



INDIAN INSTITUTE OF SCIENCE, BANGALORE

CENSE

**CENTRE FOR NANO SCIENCE
AND ENGINEERING**

DEPARTMENT BROCHURE



About CeNSE

The Centre for Nano Science and Engineering (CeNSE) focuses on interdisciplinary research and education in the broad area of nano-scale science and technology, covering topics such as nanoelectronics, devices, materials, micro-nanoelectromechanical systems, bio- and nanophotonics, bio-electronic interfaces and integrated small-scale systems. In addition to the research programs of the core faculty, the Centre runs an interdisciplinary research and training program involving more than 50 faculty members from various departments of engineering and basic science at the Indian Institute of Science (IISc). The Centre has state-of-the-art nanofabrication and characterization facilities to enable the development of cutting-edge nanoscale technologies for various applications. Center also focuses on the entrepreneurship, multi-skill development and industry ready programmes of its students through its various initiatives like InCense (Startup incubator), Industry affiliate programmes and specific training.

Programmes offered

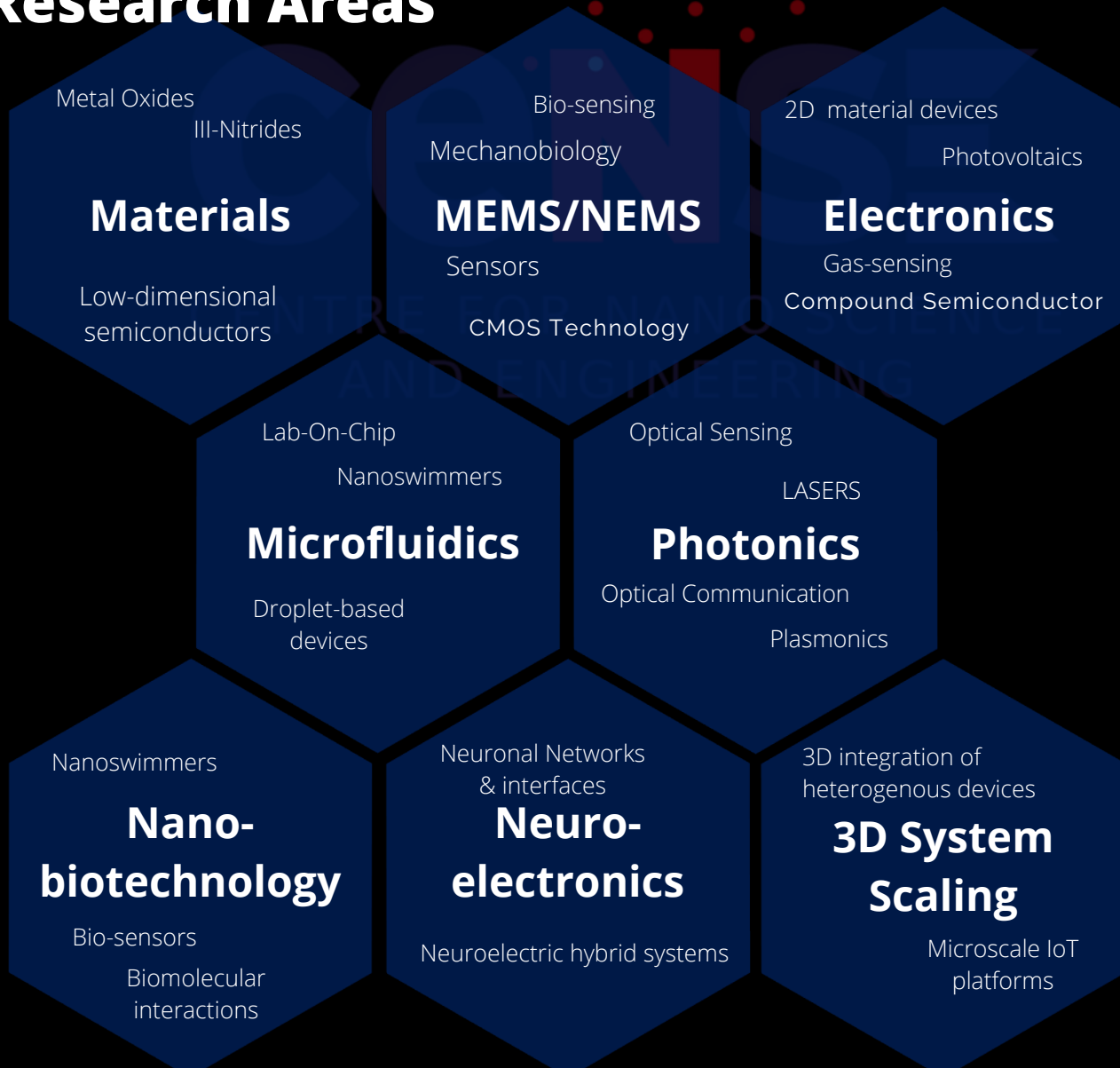
Masters in Nano Science and Engineering

- Industry Oriented
- Coursework + Thesis
- 2 year duration
- Various backgrounds viz. Electronics, Electrical, Mechanical, Physics, etc.

PhD in Nano Science and Engineering

- Research Oriented
- Coursework + Thesis
- Startups such as Agnit, Theranautilus, Pathshodh
- Various backgrounds

Research Areas



Our faculty members

Resident faculty members:



Srinivasan Raghavan

Growth of thin films & nanostructures
GaN, Oxides, 2D materials



Ambarish Ghosh

Nanoswimmers, Quantum sensing, Plasmonics,
2D materials, Quantum fluids



Navakanta Bhat

Nanoelectronics, Biosensors, Metal-oxide Gas sensors,
materials for CMOS & MEMS



Rudra Pratap

MEMS transducers, Piezo-MEMS, Mechanobiology,
Nanoscale patterning and material transport



Prosenjit Sen

Microfluidics, LAB-on-Chip, Antimicrobial and Self-
cleaning surfaces



Pavan Nukala

Ferroic-Oxides, Material network for Neuromorphic
computing, Thin film XRD, Phase-change materials



Saurabh Chandorkar

Wafer scale MEMS packaging, Low cost system
development for IC fabrication



Aditya Sadhalana

Nanofabrication, Optoelectronics, Spectroscopy,
Nano-structured materials



Chandan Kumar

Electron Hydrodynamics, Scanning SET, Electron
Optics, Moire Physics in mesoscopic devices,
Developing novel Scanning techniques



Supradeepa VR

Integrated photonics, High power Fibre LASERs,
Nonlinear Optics, High BW Optical communication



Akshay Naik

Non-linear dynamics in 2D NEMS, Noise in NEMS,
strain engineering in 2D materials



Digbijoy N Nath

Electronics, GaN technology, Nitrides, Low dimensional
semiconductors, Gas sensing, Bio sensing



Manoj Varma

Noise in Biochemical sensing, Bio-sensors,
Autonomous robots



Shankar Kumar Selvaraja

Silicon Photonic IC, Microwave photonics, Mid-IR
photonics, Photonics assisted exascale computing



Sushobhan Avasthi

Perovskite, Solar cells on steel, Oxides for photovoltaics,
sensing & memory, Heterojunction devices



Gayathri Pillai

Piezoelectricity, Sensors and Actuators, MEMS/NEMS



Vini Gautam

Neural interfaces, Bionic vision, Neuroprosthetics,
Biomaterials, Optoelectronics



Sreetosh Goswami

Brain inspired computing, Cognition, In-operando
spectroscopy, Molecular Electronics, Nano-scale
electronic, ionic and photonic devices

Visiting faculty members:



S. A. Shivashankar

Chemical synthesis of nanomaterials and precursors,
CVD, ALD, Pyrolysis, sol-gel methods



Madhusudan V. Atre

Industry experience and leadership roles in Energy,
Semiconductors, R&D



M. M. Nayak

MEMS transducers, Pressure transducers, Graphene
sensors, System integration, testing, calibration



R. Muralidharan

High power RF devices, III-Nitrides

Why hire from CeNSE?

