



# RESEARCH & DEVELOPMENT


**BROCHURE**  
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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 Electrical Engineering (EE), Mechanical Engineering (ME), and Computer Science and Engineering (CSE). The institute has been very active in its PhD programmes offered by its six Schools namely, School of Chemical & Material Sciences, Electrical Sciences, Mathematics & Computer Science, Mechanical Sciences, Physical Sciences and Humanities and Social 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 six 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.



# 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 63 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 as 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.

Office of the Dean of Research and development activities are the lifeline of a vibrant academic institution. The DR&DO Office plays a vital role in maximizing intellectual output by providing full support - from conceptualization to commercialization - to research ideas emerging within the institution.

It's 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 IIT 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

- 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.



# R&D Activities at IIT Goa

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- 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

- We are currently executing 47 Government Sponsored projects and 16 consultancy projects
- Total Funds Sanctioned under for Sponsored Research Grants 2021-21 (Major Funding Agencies: SERB, DST, brns etc. Other Government Bodies):Rs.6,77,00,000

# 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.

IIT 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.

# School of Chemical and Materials Sciences

## 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.

## MAJOR FACILITIES



Instrumentation lab



Workbench



Wet Lab



HPLC-MS

Shimadzu LCMS2020 Perform  
reactions in inert atmosphere



Gas Chromatography

Shimadzu 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

SCMS

## SPONSORED PROJECTS

Title of the Project	Sponsoring Agency	Name of the Faculty
Toward the Catalytic Hydroamination of unbiased alkenes with ammonia	Max-Planck Society	Dr. Raja Mitra

## 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.

## MAJOR FACILITIES

### AC Machines Laboratory



## MAJOR FACILITIES

### Analog Circuits Laboratory



### DC Machines Laboratory



## SPONSORED PROJECTS

Title of the Project	Sponsoring Agency	Name of the Faculty
Development and Implementation of Different Robust Control Algorithms for Plasma position control in a Tokamak	DAE Board of Research in Nuclear Sciences	Dr. Bidyadhar Subudhi
Scattering media: AI-assisted non invasive super resolution imaging	Science and Engineering Research Board	Dr. Sujit Kumar Sahoo
An affordable therapeutic solution for rehabilitation of cerebral palsy children with crouch gait	Science and Engineering Research Board	Dr. Sheron Figarado
Architect and Design an Approximate Processor for Image Processing Applications	Science and Engineering Research Board	Dr. Sunil Dutt
Unrolling Signal Processing Algorithms: Developing Interpretable and Generalizable Deep Learning for Inverse Problems	Science and Engineering Research Board-Matrices	Dr. Sujit Kumar Sahoo
Mitigation of Green House gas with Electrical discharge based plasma catalysis approach utilizing industrial wastes	SERB - POWER Research Grants	Dr. Apeksha Madhukar
Capacity Building for Human Resource Development in Unmanned Aircraft System (Drone and related Technology)	MeitY	Prof. Bidyadhar Subudhi, Dr. Sharad Sinha, Dr. Clint P. George and Dr. Neelakandan Rajamohan
Sonar Acquisition Resolution Improvement	CEFIPRA	Dr. Sujit Kumar Sahoo

# School of Humanities and Social Sciences

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## 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 designed to enhance critical thinking and analytical skills in students.



# School of Mathematics and Computer Science

## 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 and M.Tech programs in CSE and also runs a program in Mathematics & Computing in collaboration with the Department of Mathematics.

## 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

## SPONSORED PROJECTS

Title of the Project	Sponsoring Agency	Name of the Faculty
Problems in Complex Geometry	Science and Engineering Research Board-Matrices	Dr. Abhitosh Upadhyay
Lipschitz classification of smooth mappings	Science and Engineering Research Board-Matrices	Dr. Saurabh Trivedi
Maximal surfaces admitting symmetries	Science and Engineering Research Board-Matrices	Dr. Shiv Prasad
Probabilistic Pushdown Automata	Science and Engineering Research Board -Matrics	Dr. Sreejith AV
Formal verification of adaptive control algorithms	CEFIPRA	Dr. Sreejith AV
Control and Finite Element Analysis of Cahn-Hilliard-Navier-Stokes system	Science and Engineering Research Board	Dr. Saumya Bajpai
Characteristic Functions, Invariant Subspaces and Regular Factorizations	Science and Engineering Research Board	Dr. Kalpesh J. Haria
Deciding Closeness of Finite State Transducers	Science and Engineering Research Board	Dr. Amaldev Manuel
Non-commutative Poisson boundaries	Science and Engineering Research Board	Dr. Sandipan De
Enhancing Robustness of Markov Processes	Science and Engineering Research Board	Dr. Divya Padmanabhan

