

Swapnil More

swapnilmore@iisc.ac.in, [swapnil2me.github.io](https://github.com/swapnil2me), +91-9111-399-9596

EXPERTISE

Semiconductor fabrication, Photo/e-beam lithography, Thinfilm deposition, Scanning electron microscopy, Sensor design and characterization, Data science.

EDUCATIONAL QUALIFICATION

Degree	Institute / School	CGPA / %	Year
Doctor of Philosophy	Indian Institute of Science, Bangalore	7/10	Aug 2022
MTech Nanotechnology	Indian Institute of Science, Bangalore	6.4/8	July 2016
BE in Mechanical Engineering	University of Pune	69%	July 2012
Diploma in Mechanical Engineering	Government Polytechnic, Pune	86%	July 2009

WORK EXPERIENCE

COMPUTATIONAL LITHOGRAPHY (GLOBAL FOUNDRIES, BANGALORE)

AUG 2022 – PRESENT

- Implementing resolution enhancement techniques for semiconductor fabrication. Edge fragmentation for width adjustments and SRAF placement using rule-based and model-based optimization techniques.
- Calibrating optical and resist models for print image simulations.
- Processing customer layout data using EDA tools, reviewing CMOS design rules, photo mask manufacturability rules, optical rules for the simulated print image
- Shell scripting, automating the testing process using python.

RESEARCH SCHOLAR (IISC, BANGALORE)

AUG 2016 – AUG 2022

2D NEMS and MEMS sensors:

- Developed nanoelectromechanical sensors with strain tunability.
- Studied the effect of strain on linear and nonlinear dynamics, mode coupling, dynamic range, limit of detection, and quality factor of resonant sensors.
- Gained expertise in MEMS/NEMS design, nanofabrication, ultrasensitive measurement, design of experiments and scientific data analysis.

Nanofabrication and characterization:

- 6 years of class 100 cleanroom fabrication experience.
- Expertise in Photo/e-beam lithography, Dry/Wet etching, thin film deposition, exfoliation-transfer-characterization of 2D materials, fabrication process flow design, statistical process control, wafer/die handling, yield optimization.
- Experienced in imaging nanoscale devices, physical and material characterization, and preparing reports for knowledge transfer.

Ultrasensitive measurements:

- Experience with lock-in amplifiers (ZI, SRS), RF Signal generators, DC source meters, RF signal processing, PLL, and PID controllers.

- Remote control of scientific instruments through MATLAB / Python scripting.
- PCB fabrication, SMD soldering, wire bonding of nanodevices.

MEMS / NEMS Sensor packaging:

Developed a packaging scheme for NEMS sensors that achieves the following

- Vacuum cavity for nano resonator
- Coupling of external stimulus with NEMS through MEMS device
- Electrical and optical feedthrough for electrical and optical readout

Design of Experiments:

Developed various experiments, such as

- Electrostatic actuation and detection of mechanical resonance
- Electromagnetic and piezoelectric actuation of Silicon diaphragm to strain NEMS fabricated on the Silicon diaphragm.
- Mechanically coupled NEMS with strain tunable coupling.
- Free space optics for optical detection of mechanical resonance.

Data analysis and hypothesis testing:

- Maintaining clean and unambiguous datasets of the experiments
- Extracting the dynamical behavior of NEMS from the raw experimental data through noise subtraction, data visualization, and model fitting.
- Extra emphasis is given to statistical hypothesis testing by performing repeated studies under curated experimental conditions.

Publications:

- Nanomechanical Resonators: Toward Atomic Scale, [ACS Nano 2022](#)
- Strain engineering of graphene nano resonator, [J. Micromech. Microeng. 31 045015, 2021](#)
- Ultra-sensitive charge detection and latch memory using MoS₂-nanoresonator-based bifurcation amplifiers, [Appl. Phys. Lett. 118, 053105 \(2021\)](#)
- Fabrication of 2D NEMS on Flexible Substrates for Strain Engineering in Sensing Applications, [IWPSD 2017. Springer Proceedings in Physics, vol 215. Springer, Cham](#)

Conferences:

- Dynamic frequency tuning of 2D NEMS, NMC 2022, IISc Bangalore.
- Manipulating Internal Resonance and Coupled Modes in NEMS, NMC 2019, EPFL Lausanne, CH.
- Modeling Internal Resonance in 2D NEMS, International Conference on Nonlinear Solid Mechanics (ICoNSOM), Rome, Italy (June 16-19, 2019).

PROJECT ASSISTANT (IIT MUMBAI)

FEB 2013 – DEC 2013

Study and design of heating, ventilation and air conditioning system

GRADUATE ENGINEER TRAINEE (MAHINDRA & MAHINDRA)

AUG 2012 – JAN 2013

Sales and dealer development

TECHNICAL SKILLS

Semiconductor Fabrication: E-beam lithography, Photolithography, RIE, DRIE, CMOS wet bench processes, Thermal/E-beam evaporation, SEM, AFM.

Programming Languages: Python, MATLAB, JavaScript, Mathematica, LabVIEW

Design tools: Autodesk Inventor, CATIA, COMSOL, Blender

Scientific Experiment Design: Soldering, PCB making, Scientific instrument control, Vacuum system design, Free space optics.

Data Science: 2D/3D visualization, data cleaning, optimization, model fitting, hypothesis testing.

Web Development: HTML, CSS, React

ACADEMIC WORK

PH.D. THESIS (IISC, BANGALORE, 2016-2022)

Strain tunable nanoelectromechanical system (NEMS) for sensing applications.

- Design, fabrication and packaging of strain tunable NEMS sensors.
- Demonstration of linear pressure sensing, nonlinear bifurcation amplifier for pressure sensing, and dynamic strain sensing.

MASTER'S THESIS (IISC, BANGALORE, 2015-2016)

Fabrication of nanoelectromechanical system (NEMS) on flexible substrates

- Developed a nanofabrication method for NEMS on flexible substrates.
- Designed a motorized actuator to bend flexible substrate so that the strain on NEMS can be tuned during an experiment.

BACHELOR'S PROJECT (UNI. PUNE, 2011-2012)

Design of transverse electric mode cell for testing for ICs for EM compatibility

- The cell was designed as per requirements provided by the Automotive Research Association of India (ARAI).
- The designed TE-Mode cell allowed testing of EM emission from the automotive ICs as well as testing the ICs for EM compatibility till 100 MHz.

DIPLOMA PROJECT (GOVERNMENT POLYTECHNIC, PUNE, 2008-2009)

Pneumatic automation using the programmable logic controller

- Simulated various tasks for automated general-purpose assembly lines using pneumatic actuators and valves.
- The pneumatic actuation was controlled through PLC.
- The PLC provided flexibility to connect and operate actuators and valves according to the assembly process requirements.

TEST SCORE(S)

GATE – 2014 Mechanical Engineering: 911/1000, All India Rank 59 (without coaching)

CERTIFICATION COURSE(S)

Machine Learning (Stanford Online, MOOC by Prof. Andrew Ng): [Certificate](#)

NON-ACADEMIC PROJECTS (FOR FUN!)

Dashboard for controlling scientific experiments

[Webapp](#) to control and monitor the scientific experiments at NEMS-Lab.

Discord chatbot for simulating quantum circuits and for solving differential equations

[A smart chatbot](#) that simulates basic quantum circuits and solves nonlinear differential equations on the fly.

Blockchain applications for renting robots

A simple [payments app](#) and its [extension to rent](#) out IoTs on Ganache test net.