

Mahesh Raveendranatha Panicker, PhD

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Brief Biography

Mahesh Raveendranatha Panicker received his B. Tech. degree in Electrical and Electronics Engineering from Rajiv Gandhi Institute of Technology (Govt. Engineering College, Kottayam) in 2003 (First rank in the Mahatma Gandhi University, India) and Ph.D. degree from School of Computer Engineering, Nanyang Technological University (NTU), Singapore in 2009. From August 2003 to July 2005, he was a lecturer with Saintgits College of Engineering (Mahatma Gandhi University), Kerala. From August 2008 to July 2010, he was a post-doctoral fellow with centre for high performance embedded systems, NTU, Singapore. In August 2010, he started his career in industry with General Electric (GE) Global Research Centre, Bangalore. He was lead research engineer with GE till April 2017. From May 2017 till May 2018, he was senior chief engineer with Samsung Research Institute, Bangalore. He was an Assistant Professor of Electrical Engineering at IIT Palakkad from June 2018 to November 2021 and subsequently Associate Professor from November 2021 till December 2023. Currently, he is an Associate Professor with the Infocomm Technology Cluster at the Singapore Institute of Technology.

Mahesh is a Senior Member of IEEE, Six Sigma Green Belt certified and a TRIZ practitioner. He is a recipient of the Early Career Research Award from Science and Engineering Research Board, Government of India in 2019. He has won GE wide technical excellence awards in 2013 and 2015. He has also won silver award for ten or more patents with GE. During his stay in GE, Mahesh has worked on a range of projects, which include portable foetal ECG platform, compressor blade health monitoring program, real-time detection of rotor imbalance in GE transportation locomotive engines, detection of corrosion under insulation in oil/gas pipelines in refineries, nuclear reactor rebar corrosion detection, fMRI-based neuro analytics, GE's software beamforming platform for diagnostic ultrasound imaging and low-cost portable 3D ultrasound.

Mahesh's research interests include signal/image/video processing, machine learning and accelerated and embedded computing with applications in diagnostic ultrasound imaging, acoustic imaging, biomedical systems, multi-standard wireless communications and industrial prognostics. Mahesh has published his research findings in 36 refereed international journals and 75 refereed international conferences, and is an inventor on 12 patents and patent applications. Highlights of major research and translational projects are available at <https://www.pulseecho.in/>. He was an Associate Editor for Springer Circuits Systems and Signal Processing, Guest Associate Editor for Frontiers in Signal Processing, Review Editor for Frontiers in Neurorobotics. He is also a regular Reviewer for many of IEEE, Elsevier, Springer, Wiley and Frontiers Journals. He was also a consultant to GE Healthcare Bangalore, Samsung Research Institute Bangalore, VisiConsult Inc. He was the Vice Chair, IEEE Engineering in Medicine and Biology Society (EMBS) Kerala Chapter in 2020-2021, the Chair - Sponsorship Committee, IEEE International Symposium on Biomedical Imaging (ISBI) 2022 and Program Chair, IEEE South Asian Ultrasonics Symposium (SAUS) 2024.

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At IIT Palakkad, Mahesh served as the founding Head of the Department of Electrical Engineering from October 2021 till August 2023. Mahesh has also served as a member of the Senate, Board of Academic Studies and Board of Industry Collaboration and Sponsored Research.

1 EDUCATION

Ph.D., 2009

School of Computer Engineering, Nanyang Technological University, Singapore

Dissertation topic: Reconfigurable low complexity digital filter banks for software radio receivers

Link: <https://doi.org/10.32657/10356/47469>

Advisor: Professor A. P. Vinod (Vinod Achutavarrier Prasad)

Bachelor of Technology - B.Tech., 2003 (*First Rank in the University*)

Department of Electrical and Electronics Engineering, Rajiv Gandhi Institute of Technology (Govt. Engineering College), Mahatma Gandhi University, Kerala, India

Project topic: Microprocessor based Autonomous Robot

Advisor: Professor Dinesh Gopinath

2 SUMMARY OF WORKING EXPERIENCE

Total Work Experience – 20 years (Teaching: 10 years, Industry: 8 years, Post Doctoral: 2 years)

Dec 2023 – Till Now: Associate Professor, Infocomm Technology Cluster, Singapore Institute of Technology (SIT).