Diversified background:

Students joining CeNSE hail from all backgrounds, be it Engineering or Science. This fetches a variety of viewpoints and approaches to a problem.

Hands-on practical experience:

Students at CeNSE understand the theory and, simultaneously, have the hands-on experience required for industries.

State-of-the-art research facilities:

Students get exposure to National Nano-Fabrication Center, (NNFC) cleanroom facilities, where they get hands-on experience in fabricating various semiconductor devices (Nanoelectronic, Photonic, Piezoelectric, MEMS).

The Micro and Nano Characterization Facility (MNCF), offers various material and device characterization services, allowing students to equip themselves with the theory and enhance scientific reasoning, problem-solving, and critical thinking skills.

Interdisciplinary course structure:

Apart from the departmental courses, students voluntarily take up subjects from departments like DESE and ECE in IC Design, RFICS, Analog VLSI, etc.

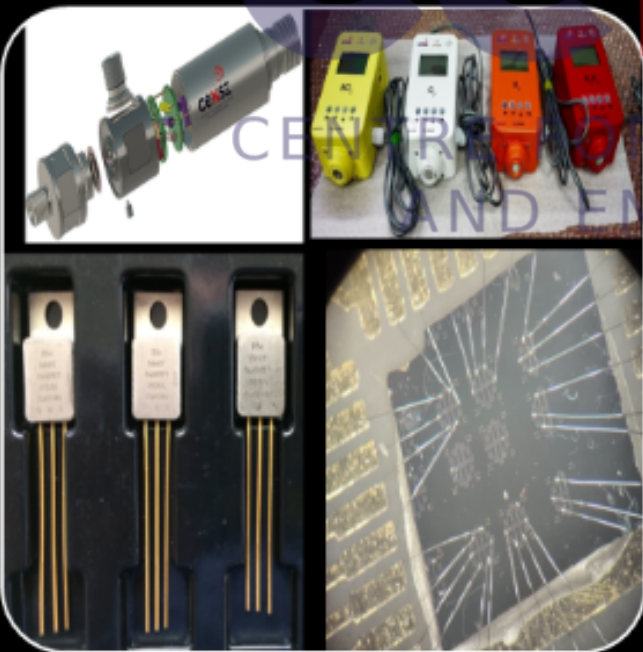
Student Training @CeNSE



Coursework: Theory and Practical



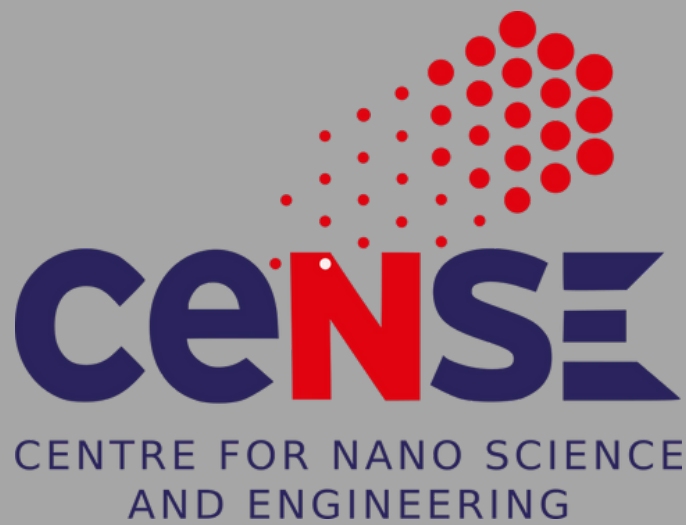
NNFC: Device realization



Packaging: System testing and Integration



MNCF: Material and Device characterization



M.TECH STUDENT PROFILES

Students Seeking Industry Placements
MTech Batch: August '22 - July '24



ABHINAV AGRAWAL



EDUCATIONAL QUALIFICATION

M.Tech. in Nanoscience & Engineering -

IISc Bangalore, India (Aug 2022 – Present)

CGPA : 7.9 / 10

B.E. in Electrical and Electronics Engineering -

BITS Pilani - Hyderabad Campus, (Aug 2016 -
July 2021)

CGPA: 8.19 / 10

M.Sc. in Physics -

BITS Pilani - Hyderabad Campus, (Aug 2016 -
July 2021)

CGPA: 8.19 / 10

MY SKILLS

Softwares: LT Spice, MATLAB,
Sentaurus TCAD

Characterization Tools: Atomic Force
Microscopy (Park AFM NX20, Bruker
Dimension Icon AFM), Raman Spectroscopy
(LabRAM HR (UV))

Basic Proficiency in German Language

PROJECTS AND RESEARCH INTERNSHIP

Quantitative Measurement of Nanoscale Friction Using Lateral Force Microscopy

CeNSE, IISc, Bangalore,

August 2022 - December 2022

Mathematical Modeling of Device

Reliability

Prof. Souvik Mahapatra, Department of
Electrical Engineering, IIT Bombay

July 2021 - June 2022

Coding Guidelines Checker

Samsung Semiconductors India R&D,
Bangalore

Sept 2020 - June 2021

PCB Design and Fabrication

Hochschule Ravensburg-Weingarten -
University of Applied Sciences

June 2019 - July 2019

Publications

"Trapped water between Graphene and
hydrophilic substrate", Page 5 - Image
Gallery 2023, Vol.06, Park Systems

TECHNICAL INTERESTS

- Semiconductor Device Physics
- Device Characterization
- Circuit Design

EMAIL

abhinavagraw@iisc.ac.in



ABHINAV ANAND



EDUCATIONAL QUALIFICATION

M.Tech. in Nanoscience & Engineering -
IISc Bangalore, India (Aug 2022 -
Present), CGPA: 8 / 10

**B.Tech in Electronics and
Communication Engineering**- Heritage
Institute of Technology, Kolkata (July
2015 - June 2019), CGPA: 8.45 / 10



MY SKILLS

Languages : C++,C, MATLAB

Softwares: Cadence Virtuoso, LT Spice,
Tanner EDA, Xilinx Vivado, Digilent
waveform Analyzer, MS office



PROJECTS AND RESEARCH INTERNSHIP

B.Tech internship at e-COE Bhubaneswar
on transfer of simple digital logic codes
,testing using testbench , synthesis to
GDS II then transfer to Artix-7 FPGA using
Xilinx Vivado

B.Tech final year project on design of
Bandgap Reference Circuit Design and
simulation using Cadence Virtuoso

