure of Aggregated Nanoparticles from Microscopy based Images and Application in Characterization of Ultrafine Particulate Matter	DST SERB	Dr.Thaseem Thajudeen	
Composite Structures under Shock and High Velocity Impact	DST SERB	Dr. Harpreet Singh	
A macroscopic model for flows over rough and porous surfaces	SERB	Dr. Sudhakar Yogaraj	
Manufacturing of Mechanical Venti- lator	IIT Goa	Dr. Sachin Kore	

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#### SPONSORED PROJECTS

Title of the Project	Sponsoring Agency	Name of the Faculty
Data Analysis and Epidemic Models for COVID-19	IIT Goa	Dr. Sreenath Balakrishnan
Studies to Predict the Extent of Virus Spread from Coughing and Sneezing	IIT Goa	Dr. Rudra Narayan Roy
Modelling Muco Ciliary Clearance in Lungs	IIT GOA	Dr. Ponnulakshmi V. K.
Image Analysis of Quasi-Fractal Nanoparticle Aggregates	IIT GOA	Dr. Thaseem Thajudeen
Modelling of Turbulent Flames Arising in Practical Combustors	IIT GOA	Dr. Rudra Narayan Roy
Proof of Concept and Technology Development for Additive Manufacture of Composite Propellants	IIT GOA	Dr. Anirudha Ambekar
Finite Element Analysis of Electromagnetic Pulse Crimping and Welding of Tubes	IIT GOA	Dr. Sachin D Kore
Kinematics of Granular Discharge in a Silo with Eccentrically Located outlet	IIT GOA	Dr. Ashish Bhateja
Direct Numerical Simulation of Turbulent Flows using Artificial Compressibility Method	IIT GOA	Dr.Sudhakar Yogaraj
Understanding the Dust Adhesion on Solid Transparent Surfaces for Solar Cell Application	IIT GOA	Dr. Arindam Das
Shock Wave Propagation in Layered Medium	IIT GOA	Dr.Harpreet Singh
Study of Interlocking Architectured Composites for Enhanced Mechanical Properties	IIT GOA	Dr.Sandip Haldar

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#### **RESEARCH SCHOLARS**

Name	Area of Research	
Mr. Abhishek Mund	Interfacial Science, Lubricant Impregnated Surfaces	
Mr. Abhishek Singh	Image Analysis for Characterization of Aerosol Quasi-Fractal Aggregates	
Mr. Adarsh Prakash	Welding and Characterization, Additive Manufacturing	
Mr. Akshat Jain	Particulate Emissions from Various Combustion Sources	
Mr. Amit Nayse	Interfacial Science	
Mr. Anoop C. V.	Thermal	
Mr. Deepak J.	Modelling of Turbulent Combustion.	
Mr. Dheeraj R.	Numerical studies on Rough Wall Turbulent Flows using Artificial Compressibility Method	
Mr. Himanshu Marwah	Design, Fabrication and Demonstration of Compliant Micromechanisms forManipulating Biological cells	
Mr. Mahesh Dalwani	Combustion Noise in Gas Turbine Combustor	
Mr. Neesu Vikram Manoj Kumar	Impact Mechanics on Composite Materials	
Mr. Nitin Anirudh G. T.	Multiscale Modelling	
Mr. Praveen Pratap Singh	Spray Combustion	
Mr. Pushparaj Pingulkar	Failure Modeling of Composites	

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#### **RESEARCH SCHOLARS**

Name	Area of Research	
Mr. Ramnath Prabhu Bam	Application of AI in Predictive Maintenance/Condition Monitoring	
Mr. Rubal Dhiman	Indoor Air Quality	
Mr. Sachin Turi	Mechanics of Marine Composites	
Mr. Sairaj Gaunekar	Thermal	
Mr. Sanket Shet	Reliability	
Mr. Sarath Babu	Radiative Heat Transfer	
Mr. Senthilkumar G.	Thermal	
Mr. Shubham Ganar	Heat Transfer in Microfluidics, Heat Transfer at Interface, Interfacial Science	
Ms. Thirupathi Nadimetla	Powder Metallurgy	
Mr. Vivek D. Phadte	Mucociliary Clearance in Lung	
Mr. Sahaj Jain	Homogenized models for flows over rough surfaces	
Ms. Vandana Anumagala	Rocket propellant fabrication and testing	

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## **School of Physical Sciences**

#### **ABOUT THE SCHOOL**

The School of Physical Sciences at IIT Goa has been an integral part of the institution since its inception. The school presently houses eminent faculty members whose research spans areas from aspects of field theories, statistical physics, biological physics, soft matter, high energy nuclear physics, early universe and condensed matter physics, to quantum materials, photonics and quantum communication. Its diversity in interdisciplinary research activity also allows the school to act as a melting pot of teaching and instruction for students covering a wide spectrum of physics research, all the way from undergraduate to the doctoral levels.