Instructor for courses in UG specializations involving Computer Engineering and Applied Artificial Intelligence. Involved in research and development of advanced signal processing, analytics, and imaging techniques for diagnostic ultrasound systems. Highlights of major research and translational projects are available at <https://www.pulseecho.in/>.

Nov 2021 – Dec 2023: Associate Professor, Electrical Engineering, Indian Institute of Technology, Palakkad; founding Head of the Department of Electrical Engineering (Oct 2021 – Aug 2023).

Instructor for courses in B. Tech Electrical Engineering and M. Tech System on Chip Design. Involved in research and development of advanced signal processing, analytics, and imaging techniques for diagnostic ultrasound systems.

June 2018 – Nov 2021: Assistant Professor in Electrical Engineering, Indian Institute of Technology, Palakkad.

Instructor for courses in B. Tech Electrical Engineering and M. Tech System on Chip Design. Involved in research and development of advanced signal processing, analytics, and imaging techniques for diagnostic ultrasound systems.

May 2017 – May 2018: Senior Chief Engineer at Ultrasound Systems, Healthcare and Medical Equipments (HME), Samsung Research Institute, Bangalore, India.

Involved in research, development and productization of advanced signal processing, analytics, and imaging techniques for diagnostic ultrasound systems and battery management systems.

Aug 2010 – April 2017: Lead Engineer at Software Sciences and Analytics Research, GE Global Research, John F Welch Technology Centre, Bangalore, India.

Helped in establishing diagnostic ultrasound imaging lab in GE Global Research, Bangalore and in establishing collaboration with General Imaging business, GE Healthcare, Milwaukee. Involved in development of advanced analytics, signal processing algorithms/systems for applications in health care, energy, oil and gas and transportation domains. Filed 10 patents and involved in many of the popular GE products such as diagnostic ultrasound systems, non-invasive neonatal/foetal heart rate monitoring, compressor blade health monitoring (BHM) and Tier4 locomotive prognostics.

Aug 2008 – Jul 2010: Research Fellow at Centre for High Performance Embedded Systems (CHiPES), NTU, Singapore.

Involved in development of novel reconfigurable low complexity spectrum sensing algorithms and architectures for military and cognitive radios.

Nov 2007 – Dec 2007: Sponsored Internship at SUPELEC in the Signal, Communication et Electronique Embarquee (SCEE) team as part of Merlion Project Grant (Dossier No. 9.03.07), France-Singapore Cooperation Platform in Science and Technology.

Involved in development of novel spectrum sensing architectures for cognitive radio.

Aug 2005 – Jul 2008: Teaching Assistant at School of Computer Engineering, NTU, Singapore.

Handled sessions in Instrumentation and Data Acquisition Lab and Digital Systems Lab.

Aug 2003 – Jul 2005: Lecturer at SAINTGITS College of Engineering, Mahatma Gandhi University, Kerala, India.

Taught basic and advanced courses in Electrical and Electronics Engineering.

3 AWARDS AND HONOURS

- **Early Career Research Award**, Science and Engineering Research Board (SERB), Government of India, 2019. It came with a research grant of INR 4.9 million (see Research Grants).
- **Mitacs Globalink Research Award**, Mitacs, Canada, 2024.
- **GE-wide Technical Excellence Award**, General Electric, 2013 and 2015.
- **Silver Award for ten or more patents**, General Electric.
- **First Rank**, B.Tech in Electrical and Electronics Engineering, Mahatma Gandhi University, Kerala, 2003.

Awards won by supervised students are listed under Research (Section 5.8).

