

Akash Roy

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🎓 Akash Roy

Resume

Interests

Acoustic MEMS, Bio-Sensors, Wearable Healthcare, Acoustic Transducers, Lab on Chip

Education

- 2021–Present **University of Southern California (USC).**
- Ph.D in Electrical and Computer Engineering
 - M.S. in Computer Engineering
 - **Advisor:** [Dr. Eun Sok Kim](#)
- 2021–2022 **University of Southern California (USC).**
- M.S. in Electrical Engineering
- 2015-2019 **Maulana Abul Kalam Azad University of Technology.**
- B.Tech in Electronics and Communication Engineering; **Bronze Medalist; GPA: 9.51/10.00**

Courses

- M.S. CSCI **University of Southern California (USC), Ongoing.**
- Artificial Intelligence, Database Management Systems, Web Technologies
- M.S. EE **University of Southern California (USC).**
- MEMS, Analog IC Design, Nanotechnology, Quantum Mechanics, Quantum Electronics, Optics, Non-Linear Optics
- B.E. ECE **Maulana Abul Kalam Azad University of Technology.**
- EM Theory, Circuit Design, Optical Communication, VLSI, Information Theory, C, C++, Data Structures

Research

- **Research Assistant, Micro Electro Mechanical Systems Lab, University of Southern California (2021 - Present)**
 - **Advisor:** [Prof. Eun Sok Kim](#)
 - **Wearable Stethoscope with MEMS Microphone:**
 - Fabricated Resonant Microphone Array (RMA) using 2 μm device layer such that the resonant frequency peaks from 200 Hz to 800 Hz.
 - Classify wheezing patterns at the edge using low power algorithms on Cypress BLE chipset and inform user through mobile phone notification when abnormality is detected.
 - **Airborne Acoustic Propulsion:**
 - Designed orifice patterns using laser micromachining / bulk micromachining which were attached to piezoelectric card speaker to test propulsion.
 - Fabricated orifice patterns on Polyester sheets and Silicon wafers using standard fabrication procedures to demonstrate substantial propulsion.
 - **Acoustic Tweezers:**
 - Designed and fabricated new and precise design of tweezers to trap cells smaller than 100 μm .
 - Performed extensive theoretical study on tweezer physics based on simulations to validate experimental observations.
 - Designed and fabricated large size tweezers to trap and hold zebrafish embryos for biological observation.
- **Undergrad Researcher, IEEE EDS Center of Excellence, Heritage Institute of Technology, India (2017 - 2020)**
 - **Advisor:** [Prof. Atanu Kundu](#)
 - **Study of Analog/RF and Power Performance of MOS-HEMT Devices (Undergrad thesis)**
 - Developed a calibrated simulation structure for double gate underlap MOS-HEMT structure that was used to perform various studies for optimizing structural parameters which led to multiple publications.

Publications

- **Wireless Acoustic Airborne Jet Propeller**
[A. Roy](#), M. Barekatin, J. Lee, B. Neff and E. S. Kim | *Transducers Conference, 2023*
- **Non-Resonant Vibration Energy Harvester with Wound Micro-Coil Arrays,**
M. Barekatin , J. Wang, [A. Roy](#), K. Sadeghian, J. Lee and E.S. Kim | *Transducers Conference, 2023*
- **Late-Stage Zebrafish Embryo Manipulation and Imaging with Acoustic Tweezers Based on Bessel Beam Trapping**
B. Neff, K. Sadeghian Esfahani, M. Barekatin, [A. Roy](#), J. Lee and E.S. Kim | *Transducers Conference, 2023*