#### FACULTY

Faculty	Research Areas
Dr. Santosh Kumar PhD (TU Chemnitz, Germany)	Solid-State Quantum Photonics, Fundamentals & Fabrication of Semiconductor Micro/Nano Devices, Science & Characterization of Materials, 2D Materials and Interfaces.
Dr. Santosh Kumar Das PhD (VECC, Kolkata)	Heavy-ion Collisions, Quark Gluon Plasma, QCD at High Tempera- ture, Transport Theory and its Application in Heavy-Ion Collisions, Heavy Quark Diffusion in QCD Matter.
Dr. Sudipta Kanungo PhD (SNBNCBS, Kolkata)	Density Functional Theory based ab-initio Electronic Structure Calculations of "Quantum Materials". Correlated Electronic and Magnetic Phenomena and Phase Transitions, Topological Phases, 2D Layered Materials and Heterostructure, Spin-Orbit Coupling Driven Phases.
Dr. Vaibhav Wasnik PhD (University of Arizona, USA)	Biological Physics, Statistical Physics, Aspects of Field Theories

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#### MAJOR FACILITIES



#### Computing Cluster

One master node and 8 compute nodes with total 192 CPU cores, used for the research on the electronic structure investigation of quantum materials. Different quantum chemistry simulation codes are running in this cluster such as, VASP, Wannier90, WannierTool etc



Photo Correlation Setup

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#### SPONSORED PROJECTS

Title of the Project	Sponsoring Agency	Name of the Faculty
Atomically thin Photonic Devices as Hosts of Single-Photons and En- tangled Photon Pair Emitters and Single-Spins for Quantum Sciences and Technologies	DST- Nano Mission	Dr. Santosh Kumar
Emerging Phases due to Spin-Orbit Coupling in 5d Oxides: a First Princi- ples Simulation Approach	DST INSPIRE	Dr. Sudipta Kanungo
Probing the Quark Gluon Plasma by Heavy Quarks	IIT Goa	Dr. Santosh Kumar Das
Scant Signal Readouts in Biological and Other Systems	IIT Goa	Dr. Vaibhav Wasnik
Investigation of Correlated Transition Metal Oxides through ab-initio First Principles Calculations	IIT Goa	Dr. Sudipta Kanungo
Atomic-layer thick Photonic and Electrical devices for Quantum Tech- nology	IIT GOA	Dr. Santosh Kumar
Stochastic Transmission of COVID-19	IIT GOA	Dr. Santosh Kumar Das

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#### **RESEARCH SCHOLARS**

Name	Area of Research	
Mr. Swoyam Srirupa Biswal	Chemoattractant by Cells	
Mr. Mohammad Salman P.	Scant Search Strategies	
Ms. Surasree Sadhukhan	Novel Topological Materials	
Ms. Roumita Roy	Spin-Orbit Coupled Correlated Oxides	
Mr. Jai Prakash	Anisotropic Quark-Gluon Plasma	
Ms. Pooja	Glasma Phase Heavy Quark Momentum Evolution	
Mr. Jithin T. S.	Solid-State Quantum Photonics	
Mr. Md. Yunus Waheed	Solid-State Quantum Photonics	
Mr. Indrajeet D. Prasad	Solid-State Quantum Photonics	
Ms. Sumitra Shit	Solid-State Quantum Photonics	

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#### **ABOUT THE SCHOOL**

School of Interdisciplinary Life Sciences (SILS) is the latest academic unit to be added to the list of existing schools at IIT Goa. It envisions bringing together scientists and engineers who possess expertise in any relevant field of life sciences research under one umbrella with an objective to tackle the futuristic problems in the realm of biology. Currently, the faculty members associated with the school have expertise and research projects in broad areas of life sciences and its allied fields such as cancer biology, vaccine development, mechano-diagnostics, point-of-care diagnostics, drug discovery, chemical biology, cancer genomics, pandemic modelling etc. The school is making progress towards developing interinstitutional and interdisciplinary research, teaching and training programs to bridge the gap between laboratory research and public health through specific research problems which are at the interface of science, health and society. Towards achieving its vision, the school is in the process of setting up state-of-the-art research labs for both teaching and research.

#### FACULTY

Faculty	Research Areas	
Dr. Bidhan Pramanick PhD (IIT Kharagpur)	Bio MEMS, Bio Sensors, Point of Care Diagnostics	
Dr. Clint Pazhayidam George PhD (University of Florida)	Cancer Genomics, Epidemic Modeling	
Dr. Rishikesh Narayan PhD (WWU Münster, Germany )	Chemical Biology Early Phase Drug Discovery	
Dr. Sreejith A V PhD (IMSc, Chennai)	Logic, Descriptive Complexity, Automata Theory, Algebraic Automata Theory	
Dr. Sreenath Balakrishnan PhD (IISc Banglore)	Mechanical Modelling of Biological Cells,Biomechanics, Micromanipulation of Cells, Epidemiology	
Dr. Sudhir Krishna	Cancer Biology, Vaccine Development, Biology-Medicine Interphase	
Dr. Vaibhav Wasnik PhD (University of Arizona, USA)	Theoretical Physics, with interest in certain aspects of Field Theories, Statistical Mechanics and Biological Physics.	

### Center of Excellence on Particulates Colloids and Interfaces

The Center of Excellence in Particulates, Colloids and Interfaces was established in November 2018 to carry out cutting-edge multidisciplinary and product-oriented practical research activities related to particulates, colloids and interfaces. While the Center's priority is to develop technology to combat challenges faced by society and industry, it also focuses on the indigenization of technology and the development of advanced fabrication and instrumentation infrastructure. With a revised proposed budget of more than Rs 30 crores for the next three years and the completion of the first phase of infrastructure and association of new faculties, the Center is oriented to develop micro and nano scale technologies, which are expected to significantly contribute to major sectors like energy, defense, environment and pollution, agriculture, health care, transportation, smart fluids and polymer composites, quantum technology etc. Industrial consultancies, advanced instrumentation development, short-term course development for industry, along with academic research, are some of the center's key activities.