Professional Certifications

- Six Sigma Green Belt
- MATRIZ TRIZ Level 2 (TRIZ Practitioner)

4 TEACHING

4.1 Singapore Institute of Technology (Dec 2023 – Present)

Modules taught in the Computer Engineering and Applied Artificial Intelligence undergraduate programmes. Mean student feedback of 4.30/5.00 (enrolment-weighted) across 5 module runs and 402 students.

- INF2009: Edge Computing and Analytics (UG)
- AAI3001: Computer Vision and Deep Learning (UG)
- CEG3004: Digital Signal Processing (UG)

Term	Module	Number of Students	Score (Out of 5)
Jan-Apr, 2024	INF2009: Edge Computing and Analytics	46	4.17
Sep-Dec, 2024	AAI3001: Computer Vision and Deep Learning	61	4.60
Jan-Apr, 2025	INF2009: Edge Computing and Analytics	107	4.50
Sep-Dec, 2025	AAI3001: Computer Vision and Deep Learning	81	4.20
Jan-Apr, 2026	CEG3004: Digital Signal Processing	107	4.04

4.2 Indian Institute of Technology Palakkad (June 2018 – Dec 2023)

Courses Taught

- Microprocessor Systems: Design and Interfacing (Theory and Lab) (UG)
- Digital Image Processing (Theory and Lab) (UG and PG)
- Digital Circuits Laboratory (UG)
- Sensor Arrays and Imaging (PG)
- Analog and Digital Communications (UG)
- Control Systems Lab (UG)
- Concepts in Engineering Design (UG)
- Introduction to Engineering (UG)

<https://www.pulseecho.in/>

New Courses Developed

- Microprocessor Systems: Design and Interfacing (B. Tech Year 2, Core) (*Heavy hands on approach where students will first implement an 8-bit microcomputer using logic gates and then learn microprocessor systems and interfacing using ARM Cortex M0+ core on FRDM KL25Z series SoC*) [Online Lectures]
- Digital Image Processing (B. Tech Year 4/Graduate Level, Elective) (*Course deals with real-life dataset (e.g., student acquired dataset, industry CT data, COVID19 Lung Ultrasound Images)*) [Online Lectures]
- Sensor Arrays and Imaging (Graduate Level, Elective) (*A unique course on sensor arrays for imaging with emphasis on ultrasound. The course covers the basics of wave physics, transducer physics and image reconstruction algorithms*) [Online Lectures]
- Digital Circuits Laboratory (B. Tech Year 2, Core) (*Designed the experiments including Verilog implementation on Zybo Zynq board*)

Teaching Feedback Scores

Year	Course	Number of Students	Score (Out of 10)
Aug-Nov, 2018	EE3050: Analog and Digital Communications	33	8.9
	EE3125: Control Systems Lab	31	8.8
Jan-May, 2019	EE2080: Microprocessor Systems - Design and Interfacing	33	9.1
Aug-Nov, 2019	EE5005: Digital Image Processing	22	8.73
	EE2170: Digital Circuits Laboratory	55	NA*
Jan-May, 2020	EE2080: Microprocessor Systems - Design and Interfacing	47	NA*
Aug-Nov, 2020	EE5005: Digital Image Processing	49	9.22
	EE2170: Digital Circuits Laboratory	43	NA*
Jan-May, 2021	EE2080: Microprocessor Systems - Design and Interfacing	43	8.69
	EE5527: Sensor Arrays and Imaging	15	9.61
July-Nov, 2021	EE5005: Digital Image Processing	72	8.86
Jan-May, 2022	EE2080: Microprocessor Systems - Design and Interfacing	43	8.7
Aug-Dec, 2022	EE5005: Digital Image Processing	44	8.26
Jan-May, 2023	EE2080: Microprocessor Systems - Design and Interfacing	40	9.2

*Not Available due to COVID-19 schedule

5 RESEARCH

5.1 Technology Interests:

- Signal/Image/Video Processing
- Machine/Deep Learning for Imaging/Reconstruction
- Embedded and Accelerated Computing

5.2 Domain Interests:

- Diagnostic Ultrasound Imaging and Image Processing
- Underwater Acoustic Imaging and Image Processing
- Industrial Prognostics and Health Monitoring

5.3 Publications: *Please refer Section 7 for detailed list of publications*

- Published 111 papers in international refereed journals and international conferences.
- Number of International Journal Papers: 36, Number of International Conference Papers: 75
- In addition: 5 non-refereed conference abstracts and 3 preprints (listed separately).