M.Tech minor project on optimization in
design of 16-bit Full Adder using Carry
Select Adder using LT Spice Circuit
design and simulation

M.Tech Major Project
Characterisation of GaN Devices

TECHNICAL INTERESTS

- Analog Integrated Circuit Design
- Digital Integrated Circuit Design
- Semiconductor Devices

EMAIL

aabhinav@iisc.ac.in



ANIK MANDAL



EDUCATIONAL QUALIFICATION

M.Tech. in Nanoscience & Engineering -
CeNSE, IISc Bangalore, India (Aug 2022 -
Present)

CGPA: 8.1 / 10

B.E. in Mechanical Engineering - Jadavpur
University (Aug 2017 -Apr 2021)

CGPA: 7.78 / 10



MY SKILLS

Languages: Python , Fortran , Javascript, HTML, CSS,
Fortran, VBA

Softwares: AutoCAD , Solidworks . Ansys(CFX,
FLUENT and Mechanical),KiCAD, Altium, Creo,
COMSOL, LT Spice

WORK EXPERIENCE

GET in Process Plan and Control (PPC) department
at Texmaco Rail and Engineering Limited
(July 2021 - July 2022)



PROJECTS AND RESEARCH INTERNSHIP

CFD simulation of atmospheric
re-entry of the FIRE-II capsule
under supersonic conditions

M.Tech Major Project
MEMS fabrication

Design and simulation of MEMS
based gas sensor for detection
of nitrogen dioxide

Growth and characterization(XRD)
of single and poly crystalline salts

Knight's tour game simulation and
build up using analog circuit and
programming in Arduino Uno

TECHNICAL INTERESTS

- CFD
- Molecular Dynamics

EMAIL

anikmandal@iisc.ac.in



HIMANSHU GUPTA



EDUCATIONAL QUALIFICATION

M.Tech. in Nanoscience & Engineering -
IISc Bangalore, India (Aug 2022 – Present)
CGPA: 9 / 10

B.Tech. in Mechanical Engineering - Madan
Mohan Malaviya University of Technology,
Gorakhpur, U.P. (Aug 2012 - June 2016)
Percentage: 80.14 %

MY SKILLS

Softwares: COMSOL

WORK EXPERIENCE

Content developer at Made Easy coaching
Institute for 5 years

PROJECTS AND RESEARCH INTERNSHIP

- PL studies of a sample containing nanodiamonds as a function of laser intensity. Detailed analysis of strength and fluctuations of the PL signal. Understanding how the PL spectrum changes as a function of time.
- Single crystal growth of Copper Sulphate Pentahydrate, Rochelle salt and Nickel Sulphate Hexahydrate at different supersaturations
- Modelling and Analysis of MEMS Gas Sensor and testing using COMSOL Multiphysics Software
- M.Tech Major Project: Design and fabrication of MEMS-based high g piezoresistive accelerometer.

TECHNICAL INTERESTS

- Semiconductor Devices
- Microfluidics Devices
- MEMS Devices

EMAIL

himanshugupt@iisc.ac.in



K V ABHINAY GANESH RAJU



EDUCATIONAL QUALIFICATION

M.Tech. in Nanoscience & Engineering -

IISc Bangalore, India (Aug 2022 – Present)

CGPA: 8.5 / 10

B.Tech in Mechanical Engineering-

K.S.R.M. College of Engineering, Kadapa (Aug 2014-Apr 2018)

CGPA: 7.48 / 10

MY SKILLS

Languages: C, Python

Softwares: COMSOL Multiphysics, Matlab, Cadence, Ansys, CREO, Solidworks, LT Spice, MS Office

WORK EXPERIENCE

Engineering Assistant (Grade-II), Panchayat Raj Engg Dept, Govt of Andhra Pradesh, Duration: Oct 2019 - Mar 2022

PROJECTS AND RESEARCH INTERNSHIP

M.Tech Major Project

Design, Develop and Characterization of MEMS Based Oscillators

○ Knight's tour: By using an Arduino UNO board build a Knight's tour on a 6 X 6 chessboard

○ Designing a wireless communication circuit on breadboard with the help of Analog

○ Discovery 2 by using OpAmps, microphone, speaker, IR LED, Photodiode, and BJTs.

○ Modelling of MEMS Gas Sensor and testing using COMSOL Multiphysics software.

○ Single Crystal growth of various salts at different supersaturations.

○ Photoluminescence studies of a sample containing nanodiamonds, as a function of laser intensity.

○ Modelling and analysis of Drum brakes.

○ Design and Fabrication of Thermo Fused Vacuum Forming Machine.

TECHNICAL INTERESTS

- Semiconductor devices
- MEMS
- Analog Circuit Design

EMAIL

abhinaykappa@iisc.ac.in



KARTIK KUMAR



EDUCATIONAL QUALIFICATION

M.Tech. in Nanoscience & Engineering -
IISc Bangalore, India (Aug 2022 – Present),
CGPA : 7.7 / 10

**B.tech. in Electronics and communication
Engineering:** Guru Gobind Singh Indraprastha
University, (Aug 2017 - Apr 2021)
CGPA: 7.6 / 10

MY SKILLS

Languages: C, C++, TINA-TI, LT Spice,
MatLab

PROJECTS AND RESEARCH INTERNSHIP

6 weeks internship at Airport
Authority of India

M.Tech Major Project

Memristor Excitation and DATA
acquisition Circuit

Quantitative Measurement of Nanoscale
friction using Lateral force microscopy

Designing, Modelling and Analysis of
MEMS Cantilever

Physically design the Knight tour game

TECHNICAL INTERESTS

- Analog Integrated Circuits
- Semiconductor Devices
- Digital Design

EMAIL

kartikkumar@iisc.ac.in



K DEVAHARSHA SIVA SAI



EDUCATIONAL QUALIFICATION

M.Tech. in Nanoscience & Engineering -
IISc Bangalore, India (Aug 2022 – Present)
CGPA : 8.8 / 10

M.Sc (Physics)
Sri Sathya Sai Institute of Higher Learning
(Aug 2020 - Apr 2022)
CGPA: 8.8 / 10

MY SKILLS

Languages: C++, Python, Matlab, MySQL

Softwares: LTSpice, COMSOL, Arduino,
OrCAD, LabVIEW, Machine Learning,
LaTeX

PROJECTS AND RESEARCH INTERNSHIP

- **M.Tech Major Project**
Designing, Developing and Characterization of Transient Voltage Suppressor (TVS) Diode
- Designing an intelligent electronic game board for the game "Knight's Tour"
- Designing, Simulating and Analyzing a Piezoelectric MEMS based Energy Harvester
- Molecular Property Prediction using Message Passing Neural Networks (MPNN)
- Comparative study on bandgap characterisation of various samples using UV-Vis-IR Spectroscopy, Photoluminescence, Cathodoluminescence
- Developing Electronic Circuits for various Temperature Measurement Sensors
- **M.Sc Course Project/Dissertation**
Effect of Sintering Aids on the Conductivity of LLTO-Y Solid-electrolyte for Li-ion Battery.
- Designing a Database Management Software using Python & MySQL
- Developing Electronic Circuits for various Temperature Measurement Sensors

TECHNICAL INTERESTS

- MEMS Fabrication
- Semiconductor Devices
- Programming

EMAIL

devaharshak@iisc.ac.in



KRISHNENDU MUKHOPADHYAY

EDUCATIONAL QUALIFICATION

M.Tech. in Nanoscience & Engineering -
IISc Bangalore, India (Aug 2022 - Present)
CGPA : 8.7 / 10

**B.E. in Electronics and Telecommunication
Engineering -** Jadavpur University (Aug 2018 -
Apr 2022)
CGPA: 9.45

MY SKILLS

Languages: C, C++, Python, Matlab

Softwares: LTSpice, Digilent

PROJECTS AND RESEARCH INTERNSHIP

Project on Deep Learning and Image Processing

Experience in using Mask writer, and Electron beam evaporator

Internship at IIT Bombay on a project that involved the application of Deep Learning for Image Processing

IEEE Research papers

1. EHHM: Electrical Harmony Based Hybrid Meta-Heuristic for Feature Selection
2. Removal of Salt and Pepper noise: A Game Theoretic Approach

M.Tech Major Project:
2D Material Fabrication and Characterisation

Made Knight's tour game using Arduino.