Coordinator: Dr. Bidhan Pramanick Email: bidhan@iitgoa.ac.in

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**Microfabrication Facility** 



Chemical Hood and Wet Bench Station



MFP 3D Origin Atomic Force Microscope



Contact Angle Goniometer & Optical Tensiometer





X-Ray Diffraction System



Probe Station



Ellipsometer



Oxidation Furnace





DLS Nanoparticle size Analyzer & Zetapotential meter with pH sweep



RH 2000 Hirox Digital Motorized Microscope (3600 X)



Temperature Controlled Dip Coater



Raman cum PL







Electrospinning setup



Electron Beam Physical Vapor Deposition System



Force Tensiometer with CMC Measurement module



Anton Paar MCR 702 Multi Drive Universal Rheometer

Carl Zeiss Sigma 300 Field Emission Scanning Electron Microscope : Soon to be Installed



#### School of Chemical and Material Sciences

- Schneidwind, T.; Kapoor, S.; G. Garivet, G.; Karageorgis, G.; Narayan, R.; Navarro, G-V.; Antonchick, P. A.; Ziegler, S.; Waldmann, "Phenotypic Discovery of Myokinasib, a Kinase Inhibitor with Unprecedented Chemotype Targeting Myosin Light Chain Kinase" H. Cell Chem. Bio. 2019, 26, 1–12.
- Properzi, R.; Kaib, S. J. P.; Leutzsch, M.; Pupo, G.; Mitra, R.; De, K. C.; Song, L; Schreiner, R. P.; List, B. "Catalytic enantiocontrol over a non-classical carbocation" Nat. Chem. 2020. 12, 1174–1179.
- 3. Kumar, G.; **Narayan, R**.; Kapoor, S. "Chemical tools for illumination of tuberculosis biology, virulence mechanisms and diagnosis" J. Med. Chem **2020**, 63, 15308–15332.
- "Enantioselective Catalysis using Copper (I)-Phosphine Complexes" R. Narayan\* in "Copper(I) Chemistry of Phosphines, Functionalised Phosphines and Phosphorus Heterocycles" M. S. Balakrishna (Ed.), Elsevier, 2019, pp 259–313.
- "The role of excited states in deciphering molecules and materials time-resolved electronic spectroscopic studies" –E. S. S. Iyer\* in "Molecular and Laser spectroscopy" Elsevier, 2020, vol 2, pp 521–551.

#### **School of Humanities and Social Sciences**

- 1. Paul, S., S. K. Sahu, and T. I. Jacob (2020). Aggregate Fluctuations and Technological Shocks: The Indian Case. In FDI, Technology, and Innovation (pp. 245-255). Springer, Singapore.
- 2. Anand, B., and **S. Paul** (forthcoming). Oil shocks and stock market: Revisiting the dynamics. Energy Economics (accepted and available online https://doi.org/10.1016/j.eneco.2021.105111)
- 3. Hashami S. POLITICS OF IDENTITY AND PLURICENTRISM: CONTACT HINDI IN BIHAR AS A CASE OF SECOND LEVEL PLURICENTRISM. PP 123-136 In Rudolf Muhr and Benjamin Meisnitzer (2018) (eds.). Pluricentric Languages and Non-Dominant Varieties Worldwide: New Pluricentric Languages-Old Problems. Peter Lang Verlang, Frankfurt in association with Das Land Steiermark and Johannes Gutenberg Universität Mainz Germany. ISBN: 978-3-631-75623-2
- Hashami S. HINDI IN COLONIAL BIHAR: POLITICS OF LANGUAGE AND THE COLONIAL PROJECT PP 26-41. In Shailendra Kumar Singh and Sweta Sinha (2019) (eds.). Linguistic Ecology: Bihar. LINCOM Language Research 12. 180pp. 2019. LIN COM Europa. ISBN 9783862889839
- 5. Rajend Mesthrie and **Sabiha Hashami.** CONNECTING THE CONTACT HINDI OF BIHAR WITH THE BHOJPURI HINDI DIASPORA PP 150-158. In Tariq Khan **(2020)** (ed.) Alternative Horizons in Linguistics: A Festschrift in Honour of Prof. Panchanan Mohanty. Lincom Europa: Munich, Germany. ISBN: 9783969390269

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## **Research Publications**