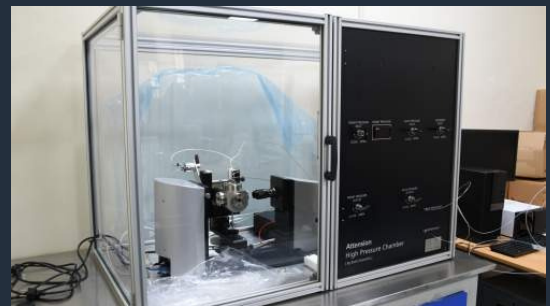
## ABOUT THE SCHOOL

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.

## MAJOR FACILITIES



Electromagnetic Pulse Welding Set Up



High Pressure Optical Tensiometer(400 Bar)



Differential Scanning Calorimeter



Thermogravimetric Analyzer



Universal Testing Machine



CNC- ElectricDischarge Machining

## MAJOR FACILITIES



CNC Turning Machine



CNC Milling Machine



Research Grade IC Engines



Olympus Research Grade Microscope  
(1000X)



Robotic MIG Welding Machine

## SPONSORED PROJECTS

Title of the Project	Sponsoring Agency	Name of the Faculty
MultiScale Modelling of Failure of composites	DRDO-Aeronautics Research and Development Board (AR&DB)	Dr. Harpreet Singh
Development of a multigrid algorithm for unstructured grid finite volume CFD solver	Indian Space Research Organisation	Dr. Sudhakar Yogaraj
Development of doubly conditional moment closure model for flame extinction/re-ignition and for partially premixed turbulent flames	Science and Engineering Research Board	Dr. Rudra Narayan Roy
Design of advanced 3D printed composites using micro-architecture for enhanced properties	Science and Engineering Research Board	Dr. Sandip Haldar
Machine Learning and Sensor - based Network for Continuous Air Quality Monitoring and Prediction	Goa State Pollution Control Board	Dr. Thaseem Thajudeen , Dr. Clint P. George and Anirudha Ambekar
Development of coupled fluid-particle dynamics code for application in continuous air monitoring	DAE-Board of Research in Nuclear Sciences	Dr. Thaseem Thajudeen , Dr. Rudra Narayan Roy





# 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.

## 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, Wannier Tool etc



Photo Correlation Setup

## SPONSORED PROJECTS

Title of the Project	Sponsoring Agency	Name of the Faculty
Probing the Quark Gluon Plasma by Heavy Quarks	DAE Board of Research in Nuclear Sciences	Dr. Santosh Kumar Das
Limitations to information processing in Eukaryotic Cells	Science and Engineering Research Board	Dr. Vaibhav Wasnik
"Designing of oxyhalides as energy storage and magnetic materials"	SERB - POWER Research Grants	Dr. Jhuma Sannigrahi

# School of Interdisciplinary Life Sciences

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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 inter institutional 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.

# 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. Thaseem Thajudeen  
Email: [thaseem@iitgoa.ac.in](mailto:thaseem@iitgoa.ac.in)