TECHNICAL INTERESTS

- Semiconductor Devices
- IC Design

EMAIL

krishnendum@iisc.ac.in



NAVARUN



EDUCATIONAL QUALIFICATION

M.Tech. in Nanoscience & Engineering -
IISc Bangalore, India (Aug 2022 – Present)
CGPA : 7.9 / 10

B.Tech in Biotechnology - IIT Guwahati (Aug
2018 - May 2022)
CGPA: 7.68 / 10

MY SKILLS

Languages: C, C++, Matlab, Python, LabVIEW
Skills : LT Spice, Deep Learning, Lumerical

PROJECTS AND RESEARCH INTERNSHIP

- Project on improving Detection of Cerebral-Microbleeds using Texture features and QSM (Quantitative Susceptibility Mapping) on MRI scans
- M.Tech Major Project: Visualizing, analysing and engineering collective behaviour of helical nano swimmers.
- Dry Transfer of PEDOT : PSS film using Nano-Imprint Lithography
- Designing an intelligent electronic game board for the game "Knight's Tour"
- Voice-Controlled Robot with obstacle avoidance
- Maze Solving Robot

TECHNICAL INTERESTS

- NanoBiotechnology
- Robotics
- Photonics
- Micro/Nano- Fabrication Technology

EMAIL

navarun2022@iisc.ac.in



SHIKHAR TAORI



EDUCATIONAL QUALIFICATION

M.Tech. in Nanoscience & Engineering -
IISc Bangalore, India (Aug 2022 – Present)
CGPA : 7.6 / 10

B.Tech in Mechanical Engineering -
National Institute of Technology, Allahabad,
(Aug 2018 - May 2022)
CGPA: 7.68 / 10

MY SKILLS

Languages: C, Matlab, Python, SQL

Softwares: Ansys, Solidworks,
AutoCAD, LTspice, Canva

WORK EXPERIENCE

Part-time Subject Matter Expert of Basic
Mathematics at Chegg

PROJECTS AND RESEARCH INTERNSHIP

- Study of Kite power systems that convert airborne energy to electricity
- Internship at Energy Swaraj Foundation: designed a small mobile solar kit that would be used in schools for demonstration
- Quantitative analysis of Lateral force and friction between HOPG and SiO₂ using LFM
- M.Tech Major Project : Thin-film Semiconductor Hybridization via Infiltration Synthesis

TECHNICAL INTERESTS

- Semiconductor Devices
- Analog Circuits
- Micro Electro Mechanical Systems

EMAIL

taorishikhar@iisc.ac.in



SWAPNAMOY KOLYA



EDUCATIONAL QUALIFICATION

M.Tech. in Nanoscience & Engineering -
IISc Bangalore, India (Aug 2022 –Present)
CGPA : 8.4 / 10

B.Tech in Electronics and Communication -
Jalpaiguri Government Engineering College
(Aug 2017 - Apr 2021)
CGPA : 8.93 / 10



MY SKILLS

Languages: C,C++,MATLAB

Softwares: Cadence Virtuoso, LT Spice,
Xilinx Vivado, Silvaco, Analog Discovery 2,
Computer proficiency in MS Office, LaTeX,
Verilog HDL.

Characterisation Tools

DC Probe Station, RF Probe Station, AFM,
Dektak, Ellipsometer



PROJECTS AND RESEARCH INTERNSHIP

- A Physics-Based Analytical Model for 2DEG Charge Density in AlGa_N/Ga_N HEMT Devices.
- Design and implementation of 8-bit adder in 45nm technology node using carry save adder architecture
- Fabrication: Dry transfer of PEDOT: PSS (Conductive) thin film from PDMS to Glass using NIL.
- Design of a Two-Stage Operational Amplifier in Cadence Virtuoso.
- **M.Tech Major Project**
Reliability & Stress Measurement and Analysis of Ga_N-Based HEMT Devices
- Implementation of Knight's tour on a 6X 6 PCB board
- Design of Bandgap Voltage Reference

TECHNICAL INTERESTS

- Analog IC Design
- Digital IC Design
- Micro- and Nano- FABrication Technology
- Semiconductor Devices

EMAIL

swapnamoyk@iisc.ac.in



THEJAS

BASAVARAJAPPA

EDUCATIONAL QUALIFICATION

M.Tech. in Nanoscience & Engineering -
IISc Bangalore, India (Aug 2022 – Present)
CGPA : 8.8 / 10

B.Tech in ECE
Ramaiah Institute of Technology (Bangalore),
CGPA: 9.19 / 10

MY SKILLS

Languages: C, C++, MATLAB
Skills: LT Spice, Silvaco TCAD

PROJECTS AND RESEARCH INTERNSHIP

- Comparative Study of Bandgap Characterisation of Various Samples using UV-VIS-IR Spectroscopy, Photoluminescence, Cathodoluminescence
- Research Paper: EMI shielding performance study of electroless coated iron nanoparticles on graphite using MWCNT and graphene in low-density polyethylene composite for X-band applications." Journal of the Indian Chemical Society (2023): 100962.
- M.Tech Major Project : Fabrication and characterisation of molecular memristive crossbars
- Design of in-memory XOR, full adder and 2:1, 4:1 MUX and 1:2 and 1:4 DEMUX – used conventional Ta/TaOx/Pt memristor characteristics for simulating the logic gates and logic circuits on MATLAB.
- Building knight's tour game using the Arduino
- Chemical solution deposition synthesis and characterisation of undoped and doped Cerium Oxide thin films

TECHNICAL INTERESTS

- Neuromorphic Computing
- Semiconductor Devices
- Circuit Design
- Micro/Nano- Fabrication Technology

EMAIL

thejasb@iisc.ac.in



VAISHAKH U

EDUCATIONAL QUALIFICATION

M.Tech. in Nanoscience & Engineering -
IISc Bangalore, India (Aug 2022 - Present) CGPA : 9 / 10

B.Tech in Engineering Physics -
NIT Calicut, CGPA: 7.32 / 10

MY SKILLS

Languages: MATLAB, Python

Skills: COMSOL, LabVIEW

PROJECTS AND RESEARCH INTERNSHIP

Project on Modelling the electrical characteristics of Organic Field Effect Transistors (OFETs)

Prof. P Predeep (Dept. of Physics, NITC) (2020-21)

M.Tech Major Project :

Investigating effects of Chirality in Strongly Coupled Plasmon-Exciton Systems.