#### **School of Mathematics and Computer Sciences**

- 1. Zhe Lin, **Sharad Sinha**, Wei Zhang, Towards Efficient and Scalable Acceleration of Online Decision Tree Learning on FPGA, 27th IEEE International Symposium on Field-Programmable Custom Computing Machines (FCCM **2019**), IEEE
- Jieru Zhao, Tingyuan Liang, Sharad Sinha, Wei Zhang, Machine Learning Based Routing Congestion Prediction in FPGA High-Level Synthesis, Design Automation and Test in Europe (DATE 2019), IEEE
- 3. Liang Feng, Jieru Zhao, Tingyuan Liang, **Sharad Sinha**, Wei Zhang, LAMA: Link-Aware Hybrid Management for Accesses in Emerging CPU-FPGA Platforms IEEE/ACM Design Automation Conference (DAC) **2019**, IEEE
- 4. Jieru Zhao, Liang Feng, **Sharad Sinha**, Wei Zhang, Yun Liang, Bingsheng He Performance Modeling and Directives Optimization for High Level Synthesis on FPGA IEEE Transactions on CAD (TCAD), vol. 39, issue 7, IEEE
- 5. Ang Poh Keong, Smitha Kavallur Pisharath Gopi, **Sharad Sinha**, Smart Nation: Offline Public Transport Made Easy 4th International Conference on Intelligent Transportation Engineering, IEEE
- 6. Boon Leng Lim, Smitha Kavallur Pisharath Gopi, **Sharad Sinha**, Smart Nation: Indoor Navigation for the Visually Impaired 4th International Conference on Intelligent Transportation Engineering, IEEE
- 7. Wenjian He, Wei Zhang , **Sharad Sinha**, Sanjeev Das, iGPU Leak: An Information Leakage Vulnerability on Intel Integrated GPU, 25th Asia and South Pacific Design Automation Conference (ASP-DAC **2020**), ACM and IEEE
- 8. Zhe Lin, **Sharad Sinha**, Wei Zhang, An Ensemble Learning Approach for Monitoring of FPGA Dynamic Power, IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (IEEE TCAD: vol. 38, issue 9), IEEE
- 9. Clint P. George , Wei Xia, and George Michailidis, Analyses of Multi-Collection Corpora via Compound Topic Modeling, The Fifth International Conference on Machine Learning, Optimization, and Data Science, Springer Nature
- 10. Sahba Akhavan Niaki, **Clint P. George**, George Michailidis, Carole R Beal Investigating the Usage Patterns of Algebra Nation Tutoring Platform, 9th International Conference on Learning Analytics & Knowledge, ACM
- 11. Sahba Akhavan Niaki, **Clint P. George**, George Michailidis, Carole R Beal, The Impact of an Online Tutoring Program for Algebra Readiness on Mathematics Achievements; Results of a Randomized Experiment, 9th International Conference on Learning Analytics & Knowledge ACM
- 12. Bharat Adsul, Saptarshi Sarkar, **A V Sreejith**, Block products for algebras over countable words and applications to logic, Logic in Computer Science (LICS), ACM/IEEE MikoÅ,aj BojaÅ,,czy, Laure Daviau, Bruno Guillon, Vincent Penelle, A V Sreejith Undecidability of a weak version of MSO+U, Logical Methods in Computer Science LMCS
- 13. Ajitha Shenoy K. B, **Somenath Biswas**, Piyush P Kurur, Efficacy of the Metropolis Algorithm for the Minimum Weight Codeword Problem using Codeword and Generator Search Spaces, IEEE Transactions on Evolutionary Computation, IEEE
- 14. Zhe Lin, Jieru Zhao, **Sharad Sinha**, Wei Zhang, HL-Pow: A Learning-Based Power Modeling Framework for High-Level Synthesis, 25th Asia Pacific Design Automation Conference (ASP-DAC **2020**), IEEE
- Arish Sateesan, Sharad Sinha, Smitha K.G., Optimization of Convolutional Neural Networks on Resource Constrained Devices, IEEE Computer Society Annual Symposium on VLSI (ISVLSI 2019), IEEE
- 17. Jieru Zhao, Tingyuan Liang, Liang Feng, Wenchao Ding, **Sharad Sinha**, Wei Zhang and Shaojie Shen FP-Stereo: Hardware-Efficient Stereo Vision for Embedded Applications 30<sup>th</sup> International Conference on Field-Programmable Logic and Applications (FPL **2020**), IEEE

#### **School of Mathematics and Computer Sciences**

- Jiandong Mu, Wei Zhang, Hao Liang, Sharad Sinha, Optimizing OpenCL-based CNN Design on FPGA with Comprehensive Design Space Exploration and Collaborative Performance Modeling, ACM Transactions on Reconfigurable Technology and Systems (ACM TRETS), ACM
- Md. Aquil Khan, Amaldev Manuel Logic and Its Applications 8th Indian Conference, ICLA 2019, Delhi, India, March 1-5, 2019, Proceedings. Logic and Its Applications - 8th Indian Conference, ICLA 2019, Lecture Notes in Computer Science 11600, Springer
- 20. Paul Gastin, **Amaldev Manuel**, R. Govind Logics for Reversible Regular Languages and Semigroups with Involution. Developments in Language Theory, Springer
- 21. Arish Sateesan, **Sharad Sinha** and Smitha K G, DASH: design automation for synthesis and hardware generation for CNN, International Conference on Field Programmable Technology (FPT **2020**), IEEE
- 22. Arish Sateesan, **Sharad Sinha**, Smitha K G and Vinod A P, A Survey of Algorithmic and Hardware Optimization Techniques for Vision Convolutional Neural Networks on FPGAs, Neural Processing Letters, Springer
- 23. Prachi Kashikar and **Sharad Sinha**, Compressing CNNs by Exponent Sharing in Weights using IEEE Single Precision Format, 22nd International Symposium on Quality Electronic Design (ISQED **2021**), IEEE
- 24. Sharad Sinha and Clint P George, Artificial intelligence for all using the R programming language, ACM SIGAI AI Matters, ACM
- 25. Zhe Lin, **Sharad Sinha** and Wei Zhang, Hard-ODT: Hardware-Friendly Online Decision Tree Learning Algorithm and System, IEEE Transactions on CAD (IEEE TCAD) IEEE

