Shubham Yadav

Curriculum Vitae

PhD - Media Lab, MIT
B.S./M.S. (Dual), EE, IIT Kanpur
(+1) 857 891 1621
shyadav@ini.ethz.ch
www.linkedin.com/in/shubham-yadav-194615a8/

Education

PhD, MIT Media Lab, *Massachusetts Institute of Technology, Cambridge, MA* 2021-'25
M.S, Media Lab, *Massachusetts Institute of Technology, Cambridge, MA* 2019-'21
M.Tech, Electrical Engineering, *Indian Institute of Technology Kanpur, India* 2017-'18
B.Tech, Electrical Engineering, *Indian Institute of Technology Kanpur, India* 2013-'17

Positions

Postdoctoral Fellow, *Institute of Neuroinformatics, Zurich Switzerland* Dec'25 - Present
Academic Visitor, *Institute of Neuroinformatics, Zurich, Switzerland* Jul'25 - Dec'25
Visting Student, *Marine Biological Laboratories, Woods Hole* 2024-'25
Research Assistant, *MIT Media Lab, Cambridge, MA* 2019-'25
SoC Design Engineer, *Intel Technologies, Bangalore, India* 2018-'19
Research Assistant, *Electrical Engineering, IIT Kanpur, India* 2017-'18

Research Vision

My research vision is to democratize precision neuroengineering by developing minimally invasive, scalable bio-electronics that seamlessly integrate nanoelectronics, neuroscience, and applied physics. I will create adaptive neurotechnology platforms that serve fundamental neuroscience research, evolutionary biology investigations, clinical therapeutic applications, and brain-machine interface development. Through evolutionary-inspired computational architectures and bio-compatible electronic systems, my work will enable researchers globally to conduct multi-species neural studies, advance translational medicine, and develop next-generation brain-machine interfaces for neurological restoration. By bridging fundamental discovery with equitable technology transfer, I aim to build accessible, scalable tools that empower researchers and clinicians worldwide to unlock the mysteries of neural evolution, treat neurological disorders, and create a more connected and healthier world.

Research Interests

- Applied Physics
- Evolutionary Neuroscience
- Adaptive biocomputation
- Neurotechnology
- Early stage disease detection
- Neurodegenerative diseases

Select Research Achievements

- ✓ Developed a non-invasive, wireless and surgery-free method for autonomous self-implantation of nanoelectronic devices for early disease detection and therapeutic intervention
- ✓ Developed optoelectronic devices for minimally-invasive, wireless bi-directional electrical control of neurons with sub-cellular resolution and millisecond precision
- ✓ Built "Injectable Electronics" for minimally invasive sub-cellular neuromodulation of tissues
- ✓ Developed nanoelectronic devices for cell-type specific electric modulation at single cell resolution
- ✓ Developing unique cell-electronics interfaces to control neural dynamics of 3D human organoids
- ✓ Developed the highest efficiency sub-cellular-sized substrate-free photovoltaic technology

Publications

12. *M. J. I. Airaghi Leccardi*, B. X. E. Desbiolles*,* ***Shubham Yadav****, Y. Yu* and Deblina Sarkar; Advancing neural interfaces: A framework for the fabrication and characterization of freestanding micro-nanodevices; **Nature Microsystems & Nanoengineering, 2026** (*equal contribution)

11. ***Shubham Yadav****, J. Mondal, and M. Saha*; Systems biology approaches for multi omics integration using artificial intelligence; **Academia Biology, 4(1) 2026**

12. ***Shubham Yadav****, Ray Lee, Shivam Nitin Kajale, Baju Joy, Monochura Saha, Preet Patel, Loey Bull, Sarah Cao, David Bono* and Deblina Sarkar; A nonsurgical brain implant enabled through a cell–electronics hybrid for focal neuromodulation; **Nature Biotechnology (2025)**

10. *Yubin Cai, Baju C. Joy, B. X. E. Desbiolles, Viktor Schell,* ***Shubham Yadav****, David Bono* and Deblina

Sarkar; Low-Frequency sub-0.5mm magnetoelectric antenna for wireless power harvesting in injectable deep-tissue implants; **IEEE Transactions on Antennas & Propagation, 73(10) (2025): 7134-7146**

9. ***Shubham Yadav****, Ahitagni Das, M.T. Islam,* and Deblina Sarkar; Prediction of Onset of Action Potentials in Spontaneous Neuron Firings; **MARC Conference, 2024**

