

Professional & Academic Summary

- Ph.D. candidate specializing in acoustics with expertise in transcranial ultrasound system design for aberration correction, image reconstruction, and vibroacoustic and multiphysics modeling of ultrasound neuromodulation.
- Advanced researcher with expertise in vibroacoustic modeling, numerical acoustics, structural acoustics, and psychoacoustics. Skilled in acoustic transducer characterization, parallelized wave simulation models for acoustic propagation analysis, and transducer optimization. Currently advancing next-generation wearable acoustic-based sensors at Meta Reality Lab Research.
- 3+ years of industry experience in hardware design, product validation, and noise, vibration, and harshness (NVH) troubleshooting for high-performance automotive products, with proven track record in cross-functional collaboration and innovative problem-solving.

Experience

- May 2025 – Pres. **Research Scientist Intern, Meta Platform Inc., Pasadena, CA**
Reality Lab Research - Advanced Sensing Systems
- Designed and prototyped high-performance ultrasound-based sensors and signal processing algorithms for AR/VR wearable systems, developing expertise in sensor physics, system optimization, and real-time signal analysis.
 - Led sensor characterization and performance parameter development using MATLAB/Python for rapid prototyping and algorithm specification, ensuring maximum system performance through iterative optimization.
 - Collaborated with cross-functional engineering teams in an agile development environment to resolve complex technical challenges in sensing technologies, from concept generation through prototype implementation.
 - Developed and implemented imaging/sensing tools for feature verification and system performance validation
- Aug 2020 – May 2025 **Graduate Research Assistant, Georgia Institute of Technology, Atlanta, GA**
Ultrasound Biophysics and Bioengineering Laboratory
- Transcranial ultrasound: Developed and experimentally validated fast parallelized acoustic propagation models for skull aberration correction, improving signal clarity and minimizing unwanted noise artifacts. Designed acoustic hologram-based ultrasound systems that account for skull heterogeneity, enhancing precision and spatial targeting using nonlinear acoustics.
 - Neuromodulation biophysics: Investigated the mechanical and acoustic interactions of ultrasound with neuronal circuits, analyzing how cells receive, transmit, and interpret acoustic signals. Applied advanced vibration analysis to refine neuromodulation methodologies.
- Aug 2018 – Jul 2020 **Graduate Research Assistant, Virginia Tech, Blacksburg, VA**
Vibration and Acoustics Laboratory
- **vibroacoustic Modeling:** Developed experimental modal analysis procedures using laser vibrometry and tire cavity accelerometer for vibroacoustic modeling of tires under rolling conditions. Quantified structural noise and vibration transfer paths for in-cabin structure-borne noise (SBN) prediction under realistic speeds, loads, and excitations.
 - **Tuned Absorber Design:** Designed a semi-active tuned absorber to reduce rest tremors in Parkinson's patients, enhancing therapeutic outcomes and patient comfort.
- May 2019– Aug 2019 **Summer Intern, Maxxis Interntaional-US, Suwanee,GA**
Tire NVH/Dynamics Group,
- Improved Maxxis Modal Analysis Procedure and validation, conducted repeatability trials with different boundary conditions. Identified complex, coupled tire mode shapes, and modal parameter characterization for structure-borne noise identification.
- Jul 2016 – Jun 2018 **Senior Design Engineer (Noise and Vibration), Bajaj Auto Ltd., Pune, India**
Powertrain Group, R&D
- Optimized engine subsystems for Noise, Vibration, and Harshness (NVH), cost, and durability.
- **Powertrain Integration:** Designed layouts ensuring engine-chassis compatibility and NVH standards for Bajaj's commuter segment bikes.
 - **Testing & Validation:** Conducted performance and durability tests from prototypes to production, ensuring reliability and quality. Developed SOPs and test plans for noise and vibration validation.
 - **Vibration Modeling:** Developed transfer matrix libraries and used predictive analytics for advanced vibration analysis.collaborating with multidisciplinary teams to refine and enhance NVH-related designs
 - **Psychoacoustic tuning of exhaust system:** balanced psychoacoustic parameters of exhaust systems with performance and Pass-by-noise (PBN) regulations.
 - **Design Failure Analysis:** Addressed field failures and applied Design Review Based on Failure Mode (DRBFM) to enhance NVH and product reliability.
- Jul 2015 – Jun 2016 **Graduate Trainee Engineer, Bajaj Auto Ltd., Pune,India**
Noise, Vibration and Harshness(NVH) Laboratory,R&D,
- Developing, testing and optimizing both engine and full vehicle level NVH functional attributes
- Gained hands on expertise in Noise and Vibration testing, data acquisition and signal processing for developing, testing and optimizing NVH functional attributes for full vehicles and engines
 - Identified critical frequencies and modes, and implemented design modifications to reduce structure borne noise and structural deformation due to combustion and transmission loads

Professional Competencies

Technical Skills	Wave simulation, acoustic modeling and characterization, noise and vibration analysis, hardware prototyping, digital signal processing (DSP), modal testing, signal acquisition, and AI/ML applications in acoustics.
Design	CAD modeling and mechanical design using SolidWorks, Siemens NX, and AutoCAD.
Analysis	Finite element modeling (FEM) and vibroacoustic analysis using COMSOL, HyperMesh, Adams, Ansys, and ME'Scope.
Programming	Python, MATLAB, Simulink for numerical modeling, data processing, and system simulation.