#### **School of Mechanical Sciences**

- 1. **Y. Sudhakar**, U. Lacis, S. Pasche, S. Bagheri, Higher-order homogenized boundary conditions for flows over rough and porous surfaces, Transport in Porous Media:136, 1–42. **(2021)**.
- 2. U. Lacis, **Y. Sudhakar**, S. Pasche, S. Bagheri, Transfer of mass and momentum at rough and porous surfaces, Journal of Fluid Mechanics:884, A21, **(2020)**
- Raju, Shilpa R., Sreenath Balakrishnan, Somanna Kollimada, K. N. Chandrashekara, and Aruna Jampani. "Anti-tumor effects of Artemisia nilagirica extract on MDA-MB-231 breast cancer cells: deciphering the biochemical and biomechanical properties via TGF-β upregulation." Heliyon 6,(10) 2020
- 4. Singh, H., & Mahajan, P., Strain localization in reduced-order asymptotic homogenization, Mathematics and Mechanics of Solids, 25(4), 913-936, 2020
- Milind Sakhardande, Rajesh Prabhu Gaonkar, Potential Based Ranking of Sectors Identified in 'Make in India' Initiative Using Fuzzy AHP: The Academicians' and Industry Professionals' Perspective, International Journal of System Assurance Engineering and Management, In Press.
- 6. Rajesh S. Prabhu Gaonkar, Akshay V. Nigalye, Sunay P. Pai, Possibilistic Approach for Travel Time Reliability Evaluation, International Journal of Mathematical, Engineering and Manage-
- ment Sciences (IJMEMS), Vol. 6, No. 1 (February 2021), pp. 223-243.
  Sunay Pai, Rajesh Prabhu Gaonkar, Safety modeling of marine systems using neutrosophic logic, Journal of Engineering for the Maritime Environment (Proceedings of the Institution of Mechanical Engineers, Part M), Vol. 235, No. 1 (2021), pp. 225–235.

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## **Research Publications**

#### School of Mechanical Sciences

- 8. Sunay Pai, **Rajesh Prabhu Gaonkar**, Using Interpretive Structural Modelling, Fuzzy Analytical Network Process, and Evidential Reasoning to Estimate Fire Risk Onboard Ships, International Journal of Performability Engineering (IJPE), Vol. 16, No. 9 (September **2020**), pp. 1321-1331.
- 9. **Rajesh Prabhu Gaonkar**, V. Mariappan, Transportation time reliability appraisal in maritime context, International Journal of System Assurance Engineering and Management, Online now, June **2020**.
- 10. Sunay Pai, **Rajesh S. Prabhu Gaonkar**, Combining Belief Functions taking into consideration Error in Judgment, International Journal of General Systems, Taylor & Francis, Online now, May **2020**.
- B Sreekanth, S Anand, T Thajudeen, Y S Mayya, P Choudhury, S Chaturvedi, Survival of Expiratory Aerosols in a Room: Study Using a Bi-compartment and Bi-component Indoor Air Model Aerosol and Air Quality Research 2020, Taiwan, pp. Just accepted.
- 12. SN Gadde , **Y Sudhakar** , S Vengadesan, Investigation of the Unsteady Aerodynamics of Insect Flight: Use of immersed boundary methods Immersed Boundary Method: Development and Applications **2020**, Singapore, pp. 335-360.
- Pawar, S., Kore, S. D., Nandy, A, Comparison of sheared edge zones developed in electromagnetic and quasi-static die less perforation Journal of Materials Engineering and Performance 2020, NA, pp. 00.
- Matthew Daly, Sandip Haldar, Vignesh K Rajendran, Jonathan McCrea, Glenn D Hibbard, Chandra Veer Singh Size effects in strengthening of NiCo multilayers with modulated microstructures, Materials Science and Engineering: A 2020, None, pp. 138581.
- Ashish Bhateja, Devang V. Khakhar, Analysis of granular rheology in a quasi-two-dimensional slow flow by means of discrete element method based simulations Physics of Fluids, 2020, USA, pp. 013301 (13 pages).
- Rajesh S. Prabhu Gaonkar, Application of Fuzzy Sets in Reliability and in Optimal Condition Monitoring Technique Selection in Equipment Maintenance, in the book Advances in RAMS Engineering edited by Durga Rao Karanki, Gopika Vinod, Srividya Ajit in the Springer Series in Reliability Engineering, Springer, Switzerland, 2019, pp. 327-359.
- 17. Sunay P. Pai, **Rajesh S. Prabhu Gaonkar**, Modelling uncertainty using neutrosophic sets for precise risk assessment of marine systems, Presented & published in abstract proceedings of the International Conference on Maintenance and Intelligent Asset Management (ICMI-AM **2020**), 17 18 January 2020, Bangalore, pp. 2.
- Saurabh L. Raikar, Rajesh Prabhu Gaonkar, Reliability models of stress-strength interference with combination of Laplace and exponential distribution, Presented & published in proceedings of the 5th International Conference on Industrial Engineering (ICIE-2019), 12 - 14 December 2019, Surat, pp. 899-903.