Microfabrication Facility



MFP 3D Origin Atomic Force Microscope



Chemical Hood and Wet Bench Station



Contact Angle Goniometer & Optical Tensiometer



X-Ray Diffraction System



Probe Station



Ellipsometer



Oxidation Furnace

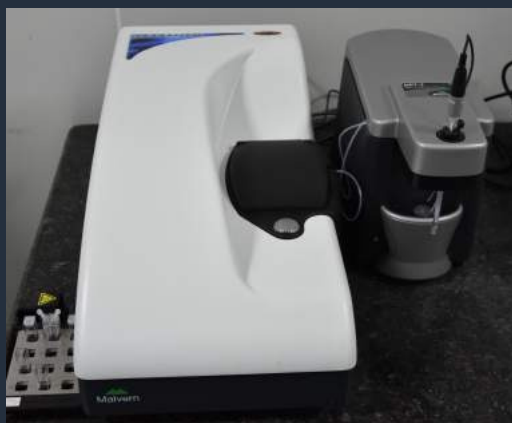


Goniometer/ Optical  
Tensiometer

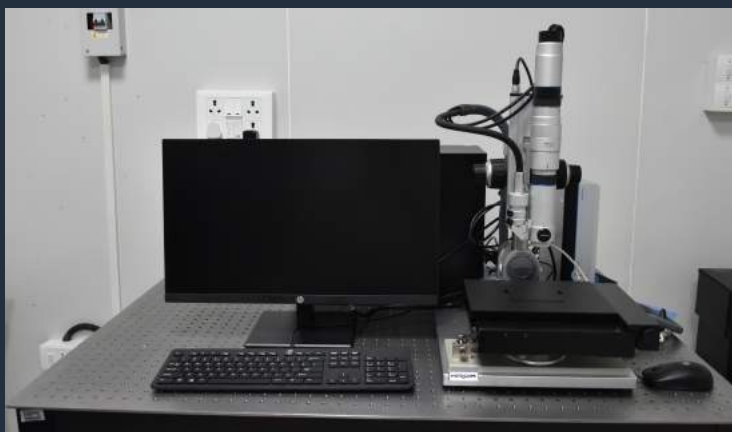


XRD

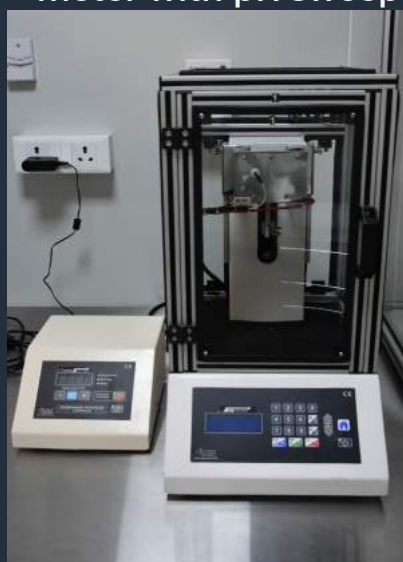




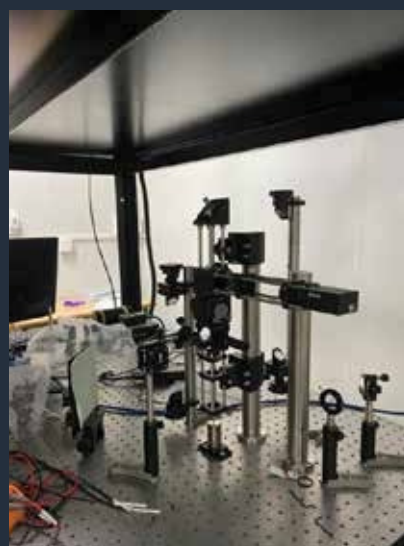
DLS Nanoparticle size Analyzer & Zetapotential meter with pH sweep



RH 2000 Hirox Digital Motorized Microscope (3600 X)