5.4 Patents: *Please refer Section 8 for detailed list of patents*

- Number of Patents and Patent Applications: 12 (8 granted: 6 US and 2 Indian; plus applications: 1 US (published), 1 Indian and 2 further)
- Registered Designs: 1 (India)

5.5 Research Grants:

As PI: **SGD 2,348,970** across 4 active grants, and approx. **SGD 150,000** across completed grants, plus in-kind support (NVIDIA hardware worth approx. SGD 13,000; GE Healthcare internship funding and compute). As Co-PI: SGD 64,000. Non-SGD amounts are converted at ECB reference rates of 25 Sep 2026.

On-going (Active) Research Grants:

No.	Title	Funding Organization	Amount	Duration	Role
1	High Performance Medical Ultrasound Enabled by Advanced Piezoelectric Materials and Transducers	RIE 2025 Manufacturing, Trade and Connectivity (MTC) Industry Alignment Fund – Pre-Positioning Programme (IAF-PP)	SGD 1,500,200 (Total fund: SGD 9,997,000)	Jul 2026 – Jun 2029	PI
2	Portable Non-contact Breast Ultrasound Imaging	MOE Translational R&D and Innovation Fund (TIF) Grant	SGD 550,420	Jun 2026 – May 2028	PI
3	Intelligent Multi-modal Fire Watcher System	Ministry of Education (MoE) Ignition Grant (STEM)	SGD 148,400	Oct 2025 - Oct 2027	PI
4	A flexible array ultrasound imaging system for hands free automatic and continuous assessment of the blood flow and tissue dynamics	Ministry of Education (MoE) Singapore Academic Research Fund (AcRF) Tier 1	SGD 149,950	Dec 2024 - Dec 2026	PI

Past (Completed) Research Grants:

No.	Title	Funding Organization	Amount	Duration	Role
1	Intelligent Agent for ultrasound image analysis using Deep Reinforcement Learning	MITACS Global Link Research Award	CAD 6,000 (approx. SGD 5,400)	Jan 2024-June 2024	PI
2	Learning based Beamformer for Point of Care Ultrasound Systems	Samsung Research India Bangalore	INR 1,217,760 (approx. SGD 16,200)	Aug 2023 – Mar 2024	PI
3	Automatic Target Detection using Simulated Side Scan and Multi-beam Echo Sounder Images	Defense Research Development Organization (DRDO)	INR 1,965,408 (approx. SGD 26,200)	Aug 2022-May 2024	PI
4	Robust receive beamforming algorithm for underwater sonar imaging system for Mine Like Object Detection in the presence of reverberation	Defense Research Development Organization (DRDO)	INR 989,218 (approx. SGD 13,200)	July 2022 – June 2023	PI
5	Cognitive Ultrasound Imaging	NVIDIA Corporation	Developer board worth USD 10,000 (approx. SGD 12,800)	NA	PI
6	Aberration Correction for Diagnostic Ultrasound Imaging	GE Healthcare	Internship Student Funding (3 students / year), ML350 Compute	June 2022 – July 2023	PI
7	Investigation of a portable, affordable, and self-guided bedside ultrasound system for tissue and blood velocity imaging	Early Career Research (ECR) award, Science and Engineering Research Board (SERB), India	INR 4,901,830 (approx. SGD 65,300)	March 2019 - June 2022	PI
8	An automated lung ultrasound workflow for diagnostic assistance in COVID-19 and beyond	COVID19 Special Core Research Grant, Science and Engineering Research Board (SERB), India	INR 1,202,960 (approx. SGD 16,000)	Aug 2020 - Aug 2021	PI
9	Automated Lung Ultrasound for COVID-19 Screening and Monitoring	CSR Fund - Federal Bank Limited, India	INR 600,000 (approx. SGD 8,000)	May 2020 - October 2020	PI
10	Development of a Real Time Spectral Analysis and Filtering System Based on Lyrtech SFF	Temasek Laboratories/DSO National Labs, Defence Science and Technology Agency (DSTA), Singapore	SGD 64,000	Sep 2008 - Sep 2009	Co-PI