8. *Shivam Nitin Kajale*,* ***Shubham Yadav****, Yubin Cai, Baju Joy* and Deblina Sarkar; 2D material based field effect transistors and nanoelectromechanical systems for sensing applications; – **iScience 24, 103513 (2021)**(*equal contribution)

7. ***Shubham Yadav****, Soumya Tripathy* and Deblina Sarkar; NEMS Sensors Based on Novel Nanomaterials; **Advanced MEMS/NEMS Fabrication and Sensors (2021), 133-185**

6. ***Shubham Yadav:*** Self-standing sub-cellular sized Photovoltaic devices for minimally-invasive and precise neuronal stimulation; **2021. MIT, M.Tech. Thesis**.

5. ***Shubham Yadav***; Optimizing solar cells for a microfabrication class; **MARC Conference 2020**

4. ***Shubham Yadav*** and S. Sundar Kumar Iyer; Building a planar single and binary blend stack ternary organic solar cells; **Flexible and Printed Electronics, 4(3) (2019): 034003**

3. ***Shubham Yadav*** and Sushobhan Avasthi; Grain Boundary analysis in IBC Perovskite Solar Cells; – **2018 4th IEEE International Conference on Emerging Electronics (ICEE). IEEE, 2018.**

2. ***Shubham Yadav:*** A Systematic Approach to Designing Ternary Organic Solar Cells; **2018. IIT Kanpur, M.Tech. Thesis**.

1. ***Shubham Yadav*** and S. Sundar Kumar Iyer; Ternary Organic Solar Cells with active layer of P3HT:PCBM and PCPDTBT material; **IWPSD, 2017**.

Patents

2. Patel, P., Sarkar, D., and ***Yadav, S.***; ***Wireless optical bioelectronics*** — US Patent, filed, June'25

1. Joy, B. C., Patel, P., Sarkar, D., and ***Yadav, S.***; ***Nanoelectronic devices and methods of manufacture and use thereof*** — US Patent, filed, March'25

Talks

Autonomous Implantation of Bioelectronics for Surgery-Free Neuromodulation, **GRS Seminar, Italy**	2026
Non-surgical Bioelectronic Implant for Targeted Focal Brain Stimulation, **IISc Bangalore**	2025
Non-surgical Bioelectronic Implant for Targeted Focal Brain Stimulation, **IIT Bombay**	2025
Guest Speaker, Johns Hopkins TNT Neurotech Industry Roundtable, **John Hopkins University**	2025
Species-Agnostic Wireless Optoelectronic Neural Interface Platform, **IISER, Pune**	2025
Non-surgical Bioelectronic Implant for Targeted Focal Brain Stimulation, **ETH Zürich**	2025
Monopolar Injectable Electroceuticals for bidirectional neuromodulation, **MIT Media Lab**	2024
Sub-cellular sized injectable nanoelectronics for focal neuromodulation, **MIT Media Lab**	2023
Self-standing micron sized photovoltaic devices for focal neuronal stimulation, **MIT Media Lab**	2022
Grain Boundary analysis in IBC Perovskite Solar Cells, **IEEE-ICEE, Bangalore**	2019

Grants and Funds

Awarded **Research budget** from (UZH/ETH Board) of 75K USD, Zurich	2025-'27
Awarded **Travel Grant** for presenting at Cephalopod Neuroscience Conference GRC, Texas	2026
Awarded **Travel Grant** for presenting at Neuroethology conference, India	2025
Awarded **Travel Grant** for presenting at FACE symposium, Stanford	Fall 2025
Secured **seed funding** from MIT Sandbox Innovation Fund, MIT	Fall 2025
Secured **seed funding** from MIT Sandbox Innovation Fund, MIT	2024-'25
Awarded **Travel Grant** for presenting at IWPSD conference	2017
Received **Graduate Research Award** for Masters' Research, Government of India	2017
Received **Merit Scholarship** for all four years of undergraduate	2013–17