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- N. Kumar, K. Naveen, M. Kumar, T. C. Nagaiah, R. Sakla, A. Ghosh, V. Siruguri, S. Sadhukhan, Sudipta Kanungo, A. K. Paul., Multifunctionality Exploration of Ca2FeRuO6: An Efficient Trifunctional Electrocatalyst toward OER/ORR/HER and Photocatalyst for Water Splitting, "Appl. Energy Materials (Accepted)", 2021
- 2. Vaibhav Wasnik, Average Search Time Bounds in Cue-Based Searches, Phys. Rev. E (Accepted), 2021
- S. Kanthal, P. Manna, Md. A. Ahmed, A. Banerjee, S. Adhikary, Sudipta Kanungo, A. K. Yadav, S. N. Jha, D. Bhattacharyya, S. Bandyopadhyay, Unique Magnetic Properties of Nd based Cuprate Francisite: Major Enhancement upon Co-doping, Appl. Surface Science, 544, 148951, 2021
- 4. J. H. Liu, S. Plumari, **Santosh K. Das**, V. Greco, M. Ruggieri, Diffusion of Heavy Quarks in the Early Stage of High Energy Nuclear Collisions at Energies Available at the BNL Relativistic Heavy Ion Collider and at the CERN Large Hadron Collider, Phys. Rev. C, 102, 44902, **2020**
- 5. Santosh K. Das, Jan-e Alam, Salvatore Plumari, Vincenzo Greco, Transmission of Airborne Virus through Sneezed and Coughed Droplets, Physics of Fluids, 32, 97102, 2020
- M. Kurian, V. Chandra, Santosh K. Das, Impact of Longitudinal Bulk Viscous Effects to Heavy Quark Transport in a Strongly Magnetized hot QCD medium, Phys. Rev. D, 101, 94024, 2020
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## **Research Publications**

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- 43. P.Pradhan and **B.Subudhi**, Wind speed forecasting based on wavelet transformation and recurrent neural network", International Journal of Numerical Modelling: Electronic Networks, Devices and Fields, doi.org/10.1002/jnm.2670
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#### High Performance Computing (HPC) FACILITY

IIT Goa is a Nodal Center for Training in HPC and Al under the National Supercomputing Mission (NSM), spearheaded by Center for Development of Advanced Supercomputing (C-DAC), under the Ministry of Electronics & Information Technology, Govt. of India (MeitY, Gol). The initiative is aimed at training students, researchers and faculty in High-Performance Computing (HPC), particularly on two diverse aspects:

Architecture and Applications and Artificial Intelligence (AI). This is achieved through workshops, seminars, guest lectures and also possibly conduct hackathons and specialized programs for HPC and AI users in various application domains. The Center is currently supported by industry giants like Intel Parallel Computing Labs,



Dr. Sharad Sinha sharad@iitgoa.ac.in

ARM and Nvidia and is expected to gather more support from the industry with time. IIT Goa has been awarded this center along with IIT Madras, IIT Kharagpur and IIT Palakkad. The IIT Goa HPC Nodal Center is coordinated by Dr Sharad Sinha (Asst. Prof., SMCS).

- 1. Central HPC Facility : It has 16 CPU nodes and 1 GPU node. Each CPU node consists of 2 processors with 20-cores each. This facility is, therefore, CPU dominated. It has a peak performance of ~20 Teraflops. This facility may be made available to those outside the IIT Goa Community for an appropriate Fee.
- 2. NSM Nodal Centre : It has 2 CPU nodes and 2 GPU nodes of which one GPU node is optimised for HPC applications like CFD while the other is optimised for AI. This facility will be freely remotely accessible for people across the nation under National Supercomputing Mission.

Users can write parallelised programs in languages like C, C++, FORTRAN etc., with which they may already be familiar, with the help of HPC Packages like OpenFoam, OpenMP, Open-MPI which are installed on our machines. Our machines run CentOS, a Linux flavour.

With direct access to these facilities, the IIT Goa HPC-AI Nodal Center will be no doubt beneficial to the faculty and students in Goan educational institutions and to students and researchers across the country via Remote Access. HPC will be the real game changer when the simulation is of a gargantuan scale or makes use of parallel programming, say involving terabytes or petabytes of data. Suitable applications of HPC include weather study, computational fluid dynamics, proteomics, among others. The architectural aspects of working at this scale will be of interest to those intrigued by Computer Science, while the ability to run simulations at this scale will be an advantage to researchers from other domains. IIT Goa is also planning to establish a bigger HPC facility once more space becomes available.

#### SOFTWARES

- MATLAB
- Ansys
- Solidworks
- Xilink

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- COMSOL Multiphysics
- Mentor Graphics
- NetSim
- Mathematica
- Cadence
- Keil
- MEMS+-



I-STEM (Indian Science, Technology and Engineering Facilities Map) is a National Portal maintained by IISc, Bengaluru which facilitates researchers to find suitable facilities to carry out their research work. The portal assists in scrutinizing the R&D facilities of all research organization removing the boundaries of distance. It also allows us to see the availability of such facilities and book the available slot accordingly.

IIT Goa is very keen to extend our facilities to other researchers in our country. To fulfil the motto, we find the I-STEM could be the best way to make our facilities accessible for others. We have already uploaded more than hundreds of research equipment for the external users. Anyone in our country can use these facilities on a payment basis. We are currently also making our technologies available for others on the I-STEM portal. It will allow a smooth technology transfer with the interested industrial organization.

If researchers are interested in knowing more about I-STEM, please visit the website or write to us at (<u>istem@iitgoa.ac.in</u>)

Project Investigator	Department	Department Equipment	
Dr. Bidhan Pramanick	COE	XRD	
Dr. Santosh Kumar	COE	E Beam PVD System	
Dr. Anirudha Ambekar	SMS	Engine Test Setup Variable Comp Ratio.	
Dr. Anirudha Ambekar	SMS	Engine Test Setup Variable Comp Ratio.	
CITS	Office of Dean	Academic ERP Software	
Dr. Sachin Kore	SMS	3D Printer, 3D Scanner and Rack	
Dr. Sachin kore	SMS	6 Axis Robotic Welding Set	
CITS	CITS	NETSIM software	
Dr. Bidhan Pramanick	SES	Dynamic Signal Analyser	
Dr. Sachin Kore	SMS	CNC Modular Kit	