5.6 Supervision of Post-Doctoral Research Fellows (Sole Supervisor):

Post-Doctoral Research Fellow Supervision (Past Projects): 1

No.	Name	Duration	Project Title and Grant Amount	Funding Organization
1	Dr. Sreehari V. R.	Aug 2022 - May 2024	Automatic Target Detection using Simulated Side Scan and Multi-beam Echo Sounder Images (INR 19,65,408)	Defense Research Development Organization (DRDO)

5.7 Graduate Research Student Supervision:

Number of Graduated Ph.D. Students: 4

No.	Name	Year of graduation	Thesis Title	Current Employment
1	Gayathri M.	2022	Tissue Adaptive Beamforming Algorithms for Realizing Cognitive Ultrasound Imaging Systems	Lead Design Engineer – Ultrasound Probes, GE Healthcare
2	Madhavanunni A. N.	2025	Ultrafast Ultrasound System for Flow Dynamics and Imaging	Postdoctoral Fellow, University of Lyon
3	Mimisha M Menakath	2025	Signal Processing for Underwater 3D Acoustical Imaging System	Post Doctoral Fellow, Luleå University of Technology
4	Pisharody Harikrishnan Gopalakrishnan	2025	Novel Transducer Array Designs for High Frame Rate Ultrasound Imaging	Technical Superintendent, Indian Institute of Technology Palakkad

Number of Graduated Master of Science (By Research) Students: 1

No.	Name	Year of graduation	Thesis Title	Current Employment
1	Madhavanunni A. N.	2020 (PhD Upgradation)	Portable Vector Flow Imaging for Ambulatory Scenarios	Converted to PhD in June 2020

Ph.D./D.Engg Students Presently Supervising: 2

No.	Name	Start Year	Thesis Title	Current Status
1	Gopika Gopikrishnan	2025	Resilient Ultrasound Imaging: A Framework for On-board, Continual, and Distributed Deep Beamforming	In progress (1 Conference Paper)
2	Somashekhar Dehury	2025	Towards a Wearable Multi-view Echocardiography Patch: Signal Processing and System Integration	In progress

5.8 Achievements of PhD Students and Undergraduate Final Year Project Students:

- Ph.D. Student, Madhavanunni A N, has won the second prize for the **Best Paper Award** in 2024 IEEE South Asian Ultrasonics Symposium [SAUS 2024] *Paper: A. N. Madhavanunni, Niya Mariam Benoy, Mahesh Raveendranatha Panicker and Himanshu Shekhar, "A Performance Evaluation of Filtered Delay Multiply and Sum Beamforming for Ultrasound Localization Microscopy: Preliminary Results," in Proc. of IEEE South Asian Ultrasonics Symposium (SAUS) 2024, IIT Gandhinagar, India March. 2024.*
- Ph.D. Student, Harikrishnan Pisharody, elected as a **Finalist in the Student Paper Competition** for the International Symposium on Biomedical Imaging (IEEE ISBI 2022). *Paper: Harikrishnan Pisharody and Mahesh Raveendranatha Panicker, "Extending The Capability Of Linear Array Ultrasound Probe To Concave Array Using Low-Cost Acoustic Lens For High Frame Rate Focused Imaging", in Proc. of IEEE ISBI 2022, Kolkata, Mar. 2022.*
- Ph.D. Student, Madhavanunni A N, elected as a **Finalist in the Student Paper Competition** for the 43rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society (IEEE EMBC 2021). *Paper: Madhavanunni A.N. and Mahesh Raveendranatha Panicker, "An Angle Independent Depth Aware Fusion Beamforming Approach for Ultrafast Ultrasound Flow Imaging", in Proc. of 43rd IEEE EMBC 2021, Nov. 2021.*
- Ph.D. Student, Madhavanunni A N, has won the **2020 Robert F. Wagner All Conference Best Student Paper Finalist Award** at the SPIE Medical Imaging Conference at Houston, USA, February 2020. *Paper: Madhavanunni A.N. and Mahesh Raveendranatha Panicker, "Triangulation based vector flow imaging with non-steered plane waves for transverse flows", in Proc. of SPIE Medical Imaging 2020, Houston, Feb 2020.*
- Ph.D. Student, Gayathri M, was one of **10 Finalists of the 3 Minute Thesis competition** organized as part of IEEE's flagship symposium in Medical Imaging-IEEE ISBI 2021. *Paper: Gayathri M and Mahesh Raveendranatha Panicker, "Towards diffuse beamforming for specular reflectors: A pixel level reflection tuned apodization scheme for ultrasound imaging," in Proc. of IEEE ISBI 2021, Nice, France, April 2021.*