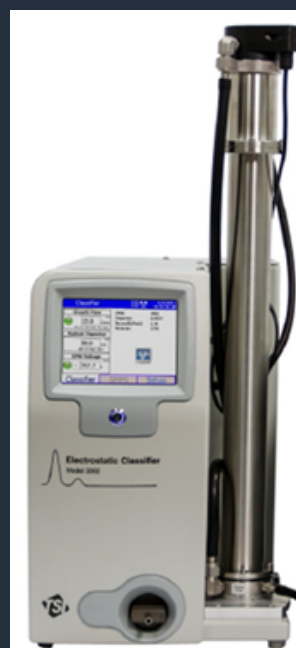
Temperature Controlled Dip Coater



Raman cum PL



Zeiss Gemini FE-SEM



Scanning Mobility Particle Sizer



Electrospinning setup



Force Tensiometer with  
CMC Measurement  
module



Electron Beam  
Physical Vapor  
Deposition System



Anton Paar MCR 702 Multi  
Drive Universal  
Rheometer

# Faculty Details

Sr. No .	Name of the Schools	Total
1	School of Electrical Sciences	1. Prof. Bidyadhar Subudhi 2. Dr. Apeksha Madhukar 3. Dr. Bidhan Pramanick 4. Dr. Nandakumar Nambath 5. Dr. Neelakandan Rajamohan 6. Dr. Sashidhar Sampathirao 7. Dr. Shakthi Prasad D. 8. Dr. Sheron Figarado 9. Dr. Sujit Kumar Sahoo 10. Dr. Sunil Dutt
2	School of Chemical and Material Sciences	<u>Chemistry</u> 1. Dr. E. Siva Subramaniam Iyer 2. Dr. Mantu Santra 3. Dr. Raja Mitra 4. Dr. Rishikesh Narayan <u>Chemical and Materials Engineering</u> 1. Prof. B. K. Mishra 2. Dr. Kedar Joshi 3. Dr. Satyaprakash Ahirwar
3	School of Mathematics & Computer Science	<u>Mathematics</u> 1. Dr. Abhitosh Upadhyay 2. Dr. Kalpesh Jayantilal Haria 3. Dr. Lok Pati Tripathi 4. Dr. Rajeew Gupta 5. Dr. Sandipan De 6. Dr. Saumya Bajpai 7. Dr. Saurabh Trivedi 8. Dr. Shiv Prasad