Education

- 2020–Pres. **Ph.D. in Mechanical Engineering**, *Georgia Institute of Technology*, Atlanta, GA
Thesis: Transcranial FUS Therapy and Neuromodulation Using Nonlinear Acoustics
Supervisor: Costas D. Arvanitis, GPA: 4/4
- 2018–2020 **M.S. in Mechanical Engineering**, *Virginia Tech*, Blacksburg, VA
Thesis: Operational Modal Analysis of Rolling Tire (for Structure Borne Noise Prediction)
Supervisor: Ricardo Burdisso & Pablo Tarazaga, GPA: 4/4
- 2011–2015 **B.Tech. in Mechanical Engineering**, *National Institute of Technology*, Rourkela, India
Thesis: Optimal Design of Piezoresistive MEMS Accelerometer
Supervisor: Subrata Panda, GPA: 9.65/10 (University Gold Medalist)

Graduate Course Work

Acoustics-I, Acoustics-II, Non-linear Acoustics, Advanced Engineering Acoustics, Acoustic Transducers and Signal Analysis, Dynamics, Quantitative Neuroscience, Medical Imaging, Imaging with Data-driven Models, Finite Element Methods, Modeling and Simulation of Multi-body Dynamics, Vibration of Mechanical Systems, Applied Liner Systems, Machine Vision, Model Order Reduction, Optimization Techniques in Engineering,

Selected Publications

- Patent Arvanitis, C. and Dash, P.P., Georgia Tech Research Corp, 2024. Trans-Skull Focused Ultrasound Using Acoustic Hologram and Heterogenous Angular Spectrum Approach, and Hologram Registration. U.S. Patent Application 18/638,465.
- Journal Articles **Dash, P. P.**, & Arvanitis, C. D. (2025). Acoustic Holography in the Megahertz Frequency Range with Optimal Lens Topologies and Nonlinear Acoustic Feedback. arXiv preprint arXiv:2508.07103 (under revision)
Dash, P. P., & Arvanitis, C. D. (2025). Breaking the Skull Barrier: Parametric Array Enable Non-Invasive Monitoring of Transcranial Focused Ultrasound (Manuscript in Prep.)
Dash, P. P., Yeseul N., Han L. & Arvanitis, C. D. (2025). In-vitro modulation of DRG Neurons with contrast-enhanced Acoustic Radiation Force. (Manuscript in Prep.)
Schoen, S., **Dash, P. P.**, & Arvanitis, C. D. (2021). Experimental demonstration of trans-skull volumetric passive acoustic mapping. *IEEE Transactions on Ultrasonics*.
- Conference Presentations **Dash, P. P.**, & Arvanitis, C. (2025). Leveraging the Parametric Array Effect for Transcranial Focused Ultrasound Interventions. The Journal of the Acoustical Society of America, 157(4)
Dash, P. P. & Arvanitis, C. D. (2024). Acoustic Hologram Assisted Fast Aberration Correction in Transcranial FUS Therapy. In 2024 IEEE Int. Ultrasonics Symp.
Dash, P. P., & Arvanitis, C. D. (2024). Efficient Design and Registration of Hologram-Assisted Transcranial FUS Therapy. In 23rd Annu. Symp. Ther. Ultrasound, Taiwan
Dash, P. P., & Arvanitis, C. (2023). Heterogeneous Angular Spectrum Approach-based Holograms for Trans-skull Focused Ultrasound Therapy. *JASA*.
Arvanitis, C., **Dash, P. P.**, & Kim, C. (2023). Ultrasound mediated control of neurons and immune cells. The Journal of the Acoustical Society of America, 153(3 supplement), A31 – A31
Dash, P. P., & Arvanitis, C. (2021). Non-linearities under highly focused high-intensity ultrasound fields. The Journal of the Acoustical Society of America, 150(4), A125 – A125
Dash, P. P., Schoen, S., & Arvanitis, C. D. (2021). 3D Transcranial Passive Acoustic Mapping with the Heterogeneous Angular Spectrum Approach. In 2021 IEEE International Ultrasonics Symposium
Jing, B., Lee, H., **Dash, P.P.**, Arvanitis, C. D., & Lindsey, B. D. High contrast ultrasound imaging of very low frequency (100 kHz) modulated microbubbles. In 2021 IEEE IUS (pp. 1-4).
Dash, P. P., Kishor, K., & Panda, S. K. (2013). Biomechanical stress analysis of human femur bone. In Int. Conf. on CAD/CAE, IIT Madras.

Service & Leadership

- 2022-Pres. **President**, IEEE UFFC Society - Georgia Tech Chapter
- 2023-Pres. **National Representative**, Acoustical Society of America - Georgia Tech
- 2022-2024 **Webmaster**, ASA Biomedical Acoustics Committee
- 2019–2020 **Treasurer**, ASA - Virginia Tech Chapter
- 2014-2015 **Young Ambassador**, DAAD Mentored students on internships in Germany & EU

Professional Affiliations

- 2021–pres. **Acoustical Society of America** acousticalsociety.org
2022—pres. **IEEE Ultrasonics Ferroelectrics and Frequency Control Society** ieee-uffc.org

Honors & Achievements

- 2024 **ISTU Registration Award:** To present research at 23rd ISTU conference in Taipei, Taiwan
2022 **CRIDC Innovation Award:** For outstanding work on acoustic hologram-based brain therapy.
2021 **ASA Travel Award:** To present research at 181st ASA conference in Seattle
2015 **Felicitated by the President of India:** For academic excellence and research innovation.(Link)
2015 **Institute Gold Medal:** Best Graduate of 2015, NIT Rourkela.
2015 **Gold Medal:** Best Mechanical Graduate by *Institute of Engineers India (IEI)*.
2014 **WISE Fellowship:** *DAAD* summer research internship in Germany.