Chemical Solution Deposition Synthesis and Characterization of Doped and Undoped Cerium Oxide Thin Films

Comparative Study on Band Gap Determination of different samples using UV-Vis, Photoluminescence and Cathodoluminescence

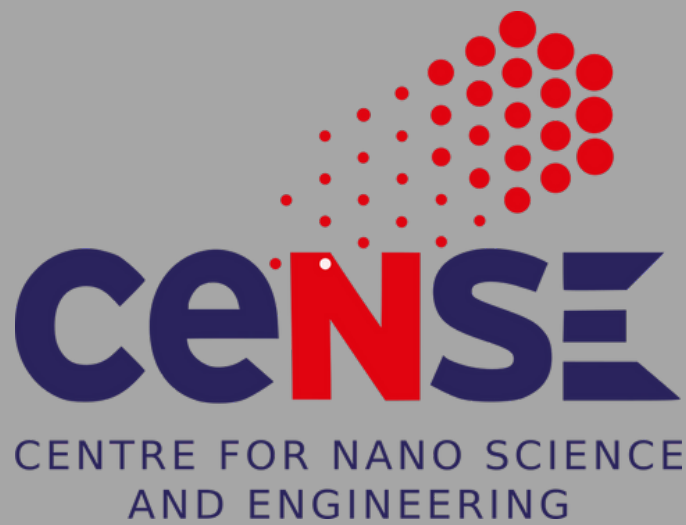
Designing and Fabricating a Refracting Telescope

TECHNICAL INTERESTS

- Light-Matter Interactions
- Photonics
- Condensed Matter Physics
- Quantum Physics

EMAIL

vaishakhu@iisc.ac.in



PHD STUDENT PROFILES

**PhD Students Seeking Industry Placements
Expected to Graduate Aug '23 - Mar '24**

Anumol Dominic

Senior Research Fellow | CeNSE | IISc

Supervisor: Prof. Manoj Varma

+91 9650356403

anumold@iisc.ac.in

anumoldominic2020@gmail.com



Have a background in Electronics and Communication Engineering and ongoing research experience in Nanopore sequencing technology and bioinformatics, and passionate about pursuing a career in R&D to enhance my knowledge and skills, and in the process, contribute to the further development of technology

EDUCATION

CeNSE, IISc Bangalore (2018-2023)

PhD Scholar, CGPA: 7.5

Thesis topic: Solid State Nanopores for protein Sequencing

Journal Publications: Under Submission (1)

NIT DELHI (2016-2018)

M.Tech in Electronics and Communication Engineering
CGPA : 9.4

Thesis Topic: Simulation and Analysis of Graphene based Plasmonic Sensors with Substrate and Optical Fiber based Geometries: Emphasis on Sensing Performance

Skills Acquired: MATLAB and COMSOL for modelling

Journal Publications: 6, Posters presented: 1

CUSAT, Kerala (2011-2015)

B.Tech in Electronics and Communication Engineering
Marks : 76.71%

Capstone project: Electronic Abacus (for rural development initiative)

Skills Acquired: Microcontroller Programming, PROTEUS, Product Design.

PROJECTS AND RESEARCH EXPERIENCE

- ❖ Fabrication of ultra-thin SiNx membranes for Nanopore device Fabrication
- ❖ Fabrication of SiO₂ underlayer structures of Ultra-thin SiNx membrane Nanopore Devices for Noise Reduction
- ❖ Modelling and estimation of Impedances seen in standard Nanopore Devices
- ❖ Breath Analyzer System (Complete Hardware, Data Acquisition Module and Basic Pre-processing)

TECHNICAL EXPERTISE: Fabrication And Characterization

- ❖ Optical lithography
- ❖ Dry etching techniques
- ❖ Wet etching techniques,
- ❖ optical characterization methods
- ❖ I-V measurements
- ❖ Setup and installation of following tools in our lab
 - ❑ AM2400 amplifier,
 - ❑ Elements SRI Amplifier
 - ❑ The Northern Nanopore Controlled Breakdown Tool
- ❖ Product Packaging Design
- ❖ Effective Technical Communication

Softwares

- MATLAB ●●●●○
- COMSOL ●●○○○
- C/C++, JAVA ●●●●○
- VHDL (Xilinx) ●●●○○
- Microcontroller Programming (Arduino ESP32/MICRO-C) ●●●●○
- LTspice/Multisim ●●●○○

Harsh Arora

PhD student, CeNSE IISc

Supervisor: Prof. Baladitya Suri, IAP, IISc

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harsharora@iisc.ac.in



I am a theoretical physicist by training, working on the intersections of Quantum Optics, Superconducting Qubit devices and Measurement Theory, all from the perspective of tools from Quantum Field Theory.

Doctoral Candidate, 2018-Present

- Thesis: *Non-Markovian Dynamics of Driven Open Quantum Systems*
- My work deals with the modelling of driven Qubits in multi-mode cavities using Feynman Path Integrals.
- I work on the Quantum-to-Classical dynamics of non-linear Systems which are subject to weak continuous measurements.

Masters in Applied Math, 2017 – on hold

- University of Washington, Seattle
- Graduate Teaching Assistant, Dept. Of Physics, UW Seattle, 2017-18

BS-MS, Physics, 2012-17

- Indian Institute of Science Education and Research Bhopal, CGPA: 8.41
- Master's Thesis: Pricing of Financial Derivatives using Path Integrals

Publications

- Non-Markovian dynamics of a Driven Qubit in a Structured Environment, under preparation.
- Off-resonant driving of a Qubit in a multi-mode cavity, under preparation.
- Quantum-Classical transition via weak continuous measurements using restricted Path Integrals, under preparation.

Accolades

- Prime Ministers Research Fellowship (PMRF), 2018-2023.
- Inspire Fellowship, 2012-2017.

Technical Skills

- Python
- Linear Algebra
- Quantum Algorithms
- Stochastic Calculus
- Perturbation Theory
- Differential Equations
- Mathematica
- Options Pricing
- Quantum Field Theory
- R

Technical Interests

- Quantum Computing
- Quantum Algorithms
- Superconducting circuit modelling
- Quantitative Finance
- Options Pricing
- Data Analysis



Hemant Kumar Verma

PhD Student | CeNSE | IISc Bangalore

Advisor: [Prof. Akshay Naik](#)

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hkvermaphy@gmail.com



Expertise

MEMS sensors design; Simulation and Modelling; MEMS Testing and Characterization; Microfabrication

Timeline

2018-Present

- PhD & MS | CeNSE | CGPA: 7.6/10
- Thesis Topic: Self-sensing MEMS-cantilevers for gas sensing and environmental monitoring applications.

2018-2022

- Graduate Research Student | Work in collaboration with **Indian Space Research Organization (ISRO)** on "the development of gas sensors with dynamic microcantilevers."