## Faculty Details

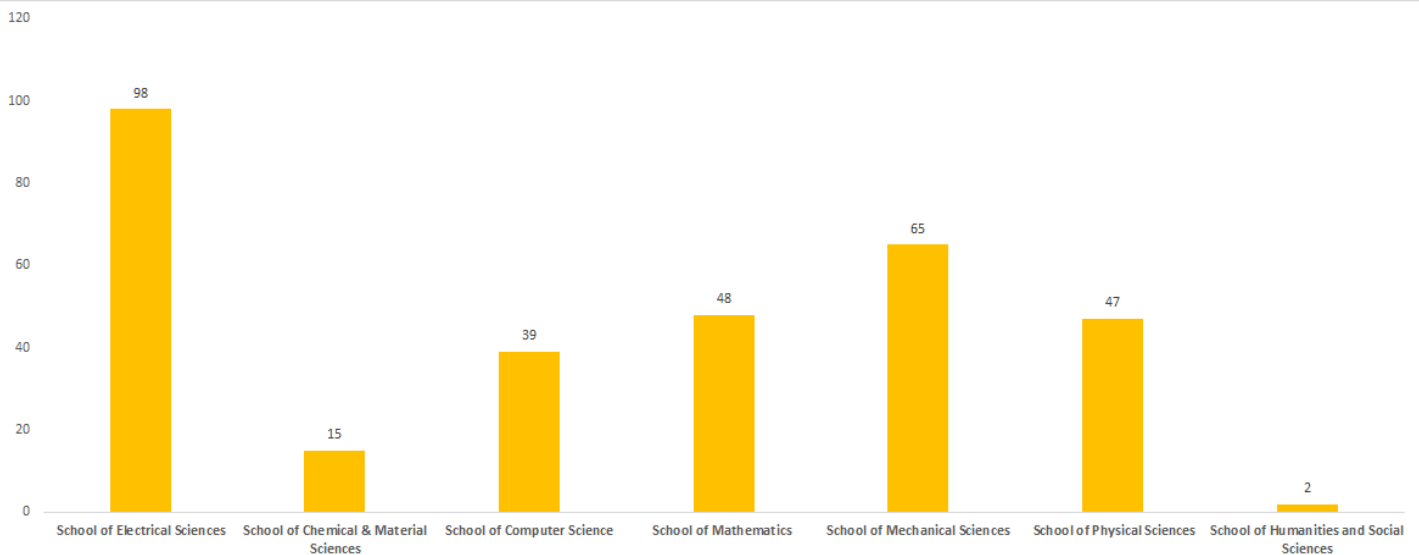
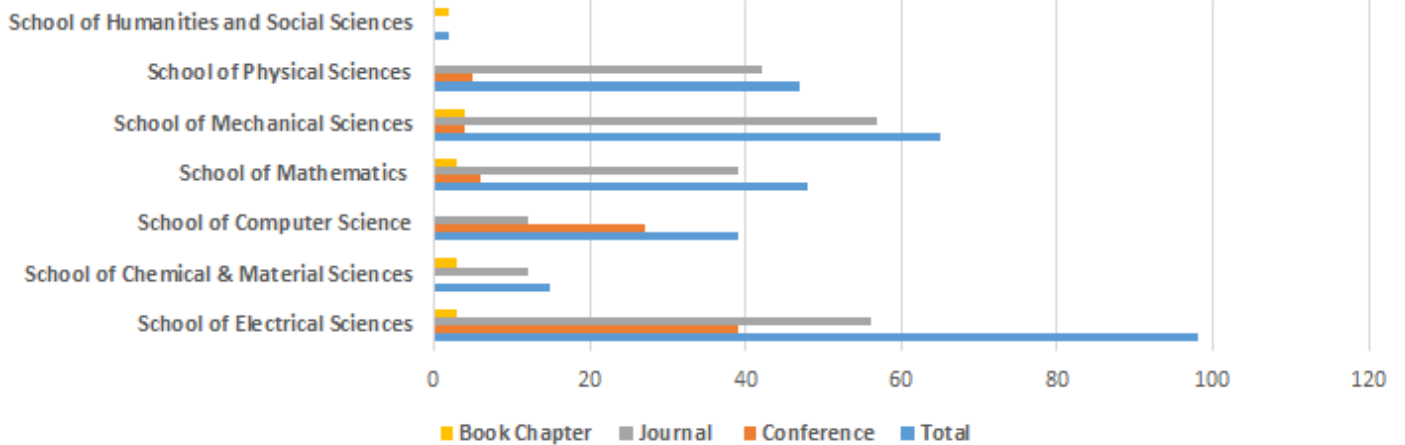
Sr. No .	Name of the Schools	Total
		<u>Computer Science</u> 1. Dr. Amaldev Manuel 2. Dr. Arpita Korwar 3. Dr. Clint Pazhayidam George 4. Dr. Divya Padmanabhan 5. Dr. Neha Karanjkar 6. Dr. Rahul C S 7. Dr. Satyanath Bhat 8. Dr. Sharad Sinha 9. Dr. Shitala Prasad 10. Dr. Sreejith A V 11. Dr. Sudakshina Dutta
5	School of Mechanical Sciences	1. Prof. Sachin Dnyandeo Kore 2. Dr. Anirudha Ambekar 3. Dr. Arindam Das 4. Dr. Ashish Bhateja 5. Dr. Harpreet Singh 6. Dr. Ponnulakshmi V. K. 7. Dr. Rajesh S. Prabhu Gaonkar 8. Dr. Rudra Narayan Roy 9. Dr. Sandip Haldar 10. Dr. Sreenath Balakrishnan 11. Dr. Sudhakar Yogaraj 12. Dr. Thaseem Thajudeen
6	School of Physical Sciences	1. Dr. Santosh Kumar 2. Dr. Santosh Kumar Das 3. Dr. Sudipta Kanungo 4. Dr. Vaibhav Wasnik
7	School of Humanities and Social Sciences	1. Dr. Sabiha Hashami 2. Dr. Sunil Paul
8	School of Interdisciplinary Life Sciences	1. Dr. Bidhan Pramanick 2. Dr. Clint Pazhayidam 3. Dr. Rishikesh Narayan 4. Dr. Sreejith A V 5. Dr. Sreenath Balakrishnan 6. Dr. Vaibhav Wasnik

# Research Publications

Sr. No .	Name of the Schools	Total	Conference	Journal	Book Chapter
1	School of Electrical Sciences	98	39	56	3
2	School of Chemical & Material Sciences	15	0	12	3
3	School of Computer Science	39	27	12	0
4	School of Mathematics	48	6	39	3
5	School of Mechanical Sciences	65	4	57	4
6	School of Physical Sciences	47	5	42	0
7	School of Humanities and Social Sciences	2	0	0	2
8	School of Interdisciplinary Life Sciences	0	0	0	0



# Research Publications



## High Performance Computing (HPC) FACILITY

IIT Goa is a Nodal Center for Training in HPC and AI 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.