Awards and Achievements

Grass Fellow, Marine Biological Laboratories (MBL), Woods Hole, MA	2026
Postdoctoral Fellow **Institute of Neuroinformatics**, UZH and ETH Zurich	2025-'27
Member, **Sigma Xi**, The Scientific Research Honor Society	2025
Fellow, Define Ventures AI Fellows Program	Spring 2025
Finalist at Startup Stadium, Bio International Convention	2025
Finalist at Tufts New Ventures Competition	2025
Selected for **MIT DHIVE program** focused on healthcare innovation	Summer 2024
Research got a perfect score of 10 for **NIH Director's New Innovator Award proposal**	2022
Department **Rank 1** in IIT Kanpur Electrical Engineering batch of 2018	2018
Received **Academic Excellence Award** for the Academic Year 2016–17	2017
Secured an All India Rank **1574** in IIT-JEE (Advanced) among 1.5 million students	2013
Secured an All India Rank **16** in UPSEE among 0.2 million students	2013
International rank of **935** in International Mathematics Olympiad	2008

Teaching Experience

Teaching Workshop – **The Kaufman Teaching Certificate Program**	Spring '25
Teaching Assistant – **Next generation devices for Nanoelectronics and Biotechnology**	Fall '21
Teaching Assistant – **Life Nanomachine Symbiosis**	Spring '21
Teaching Assistant – **Microelectronics II (EE311)**	Spring '18
Teaching Assistant – **Electronics Circuit Laboratory (EE380)**	Fall '17
Academic Mentor – **Counselling Service, IIT Kanpur**	2014–15

Mentorship

- Trained and mentored sixteen undergraduate students through MIT's Undergraduate Research Opportunities Program (UROP)
- Mentee won the prestigious **Best UROP award**
- Mentee got selected for the prestigious **Neo scholar** fellowship
- Trained and mentored seven Masters students and three of them enrolled for PhD at MIT
- Trained and mentored three PhD students, and two Postdoctoral researchers on various projects

Outreach

- Organizing committee member, MARC conference MTL-MIT, 2026
- Reviewed articles for journals including npj Biosensing, ACS AMI, IEEE JHBI, IEEE URTC
- Organised a symposium on the CephNeuroAI initiative at MIT, 2025
- Serving as the Environment and Health Safety **(EHS) representative** to create a safe and organized working lab environment for research labs.
- Serving as a process technical committee **(PTC) reviewer** to guide the user community at MIT.Nano (nanofabrication facility at MIT serving >1500 active researchers)
- Serve as Committee on Animal Care **(CAC) representative**, facilitating effective communication between CAC staff and the lab to ensure optimal animal facility usage and welfare
- Contributor at Smile Foundation, NGO empowering underprivileged children, youth and women.
- Orgainizing workshops for local schools in Boston-Cambridge region to build scientific curiosity and share exciting opportunities among children from underrepresented communities.
- Organizing online seminars for high school children from developing countries to motivate students to undertake careers in STEM.

Technical Expertise

- **Equipments built**: Probe station, Glovebox, 2P with ephys, in-vivo ephys, in-vivo optical stimulation setup
- **Nanofabrication**: Lithography (photo, e-beam), Deposition (CVD/PVD, thermal), sputtering, Etching (RIE/Wet), GloveBox, spin-coating, nano-particle synthesis
- **Characterization**: XRD, XPS, VSM, Raman/UV-Vis-spectroscopy, ICP-MS, FTIR, Potentiostat, fluorescence & confocal microscopy, 2P-microscopy, Light sheet microscope, SEM, TEM, AFM, STM, FIB-SEM
- **Molecular Biology**: Murine and human tissue culture, MTT or WST, Western blot analysis, DNA-RNA extraction and purification, RT-PCR, Microtome, Vibrotome, Cryotome, parafinization, Embedding, Preparing cryofrozen section, IHC, IFC, ELISA, Seperation of cells from Tissue-MACS, FACS, Virus handling

- **Electrophysiology:** whole-cell patch clamp, single unit recording, MEA recording for 2D and 3D cultures, ex-vivo patch clamping, Calcium & voltage-sensitive dye recording, GECI/GEVI, LFP recording
- **In-vivo experience**: BALB/c, C57BL/6, SCID, transgenic mouse handling and breeding; RO, Tail Vein, IP, Subcutenious, Cisterna-magna injection; Orthotopic and heterotopic Tumor induction; Stereotactic surgery, peripheral nerve injection, peripheral nerve ligation, IVIS, Optogenetics, TDS, tES, Perfusion
- **Languages:** C/C++, Python, MatLab, VerilogA, labVIEW, VHDL, HTML, LaTeX
- **Softwares:** SilvacoAtlas, ICCAP, MentorGraphics, Cadence, Virtuoso, Microcap, COMSOL, SolidWorks