

Vanshaj Vidyan

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RESEARCH SUMMARY

Integrated M.Sc. Physics graduate from NISER with hands-on experience in semiconductor device fabrication, thin-film processing, and electrical characterisation in cleanroom environments. Strong interest in experimental device physics, nanofabrication, and precision measurement, with experience in process optimisation, measurement automation, and computational analysis. Seeking a doctoral position in advanced nanoelectronics and experimental device physics.

EDUCATION

National Institute of Science Education and Research (NISER)

Bhubaneswar, India

Integrated M.Sc. in Physics (GPA: 8.43/10.00)

Aug 2021 – May 2026

- Degree awarded by Homi Bhabha National Institute (HBNI), ranked #1 among Indian academic institutions in Physical Sciences in the Nature Index 2026.
- Minor in Computer Science (*GPA: 8.89/10.00*)
- Thesis title: Comparative Neuromorphic Performance of Organic FeFETs Using Novel Solution-Processed Ferroelectric Materials for Enhanced In-Memory Computing (*Grade: 9.50/10.00*)

RESEARCH EXPERIENCE

Organic Ferroelectric Transistors for Neuromorphic Applications

NISER Bhubaneswar, India

M.Sc. Thesis Research under Prof. Satyaprasad P Senanayak

Jun 2025 – Jul 2026, Full-time

- Fabricating organic FeFET neuromorphic devices (Si/SiO₂/Ferroelectric/PBTTT/Au) using solution-processable ferroelectrics with varied anions (BF₄, FeCN₆, PF₆) to study structure–property correlations.
- Performed device fabrication via spin coating and thermal evaporation in inert environments, followed by comprehensive neuromorphic characterization (transistor, memory, and synaptic plasticity studies).
- Manuscript in preparation for journal submission.

Process Optimization & Metrology for β -Ga₂O₃ UV Photodetectors

IIT Delhi, India

Semiconductor Device R&D Intern under Prof. Rajendra Singh

May 2024 – Jul 2024, Full-time

- Developed β -Ga₂O₃ Schottky photodetectors achieving a high UV-to-visible rejection ratio (SNR) of 4.3×10^4 , achieving high spectral selectivity and efficiency. Optimized deposition parameters to minimize defects.
- Characterized thin films using AFM, XRD, and Raman spectroscopy to analyze material morphology and structural properties.
- Automated data acquisition and analysis using NI-LabVIEW, processing >10,000 data points.

Surface Engineering & Optical Metrology for Hybrid Solar Cells

CSIR-NPL, India

Photovoltaic Process R&D Intern under Prof. Sanjay Srivastava

Jun 2023 – Aug 2023, Full-time

- Engineered PEDOT:PSS/Si hybrid solar cells with optimized KOH & IPA etching, reducing silicon reflectivity from >35% to <9%, significantly enhancing quantum efficiency.
- Refined co-solvent (EG & DMSO) ratios to maximize performance, achieving a >20% efficiency improvement.
- Gained hands-on experience in thermal evaporation, spin-coating, and photovoltaic (PV) device characterization.
- Work **accepted for publication** in upcoming Springer Proceedings in Physics (IWPSD-2025).

India Semiconductor Workforce Development Program (ISWDP)

IISc – Synopsys, India

Samsung Student Fellow | Mentored by Prof. Mayank Shrivastava

Jun 2025 – Sep 2025, Online

- Hands-on experience with the Synopsys Sentaurus TCAD suite for device and process simulations.
- Modeled and analyzed 2D/3D structures: Diodes, BJTs, MOSFETs, PMOS, CMOS, FinFETs, HEMTs with process aware designs.
- Simulated fabrication flows, including deposition, etching, lithography, ion implantation, and diffusion, and evaluated effects on junctions, doping uniformity, and electrical characteristics.

PUBLICATIONS & CONFERENCE PRESENTATIONS

- Urvashi Punia, **Vanshaj Vidyan**, Riya Bansal, Diksha, Prathap Pathi, Sanjay K. Srivastava, “Mixed co-solvent derived high conductive PEDOT:PSS for efficient hybrid silicon solar cell,” accepted for publication in *Springer Proceedings in Physics*, XXIII International Workshop on Physics of Semiconductor Devices (IWPSD 2025).