## SOFTWARE

- MATLAB
- Ansys
- Solidworks
- COMSOL
- Multiphysics Mentor
- Graphics NetSim
- Mathematica
- Cadence
- Keil
- MEMS

# I-STEM

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 ([istem@iitgoa.ac.in](mailto:istem@iitgoa.ac.in))

## I-STEM EQUIPMENT

Project Investigator	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.
Dr. Sachin Kore	SMS	3D Printer, 3D Scanner and Rack
Dr. Sachin Kore	SMS	6 Axis Robotic Welding Set
Dr. Bidhan Pramanick	SES	Dynamic Signal Analyser
Dr. Sachin Kore	SMS	CNC Modular Kit

## 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 Research 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

# I-STEM

## EQUIPMENTS



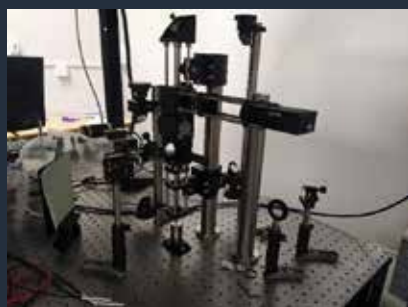
AFM



XRD



Amplified laser with OPA and Transient AI

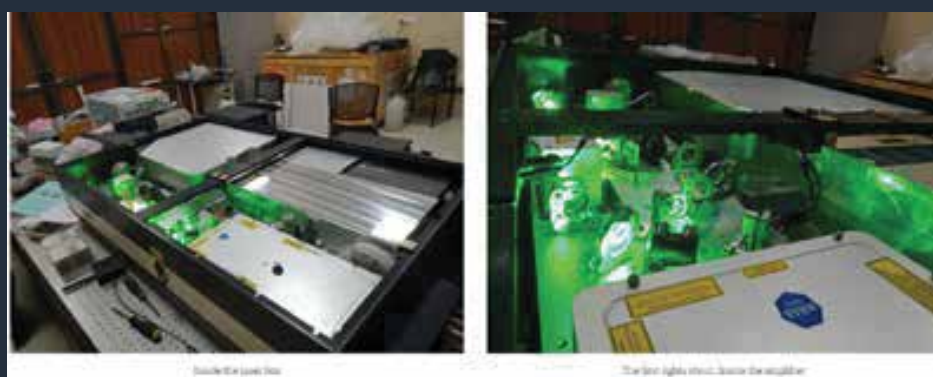


RAMAN CUM PL



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Laser



LCMS 2

# MoUs and Collaborations

35

2022



SIEMENS

Siemens Limited



sciverse™

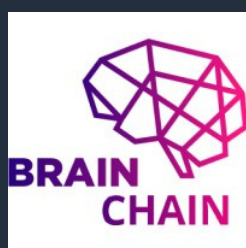
Sciverse Solution Pvt Ltd.



CSIR-Central Drug Research Institute



Federation Gay Lussac



Brainchain  
Technologies  
Pvt. Ltd.



BITS Goa Innovation  
, Incubation &  
Entrepreneurship  
Society



Goa Police



AIC STPINEXT  
INITIATIVES



INFLIBNET Center ,  
An IUC of University  
Grant Commission ,  
Infocity , Gandhinagar



National Centre for  
Biological Sciences



Indian Institute  
Of Information  
Technology,  
Design &  
Manufacturing,  
Kurnool

# MoUs and Collaborations

2021



TATA CHEMICAL LTD.



MEFY CARE PVT LTD



Indian Naval Academy



Max- Planck Partner  
Group



Kineco Kaman Composites  
India (P) Ltd



John Deere India  
Pvt Ltd