2014-2018

- BS (Major: Physics) | NIT Agartala | CGPA: 9.19/10

Projects

- Self-sensing NEMS cantilevers and its application in temperature probing.
- Dynamic NEMS-based cantilevers to quantify the moisture present in ultra-pure gases.
- Pd-coated Silicon nitride cantilevers as hydrogen sensors.
- Characterization of LPCVD Silicon Nitride (Si₃N₄) using AFM, XRR, and Ellipsometer.
- Controlling sidewall angle in RIE etch.

Positions of Responsibilities

- Supervised visiting undergraduate students at Micro and Nano Sensors lab, CeNSE, IISc, Bangalore.
- Teaching Assistant for "Applied Solid State Physics" from August - December 2021.
- Core organizing team member of NMC2022 and IEEE for the workshops held at CeNSE, IISc Bangalore.

Accolades

- Awarded IAS Fellowship (Indian Academy of Science) to carry out summer research at IISc Bangalore in 2017.
- Department Prize for best presentation award in Annual Students Research Symposium 2022, IISc Bangalore

Conferences

- [Transducer 2023](#)
- [NMC 2022](#)
- [IEEE APSCON 2023](#)
- [IWPSD 2021](#)

Skills

Microfabrication:

- ✓ Extensive Cleanroom Experience (Class 100 and Class 1000)
- ✓ Process Flow Design & optimization
- ✓ E-beam/Optical Lithography, Thermal/e-beam evaporator, Sputtering, Dry Etch (RIE), Wet Etch, Critical Point Dryer

Modelling & Simulation:

- ✓ FEA Simulation with COMSOL
- ✓ PCB Design & Circuit Simulation
- ✓ MATLAB & Python

Device Characterization:

- ✓ Ultrasensitive RF measurements with Lock-in Amplifier
- ✓ Electrical probe station (low temperature down to 4K), Scanning Electron Microscopy (SEM), Atomic Force Microscopy, Low-noise RF measurements, Optical Interferometry, Laser Doppler Vibrometry, Ellipsometry
- ✓ PCB Design

Software

Programming:

- ✓ MATLAB, Python, Mathematica, LabVIEW

Simulation:

- ✓ COMSOL Multiphysics, LTspice

Design Tools:

- ✓ CleWin, AutoCAD, Autodesk Eagle, Blender, Inkscape

Technical Interests

- MEMS Sensors
- Fabrication Engineer
- Process Engineer
- Test & Development Engineer
- Device Engineer

Jyotiranjana Sahoo

Senior Research Fellow | CeNSE | IISc
Research Supervisor: Prof. Digbijoy N Nath

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I am an engineer and a researcher, with specialization in **design, TCAD simulation, fabrication, characterization and modeling** of semiconductor devices, and **analog and digital VLSI circuits**. The expeditious world of semiconductor electronics, the technology that it enables and its impact intrigues and fascinates me to explore and contribute further to an R&D sector.

Qualification

- **PhD Scholar**, CeNSE, IISc Bangalore (2018 to present)
CGPA: 8.6
Thesis topic: Design, Fabrication and modeling of High-Power Gallium Oxide based Diodes and Transistors
- **M.Tech** in Microelectronics and VLSI Technology, IIT Kanpur
Research Supervisor: Prof. Yogesh Singh Chauhan
CGPA : 9.25
Thesis: Modeling and Simulation of LDMOS and VDMOS FETs
- **B.Tech** in Electronics and Telecommunication, SIT Bhubaneswar
CGPA : 9.0

Experience

- R&D Engineer, Ericsson Global India Private Limited, Bangalore (2014-15)
- Assistant Professor, Silicon Institute of Technology, Bhubaneswar (2015-18)

Projects

- Study of GaN Transistor Reliability and Threshold Stability after Thermal Stress
- Fabrication of a conformal topological *p-n junction on Si substrate and its Characterization through SEM*
- *Design of a two stage Operational Amplifier using 0.5 μ m Technology in Mentor Graphics*
- *Design of a voltage mode-controlled buck DC-DC converter and controller for point-of-load application using P-spice*

Accolades & Position of Responsibilities

- Gold leaf certificate for IEEE Asia-Pacific PrimeAsia Conference
- Best presentation award in Annual Students Research Symposium 2022, IISc Bangalore
- Secretary, Maintenance and Amenities, IIT Kanpur
- Supporting volunteer at G20 Deep-tech Summit, Bengaluru



Skills

Simulation and Modelling

- ✓ TCAD Silvaco
- ✓ Agilent Sentaurus
- ✓ Mentor Graphics
- ✓ Cadence
- ✓ SRIM for implantation
- ✓ ICCAP
- ✓ Verilog
- ✓ PSpice

Micro-Fabrication

- ✓ Optical & Electron-beam Lithography
- ✓ Dry-etch, Wet-etch
- ✓ Thin Films Deposition
- ✓ Mask Design using Clewin

Device Characterization

- ✓ Electrical characterization
- ✓ Scanning Electron Microscopy
- ✓ Atomic Force Microscopy

Programming Language

- ✓ MATLAB
- ✓ C and C++
- ✓ Python
- ✓ Mathematica
- ✓ Verilog

Technical Interests

- ❖ Electronic Device Engineering
- ❖ Electronic Device Fabrication
- ❖ TCAD Device Simulation
- ❖ Digital/Analog Circuit
- ❖ Electronic Device Modeling
- ❖ Power Electronics
- ❖ Design and process integration Engineering



Khuushi



Senior Research Fellow | CeNSE | IISc

Advisor: Prof. Prosenjit Sen

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Background includes VLSI Engineering and Microfluidics focusing in High-throughput large area droplet generation for single cell array generation. Developing a novel method for lithography free printing of electronics.

Timeline

2018-Present

- Ø Ph.D. Candidate | CeNSE, IISc. (2018 - present)
CGPA: 7.7
- Ø Thesis : Fab-free Micropatterned heterogenous Surfaces for Multiscale Droplet Generation and printing electronics.

2016-2018

- Ø M.Tech (VLSI Design and Nanotechnology) | VNIT, Nagpur | CGPA: 8.1
- Ø Thesis: Design and fabrication of low-cost passive micromixers

2010-2014

- Ø B.Tech | BCREC, Durgapur | CGPA: 7.91
- Ø Thesis: RFID based attendance system

Positions of Responsibilities

- Treasurer of IEEE Nanotechnology and Sensors council joint student body, IISc Bangalore.
- Local organising committee chair for IEEE Applied Sensing conference (APSCON) 2023, Bangalore
- Volunteer for various workshops and international conferences

Accolades

- Best poster Award ICEE conference - 2018

Technical Skills

- ✓ **Process Design**
- ✓ **Semiconductor Fabrication**
 - Wet etching
 - ALD
 - CleWIN
- ✓ **Device Characterization**
 - SEM
 - AFM
 - Optical profilometry
 - Confocal Microscopy
 - Optical characterization

IT skills

- ✓ **Programming language:**
C, C++, JAVA, Verilog, VHDL
- ✓ **modelling and Simulations:**
TCAD, Silvaco, COMSOL
Multiphysics, Blender
Cadence- InnovusX,ilinx ISE,
Mentor Graphics ModelSim,
Xilinx Vivado, ngspice ,
Magic

IT skills

- Microfluidics
- Healthcare Diagnostics
- Semiconductor Device modelling and process flow

Sagun Shekhar



PhD student, CeNSE IISc

Supervisor: Prof. Prosenjit Sen

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I am someone who found meaning in pursuit of Science since a young age and consider myself lucky to still be able to live my life as a scientist everyday. I am looking for scientific and engineering challenges that help me exercise my desire to learn more and contribute advancement of science.