RELEVANT COURSEWORK

Physics: Quantum and Nanoelectronics, Quantum Optics, Physics of Mesoscopic Systems, Condensed Matter Physics, Electromagnetism I–II, Statistical Mechanics, Nonlinear Physics, Experimental Techniques, Quantum Mechanics I–II
Computer Sciences: Machine Learning, Algorithmic Design & Analysis, Algorithmic Coding Theory, Discrete Mathematics, Programming and Data Structures.
Experimental: Advanced Electronics, Solid State Physics, and Instrumentation Laboratories.
Interdisciplinary: Biophysics (Introductory), Mathematical Methods I–II.

TECHNICAL SKILLS

Fabrication Techniques:

- **Thin Film Deposition:** Solution processing (spin coating), PVD (e-beam, thermal evaporation, sputtering)
- **Environments and Protocols:** Class 1000 cleanroom operations, inert atmosphere processing (glovebox)
- **Patterning & Surface Engineering:** Photolithography (channel length: 100 nm–1 μ m), wet etching

Metrology & Characterization: Probe stations (Lakeshore CRX-6.5K), Semiconductor Parameter Analyzer (Keysight B1500A), Source Measure Unit (Keithley 2450), Profilometer (Bruker DektakXT), C–V profiling, AFM, XRD, SEM, Ellipsometry, Raman and UV–Vis spectroscopy; Understanding of Critical Dimension (CD) and Overlay Control

TCAD Simulation: Synopsys Sentaurus suite (sde, sdevice, sprocess, swb) for 2D/3D device and process simulations

Software & Automation: Python (NumPy, SciPy, Pandas), MATLAB, LabVIEW, Bash scripting, LaTeX

AWARDS & ACHIEVEMENTS

Samsung Student Fellow & Top National Performer, IISc–Synopsys ISWDP: Selected as a **Samsung Fellow** with registration fee sponsorship; recognized among the top national performers in all three levels of IISc–Synopsys ISWDP. (Jun 2025 - Sep 2025)

Winner, Principled Business Shark Tank: Crowned as **global winner** of the Principled Business Shark Tank at LibertyCon 2025, Washington, D.C., securing **USD 10,000** for my startup *DehaadiConnect*, to uplift **440 million underprivileged daily-wage labourers** by digitising India’s informal job market. (Feb 2025)

National Topper, National Graduate Physics Examination (NGPE): Acclaimed as **National Topper** in NGPE-2022. Conducted by the Indian Association of Physics Teachers (IAPT). (May 2022)

DST-INSPIRE Fellowship: Awarded to the **top 0.01%** of candidates in India for excellence in natural sciences. Sponsored by the Department of Science and Technology, Government of India, providing **INR 400,000** in financial support and mentorship. (Aug 2021 – Jul 2026)

Young Researcher, New York Academy of Sciences (NYAS): Selected in the 2018 cohort of the Junior Academy, an exclusive program with a **5% acceptance rate**, completing challenges sponsored by organizations like *AstraZeneca*, *Chalmers University of Technology*, NYAS. (Oct 2018 – Oct 2021)

PROFESSIONAL TRAININGS & CERTIFICATIONS

Hands-On Training in Semiconductor Device Technology, IIT Delhi Hands-on training in MOS device fabrication and Class 1000 cleanroom protocols.	<i>May 2025</i>
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Technical Tutorials, IWPSD 2025, IIT Roorkee Advanced semiconductor device tutorials delivered by experts from imec, Intel, Micron, and NCSU.	<i>Dec 2025</i>
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Display Technology Tutorials, SID India Technical overview of OLED, MicroLED, and LCD display technologies.	<i>Sep 2025</i>
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Tutorials on Semiconductor Manufacturing, SEMI University Training in semiconductor manufacturing flows, vacuum systems, and industrial safety practices.	<i>Sep 2024</i>
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