#### **I-STEM EQUIPMENT**



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#### **I-STEM EQUIPMENT**

Project Investigator	Department	Equipment	
Dr. Bidhan Pramanick	COE	CNC Prototyping Machine	
Dr. Bidhan Pramanick	SES	MEMS + Complete (For Mathworks and Cadence)	
Dr. Bidhan Pramanick	SES	3D Printer	
Dr. Arindam Das	COE	Field Emission Scanning Electron Microscope (FESEM)	
Dr. Arindam Das	COE	Sigma 700 Force Tensiometer, MCR 702 Universal Rheometer	
Dr. Ashish Bhateja	SMS	Compute Cluster	
Dr. Harpreet Singh	SMS	Simulia ABAQUS Extended Re- search Edition	
Dr. Sachin Kore	SMS	Proxxon Precision PD 400 Lathe	
Mr. Amol Kamble	SMCS/CSE	Supply of TUL PYNQ-Z2 Board with accessories	
Dr. Sheron Figardo	SES	Dual Rotor Aerodynamic System	
Dr. Sheron Figardo	SES	Modular Servo	
Dr. Santosh Kumar	SPS	Optics and Optomechanics Items	
Dr. Bidyadhar Subudhi	SES	DC Microgrid System	
Dr. Harpreet Singh	SMS	Compute Server	
Mr. Amol Kamble	SMCS/CSE	Supply of Makerbot Replicator + 3D Printer	

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## I-STEM





Laser



LCMS 2



## **Consultancy Projects**

#### **CONSULTANCY & TESTING POLICY**

IIT Goa extends its human resource and equipment for service of the nation in view of promoting industry-academia collaboration. Consultancy and testing services are provided with nominal charges. Such works are undertaken with proper registration with R&D, IIT Goa.

#### **TESTING SERVICES**

Testing, certification and calibration work are undertaken depending upon the available equipment/instruments at IIT Goa. For more details about the instrument and booking procedure, please visit our I-STEM website.

#### CONSULTANCY

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Industrial consultancy to solve industrial problems is undertaken by faculty members of IIT Goa. Such consultancy projects are registered with the R & D section before commencement of the work with necessary agreements as formulated under IIT Goa's standard guidelines.

#### **CONSULTANCY PROJECTS**

Name of the Faculty	Sponsoring Agency	Name of the Project	Project Duration
Dr. Sasidhar Sampathirao	River Navigation Department Government of Goa	Evaluation And Expert Opinion For Pro- viding Technical Clarification For Specifi- cations Of First Electric/Solar Hybrid Ferry Boat	24 Months
Dr. Sharad Sinha	Amazon Web Services (AWS)	Amazon Educate Grant	12 Months
Dr. Sharad Sinha	CEERI	ARM Architecture And System On Chip (SOC) Design	24 Months
Dr. Sachin Kore	Apple Inc., USA	Electromagnetic And Electrohydraulic Forming of Al Sheets	-



Proprietors: Dr. Barada Kanta Mishra, Dr. Arindam Das and Dr. Dakappa Shakthiprasad.

The company was incorporated on January 20, 2020. It is classified as a non-govt company, registered with the ROC-goa and is the winner of Defence India start-up challenge.

#### Sakai Autonomous Machines



Proprietors: Dr. Bidyadhar Subudhi, S.Swain and S.Mahapatra

The company was incorporated on Feb 16, 2021

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## **Awards & Recognitions**

#### RECOGNITIONS

Three professors from Indian Institute of Technology Goa placed among Stanford University's top 2% Research Scientists.

- Professor B. K. Mishra, Director, IIT Goa, Director is ranked eleventh(11th) in the world for his research in the field of mining and metallurgy.
- Professor Bidyadhar Subudhi, School of Electrical Sciences is ranked among top 2% scientist in the world in the field of Industrial Engineering and Automation.
- Professor Dhirendar Bahadur, School of Chemical and Materials Sciences is ranked among top 2% scientist in the world in the field of Applied Physics.
- Prof. B.K. Mishra Director IIT Goa, has been conferred The Institution of Engineers (India) Eminent Engineer Award 2020. The award was presented to him by the Chairman, IEI, Goa State Center & Honorary Secretary IEI, Goa State Centre on behalf of IEI, Durgapur Chapter.

#### AWARDS

• Mr. Sagar Pawar (PhD student of Prof. Sachin Kore), won the Gold in Research category of CII MIL-CA award in 2021. Their research was on Electromagnetic Forming and Perforation of Tubes.



## Project on COVID-19 Research

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Title of the Project	Sponsoring Agency	Name of the Faculty
Design and development of low cost electro- chemical sensor for rapid detection of SARS-CoV-2	IIT Goa	Dr. Bidhan Pramanick
Manufacturing of Mechanical Ventilator	IIT GOA	Prof. Sachin Kore
Stochastic Transmission of COVID-19	IIT GOA	Dr. Santosh Kumar Das
IoT Based Contactless/ Touchless Smart Entry-Exit & Attendance System for Personnel	IIT GOA	Dr. Sharad Sinha
Data Analyses and Epidemic Models for COVID-19	IIT GOA	Dr. Sreenath Balakrishnan
Studies to predict the extent of virus spread from coughing and sneezing	IIT GOA	Dr. Rudra Narayan Roy
Structure-Based Design, Synthesis and Biological Evaluation of Novel Mpro Inhibitors for Targetting COVID-19	IIT GOA	Dr. Rishikesh Narayan