2018-Present

- CGPA: 7.54
- Thesis topic: Exploring the use of thinned single crystal Lithium Niobate in engineered sensors.
- My work involves thinning bulk lithium niobate to film thickness to engineer various sensors which have better properties than sensors made of grown layers of piezoelectric materials.

2013-17

- Mechanical Engineering | 67%

Projects

- SAW Strain Sensor for Torque Measurements of Industrial Motor Shafts.
- SAW pressure sensor made by transfer of thinned Lithium Niobate on separately etched cavities.
- Fabrication of AFM tips using a dry etch process.

Accolades

- Best Presenter prize in Mechanical domain in CeNSE annual Symposium 2022.
- Held the position of Vice Chair of IEEE NC SC JSC student chapter and conducted two national level workshops successfully.

Conferences

- Transducers 2023 (June)*

Skills

- MEMS Design, Fabrication and its packaging.
- PCB layout and packaging.
- Electrical characterisation of RF MEMS.
- Microcontroller Programming and MATLAB coding.
- COMSOL Simulations.

Technical Interests

- MEMS
- Microfluidics
- Biomechanics
- Instrumentation
- Heterogenous Integration
- Packaging



Samridh Sharma

Senior Research Fellow | CeNSE | IISc
Research Supervisor: Prof. Saurabh Chandorkar

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samridhsharma95@gmail.com

I am a curiosity driven research scholar, with experience in **MEMS device design, fabrication and characterization**, to improve sensing resolution of a **novel mass spectrometer**. The world of semiconductor devices and the technology it enables fascinates and motivates me to explore further and build systems in an R&D segment.

Timeline

2018-Present

- PhD & MS | Nanoscience Engineering | CGPA 7.90
- Thesis topic: Energy dissipation in Suspended Microchannel Resonator
- Projects
 - Calculation of energy loss during tip-sample interaction in tapping mode AFM
 - Constructing POV based LED Display
 - Controlled sidewall angle in RIE etch

2013-17

- B.Tech | Mechanical Engineering | CGPA 7.70
- Project: Fresnel Solar Concentrator

Positions of Responsibilities

- Secretary for IEEE Nanotechnology council CeNSE, IISc
- Organised various webinars, summer school, symposium
- Supporting volunteer at: APSCON 2023, G20 Deep-tech Summit
- CeNSE PhD student's placement coordinator 2023

Accolades

- Best Poster award in NMC 2022
- Best Poster award in IWPSD 2021

Conferences

- IEEE APSCON 2023
- MNE-ES 2022
- Nano Mechanical Sensing 2022
- IWPSD 2021



Skills

- ✓ **Process Design**
- ✓ **Semiconductor Fabrication**
 - ✓ Optical & Electron-beam lithography
 - ✓ CleWin, KLayout
 - ✓ Dry-etch, wet-etch & deposition systems
- ✓ **Device Characterization**
 - ✓ SEM, AFM, FIB
 - ✓ LDV
 - ✓ Optical characterization
- ✓ **Modelling & simulations**
 - ✓ COMSOL
 - ✓ MATLAB, Python
 - ✓ OpenFOAM, C++
 - ✓ FUSION360, Blender
- ✓ **Technical writing and Presentation**

Technical Interests

- MEMS sensors
- Microfluidics
- Healthcare Diagnostics
- Process Engineering
- Device engineering
- Product Development

Shubhangi Bhardwaj

Senior Research Fellow | CeNSE | IISc
Research Advisor: Prof. Sushobhan Avasthi

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Device Physicists, c-Si IBC & Perovskite solar cell fabrication & advanced characterization, bulk & interface defect studies

Projects

2018-Present

- **Ph.D. Candidate** | CeNSE, IISc | CGPA: 8.3
- **Thesis-** Design and Fabrication of High-Efficiency Perovskite and Interdigitated Back Contact Silicon Solar Cells: Targeting Interface and Bulk Defect Passivation

2016-2018

- **Masters** by Research | IIT-Guwahati | CGPA-9.14
- **Thesis-**Influence of deposition parameters on the structural and optical properties of WS₂ thin films deposited by PLD and TiO₂ thin films deposited by RF sputtering

2013-2016

- Software Engineering Analyst | **Accenture Services Pvt. Ltd.** | Application development and testing
- **Amikab Electronics** | Site Analyst | Green Energy Solutions

2009-2013

- **B.Tech.** | Electronics and Communication Engineering | UPTU | 80.45%
- **Project-**Solar-Hybrid Inverter implemented using FPGA

Responsibilities

- President of IEEE HKN, SIGHT, Nanotechnology and Sensor Council joint student body, IISc Bangalore
- Lab and Safety In charge of Heterojunction Lab, CeNSE, IISc Bangalore
- Organizing Committee Chair (Local, Technical and Digital Content) for IEEE Applied Sensing Conference (APSCON) 2023 and 2024
- Judge at 30th KVS NATIONAL LEVEL National Children Science Congress 2022, KV , Bangalore

Accolades

- Best poster award for the work presented at 8th WCPEC, Milan, Italy, 2022
- IEEE HKN honorarium lifetime membership
- IEEE Best Officer Award 2021 from IEEE IISc Student Branch, Bangalore
- Young scientist award for the research work presented in National Conference, ASTM-2018, IIT (ISM) Dhanbad
- Accenture Services-Business Delivery Excellence Award (Ace Award)

Fab Skills

- ✓ **Cleanroom Extensive Experience (Class-100 and 1000)**
- ✓ Process flow design
- ✓ PVD (Thermal Evaporation, DC and RF Sputtering, PLD, CVD (ALD, PECVD, ICPCVD)), spin coating, and sol-gel synthesis
- ✓ **Lithography**
- ✓ **Characterization**
 - Optical: PL, MDP, TRPL, UV-Vis-NIR spectroscopy, EL, FTIR
 - Material: FESEM, XPS, XRD, AFM
 - Electrical: IV, EQE, IQE, EIS, Hall Measurement, SCLC
 - Advanced: I-DLTS or PITS, PEM

IT skills

- ✓ **Programming languages:** C, C++, Java, Python
- ✓ **Web technologies:** VB Scripting, Shell Scripting and Java Scripting
- ✓ **Software Engineering Tools/Technologies:** Coventor, COMSOL, MATLAB, Silvaco, CleWin, TCAD, Adobe Illustrator, Inkspace, LTspice, OriginLab, LaTeX, Verilog, VHDL, LabView, Blender

Interests

- ✓ Semiconductor device modelling and fabrication
- ✓ Vacuum Technologies
- ✓ Process flow & Tool development

Upanya Khandelwal

Research Scholar | CeNSE | IISc
Advisor(s): Prof. Saurabh Chandorkar
Prof. Pavan Nukala



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upanya.8196@gmail.com

Seeking a challenging role in the semiconductor industry, leveraging my expertise in memory devices and passion for R&D to contribute in the development of innovative and cutting-edge technologies.