- **MEMS Piezoelectric Resonant Microphone Array for Lung Sound Classification**
Hai Liu, [A. Roy](#), M. Barekattain, S. Liu, Y. Cao, Y. Tang, A. Shkel and E. S. Kim | *IOP JMM Journal*, 2023
- **Ultrasonic Air-Borne Propulsion Through Synthetic Jets**
Hai Liu, [A. Roy](#), M. Barekattain and E. S. Kim | *Solid-State Sensor and Actuator Workshop*, 2022 [PDF]
- **Analog/RF and Power Performance Analysis of an Underlap DG AlGaIn/GaN Based High-K Dielectric MOS-HEMT**
[A. Roy](#), R. Mitra, A. Mondal and A. Kundu | *Springer Silicon Journal*, 2021 [PDF]
- **Influence of Symmetric Underlap on Analog, RF and Power Applications for DG AlGaIn/GaN MOS-HEMT**
R. Mitra, [A. Roy](#), A. Mondal and A. Kundu | *Springer Silicon Journal*, 2021 [PDF]
- **Comparative Study of Variations in Gate Oxide Material of a Novel Underlap DG MOS-HEMT for Analog/RF and High Power Applications**
A. Mondal, [A. Roy](#), R. Mitra and A. Kundu | *Springer Silicon Journal*, 2020 [PDF]
- **Impact of AlGaIn Doping Concentration on the Analog/RF Performance of a Double Gate Underlap n-AlGaIn/GaN MOSHEMT**
R. Mitra, [A. Roy](#), A. Kundu and M. Kar | *ISDCS*, 2020 [PDF]
- **Effect of Doped AlGaIn Width Variation on Analog Performance of Dual Gate Underlap MOS-HEMT**
A. Mondal, S. Ghosh, [A. Roy](#), M. Kar and Atanu Kundu | *IEEE Calcutta Conference (CALCON)*, 2020 [PDF]
- **Influence of Channel Thickness on Analog and RF Performance Enhancement of an Underlap DG AlGaIn/GaN based MOS-HEMT device**
[A. Roy](#), R. Mitra, A. Kundu | *Devices for Integrated Circuit (DevIC)*, 2019 [PDF]

Work Experience

- May 2023 - **TDK InvenSense, Boston**, *Microphone Product Engineer*.
Aug 2023
 - Design and characterization of MEMS microphones
 - End to end industry production line knowledge for MEMS sensors
- Jun 2019 - **Tata Consultancy Services, India**, *Software Engineer*.
Dec 2020
 - Full Stack Developer using Flask Framework, Angular, Amazon AWS, React etc.
 - Devops using Kubernetes, Redis, Sonarcube etc
- Jun 2018 - Jul 2018 **Electronic Sector Skill Council of India**, *VLSI Intern*, [Certificate].
 - Acceptance rate: 10%
 - VLSI Design Engineer (QP No. - ELE/Q1201) conforming to National Skill Qualifications Framework Level-5
 - Developed 4 bit processing unit for basic arithmetic functions on Spartan 6 FPGA Board using Xilinx IDE.

Skills

- **Languages:** Python, C, C++, Javascript, HTML, Angular, React
- **Cleanroom Equipments:** Photolithography, Sputtering, RIE, Asher, CVD, Parylene Coater, Wire Bonder, Profilometer
- **Tools:** COMSOL, Synopsys TCAD, Silvaco TCAD, AutoCAD, GIT
- **Platforms:** Cypress BLE, TI BLE, Raspberry, AWS, GCP, Jupyter

Non-Research Projects

- **Sunchargers**
 - IoT based Smart Street solution for SoS, Light Saving and Traffic Mapping using Solar Power.
 - Won Judges' Choice Award from Capgemini Global Hackathon among participants from 13 countries.
 - Became part of top 3000 startups in India honored by IIM Calcutta. [Certificate]

Professional Service

- **Journal Review:** Springer Silicon, Elsevier Microelectronics
- **Mentorship:** Part of USC Viterbi Graduate Mentorship program mentoring 2 students per semester. (2022 - 2023)
- **IEEE:** Graduate Chair at (2021 - 2022), Undergrad Chair at HIT-K (2017 - 2019)

Accolades:

- **2021:** Awarded **Viterbi Fellowship** by **University of Southern California** .
- **2020:** **Appreciation Award** by **TCS, India** for contributions in AWS Account Creation project.
- **2019:** **Outstanding Volunteer Award** by **IEEE, Kolkata Section, R10** for outstanding volunteering efforts.
- **2018:** **Top Performer** at **Electronic Sector Skill Council of India** for having highest national rank for Summer 2018.