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## Seminar/Symposium/ Workshop/Short Courses

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Name of the Person In Charge	School	Funding Agency	Title	Date of Commencement	Duration
Dr. Sharad Sinha and Dr. Clint P. George	SMCS	ACM SIGAI	Artificial Intelligence for All	31.08.2019	l day
Dr. Bidyadhar Subudhi	SES	Self Financing	Track 1 Power Electronics Control and Machines for Micro Grid System and Renewables	05.12.2019 to 07.12.2019	3 days

Name of the Person In Charge	School	Funding Agency	Title	Date of Commencement	Duration
Dr. Sachin D. Kore	SMS	CEFIPRA	Seminar on Goa Atlantic Cooperation Project on Marine Science and Technology (GoAT) in France.	20.01.2020 to 24.01.2020	5 Days (Completed)
Dr. Sharad Sinha	SMCS	CEERI	ARM Architecture and System-on-Chip (Soc) Design.	01.12.2019 to 03.12.2019	3 Days (Completed)
Dr. D. Bahadur	SCMS	SERB	Advanced Functional Materials at Nano and Atomic Scale	10.02.2020 to 28.02.2020	18 Days (Completed)
Dr. Thaseem Thajudeen	SMS	Nano Ja- tha	Nano Jatha	12.02.2020	1 Day
Dr. Sharad Sinha	SMCS	NSM	Pan India Online Course in HPC Under NSM	10.11.2020	3 Months (Ongoing)
Dr. Bidhan Pramanik	COE	Self- Financing	Particulates,Colloids and Interfaces	14.12.2020	l Day (Completed)
Dr. Sharad Sinha	SMCS	AICTE	ATAL Faculty Development Program on Internet of Things	14.11.2020	5 Days (Completed)



#### **IPR ACTIVITIES**

The Institute Innovation Council, IIT Goa, conducted a webinar on **Intellectual Property Rights** and **Filing of Patents** on Monday, 24 August 2020. The webinar expert was advocate **Ms.Shalini Sitaraman Menezes**.

Adv. Menezes introduced the concepts of copyright, trademarks, patents filing and other aspects of Intellectual Property Rights to an audience comprising faculty, staff and students. The examples of IPR are industrial property, industrial design, confidential information, geographical indications etc.

In the coming years, IPR will play a pivotal role in the growth of R & D related outcomes of our institute and the country. Following the session, participants had a host of questions for the expert, which she responded to satisfactorily. Based on the previous experience, we intend to conduct many more sessions on legal and IPR related issues for our ecosystem.

"Know Your IP Rights" an IPR Quiz week was conducted for students to promote understanding and awareness of Intellectual Property and emphasise its importance. A question was released every day and a scoreboard was maintained based on students' answers which was used to determine the winners at the conclusion of the Quiz. Questions ranged from those on intellectual property rights to concepts such as patents and trademarks. The event was successful in terms of student engagement as was seen in their week-long enthusiastic participation.

Name of the Faculty	Department	Project Name	Year
Dr. Sashidhar Sampathirao, Ms. Silba Mathew (IIT Bombay) and Prof. B. G. Fernandes (IIT Bombay)	School of Electrical Sciences	Motor System and Winding for an Electric Motor	2019
Dr. Sashidhar Sampathirao and Prof. B. G. Fernandes (IIT Bombay)	School of Electrical Sciences	Semi-Modular Submersible Brushless DC Motor	2019
Dr. Ashish Rajak (IIITDM Jabalpur) and Dr. Sachin D. Kore	School of Mechanical Sciences	Multi Shot Fieldshaper Design for EM Crimping.	2020

#### PATENTS FILED BY IIT GOA

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# **MoUs and Collaborations**

2020



Public Works Department,Govt. of Goa



Kineco Kaman



Goa Shipyard Ltd., Goa Ministry of Defence



Goa College of Engineering (GEC)



Campus Monde de la Mer



NAVAL Group



प्रगत संगणन विकास केंद्र CENTRE FOR DEVELOPMENT OF ADVANCED COMPUTING

Centre for Development of Advanced Computing



INESC-TEC Institute for Systems and Computer Engineering, Technology and Science, Portugal

## SIEMENS

Siemens Limited



MEFy CARE PVT LTD



Ecole Nationale d'Ingenieurs de Brest (ENIB)



ENSTA Bretagne

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2019



ARM India University Program



**Express Analytics** 

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प्रगत संगणन विकास केंद्र CENTRE FOR DEVELOPMENT OF ADVANCED COMPUTING

Centre for Development of Advanced Computing



Raja Ramanna Centre for Advanced Technology (RRCAT Indore)



NIWE



ALCOLABS



Chennai Mathematical Institute

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## **MoUs and Collaborations**

#### 2018



CSIR- Central Mechanical Engineering Research Institute (CMERI Durgapur)



ÉCOLE NAVALE / French Naval Academy GOA-Atlantic Cooperation Programme



Common Offer Acceptance Portal (COAP) Coordinated by IIT Madras



CSIR- Advanced Materials and Processes Research Institute (AMPRI Bhopal)



Goa College of Engineering (GEC)

### **Ministry of Education** Government of India

#### Ministry of Education



CSIR- Institute of Minerals and Materials Technology (IMMT Bhubaneswar)



CSIR- National Institute of Oceanography (NIO Goa)



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Name	Designation	Email	Phone Number
Dr. Bidyadhar Subudhi	Dean (R&D)	dean.research@iitgoa.ac.in	0832-2490859
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