Timeline

2018-Present

- PhD | CGPA: 8.1
- Thesis topic: Non-linear coupled oscillators for neuromorphic computing
- System design on PCB

2016-2018

- Master's in Physics | Percentage: 63%

2013-2016

- Bachelor's in Physics | Percentage: 83%

Projects

- Fabrication of Graphene metallized SiN membranes.
- Fabrication of sharp Si micro-needles.
- Clamping loss in epi-seal MEMS resonators.
- Energy loss during tip-sample interaction in tapping mode AFM.

Conferences

- EMRS 2022
- APPC15 2022
- Quorum7 2022
- ICMAT 2023



Skills

- ✓ Semiconductor Fabrication, Process Design
- ✓ Device Characterization
- ✓ Technical writing and presentation
- ✓ Modelling & Simulation:
 - COMSOL
 - LT Spice, TINA-TI
 - MATLAB, C++

Technical Interests

- ✓ Memristors
- ✓ MEMS
- ✓ Process Engineering
- ✓ Device Engineering
- ✓ Product Development

Vinaya

Senior Research Fellow | CeNSE | IISc

Advisor: Prof. Prosenjit Sen

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vinayamiyala@gmail.com

Interdisciplinary researcher with 4+ years experience in microfluidics, MEMS, microfabrication, characterization and control systems.

Timeline

2018-Present | PhD

Centre for Nanoscience and Engineering | Indian Institute of Science | CGPA: 7.40

- Thesis project: Development of a viscoelasticity sensor for biological fluids using an acoustically actuated air-liquid interface

Other Projects

- Modeling Hydraulic Circuit Equivalents of Microfluidic System Using COMSOL And SIMULINK
- On-Chip Generation and Size Control of a Microbubble Using Electrolysis
- Controller design and implementation for electric motor
- Diffusion Doping of Spin-On Dopants
- 3D Morphology Analysis of Transparent C.Elegans through Optical Profilometry

2018-2018 | Applications Engineer

Atonarp Microsystems

2014-2018 | B.E.

Electrical and Electronics Engineering | PES Institute of Technology | CGPA: 8.86

- Detection And Classification of Plant Diseases Using Convolutional Neural Networks
- Controller modelling and design for a room heater
- Hybrid Inverter design

Positions of Responsibilities

- Student Representative of IISc Wellness Committee
- Convener of Empaths, a student support group at IISc



Research Interests

- ✓ Healthcare
- ✓ Microfluidics
- ✓ Bioengineering
- ✓ MEMS sensors
- ✓ Process Engineering
- ✓ Product Development
- ✓ Device engineering

Skills

- ✓ High-Speed Imaging
- ✓ Optical Microscopy
- ✓ Microfabrication: Wet Etch, Dry Etch, Lithography, Sputtering
- ✓ Characterization: Optical Profilometer, LDV
- ✓ Soft Lithography
- ✓ Design of Experiments
- ✓ COMSOL Multiphysics
- ✓ MATLAB
- ✓ ImageJ
- ✓ CleWin

Relevant Courses

Students from CeNSE credit various subjects from departments such as **DESE, ECE, Management, Robotics, Electronics, Mechanical Sciences, Applied Physics**, etc., in addition to their home department with a view to enhance multidisciplinary work. Some of these include:

HARDCORE COURSE

NE200 Technical Writing and Presentation

NE201 Micro and Nano Characterization Methods

NE202 Micro and Nano Fabrication Lab

NE203 Advanced Micro and Nano Fabrication Technology and Process

NE250 Entrepreneurship, Ethics and Societal Impact

DEPARTMENT ELECTIVES

NE315 Semiconductor Devices for RF and Microwave Electronics

NE314 Semiconductor Opto-electronics and Photovoltaics

NE206 Semiconductor Device Physics: Basic Devices

NE317 From Natural to Artificial Intelligence

NE213 Introduction to Photonics

NE215 Applied Solid State Physics

NE221 Advanced MEMS Packaging

NE222 MEMS: Modeling, Design, and Implementation

NE223 Analog Circuits and Embedded Systems for Sensors

NE231 Microfluidics

NE241 Material Synthesis: Quantum Dots to Bulk Crystals

NE310 Photonics Technology: materials and devices

NE312 Nonlinear and Ultrafast Photonics

NE313 Lasers: Principles and Systems

NE316 Adv. electron microscopy in material characterisation

NE332 Physics and Mathematics of Molecular Sensing

Industry Interface CeNSE – I2CeNSE

CeNSE Industry Affiliate Program

- A win-win model for industry & academia
- Enables networking and collaboration between CeNSE and the Industry Affiliate (IA) Member
- Establishing research collaborations between faculty & Industry to jointly tackle complex problems
- Enables utilization of CeNSE research facilities
- Implement the features by handholding the IA
- CeNSE and IA working as one team to create an ecosystem benefiting the society at large



Labs & Equipments

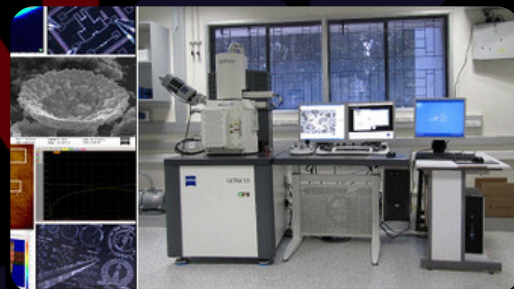
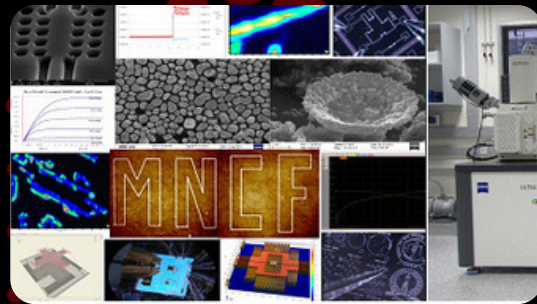
NNFC

- Lithography : Direct LASER, E Beam, Photolithography
- Wafer Bonder
- Deposition : LPCVD, PECVD, PVD
- Etch : Dry/Wet
- Inline Characterisation : Ellipsometer, Dektak, KMOS, 4 point-probe



MNCF

- **Electrical Characterisation:** Impedance Analyser, MPMS SQUID, DC Probe station
- **Mechanical Characterisation:** AFM, PNDs, micro UTM, Optical profilometer, microsystem analyser
- **Material Characterisation:** SEM, TEM, XPS, UHR dual beam FIB
- **Optical Characterisation:** XRD, Raman, Solar simulator, UV-VIS-NIR Spectrometer, Quantum efficiency measurement instruments.



MEMS & IC Packaging

Systems Engineering Facility

Thematic Research Facilities

- Biophotonics & Bioengineering
- Bio Sensors Lab
- Functional Thin Films Lab
- Gas sensors Lab
- Heterojunctions Lab
- MEMS/MOEMS Lab
- NEMS
- Neuro-electronics Lab
- Non-linear photonics & High power LASERs Lab
- Optics, Nanostructures & Quantum Fluids
- Photonics
- Polymer Process Lab
- Photovoltaics & Energy Lab

Overall Industry Collaboration

CeNSE engages with various companies for research collaborations, student hiring, training, facility usage and M.Tech fellowships.



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for placement process details