- Ph.D. Student, Gayathri M won the **Excellence in Research Award** as part of the IIT Palakkad Research Scholars Day 2023.
- B. Tech project student, Antony Jerald, won **Undergraduate Research and Innovation Awards 2023** at IIT Palakkad for excellence in undergraduate research.
- Internship students, Arjun and Aniket Singh Rajpoot, won **Undergraduate Research and Innovation Awards 2022** at IIT Palakkad for excellence in undergraduate research.
- B. Tech project student, Roshan P Mathews, won **Undergraduate Research and Innovation Awards 2021** at IIT Palakkad for excellence in undergraduate research.

5.9 Translational Research:

- Recent work employing lung ultrasound as a continuous monitoring tool to help clinicians in COVID19 which is deployed and available at <https://www.pulseecho.in/alus/>. The work was covered in detail by the national daily The Hindu, the national magazine The Week and in the Doordarshan News. The work was also presented in the first all IIT R&D festival.
- An automated multi-scale image contrast enhancement algorithm for industrial CT scans has been developed and under evaluation by experts from <https://vcxrayindia.com/>.
- MOUs signed with University of Alberta, GE Healthcare Bangalore and Sree Chitra Tirunal Institute for Medical Sciences & Technology, Trivandrum (SCTIMST) for automated image analysis for ultrasound systems.

6 PROFESSIONAL SERVICE

6.1 Administrative Appointments:

- Lead, Minor in Artificial Intelligence, Singapore Institute of Technology (Jan 2026 - Now)
- Head, Research group on "Smart Healthcare", Singapore Institute of Technology (Jan 2025 - Now)
- Head, Department of Electrical Engineering, Indian Institute of Technology Palakkad (Oct 2021 – Aug 2023)
- Member, Board of Industry Collaboration and Sponsored Research, Indian Institute of Technology Palakkad (July 2018 – July 2021)
- Member, Board of Academic Studies, Indian Institute of Technology Palakkad (June 2019 – July 2020)
- Stream Co-ordinator, Electrical Engineering, Indian Institute of Technology Palakkad (June 2019 – July 2020)
- Institute Coordinator DRDO-MoE PhD Fellowship (May 2020 – May 2023)
- Convenor, Centre for Computational Imaging, Indian Institute of Technology Palakkad

6.2 Professional Activities:

- Senior Member, IEEE
- Associate Editor, Springer Circuits, Systems and Signal Processing
- Review Editor, Frontiers in Neurorobotics
- Associate Editor (Guest) and Review Editor, Frontiers in Signal processing
- Vice Chair, IEEE Engineering in Medicine and Biology Society (EMBS) Kerala Chapter, 2020-2021
- Program Chair, IEEE South Asian Ultrasonics Symposium (SAUS) 2024
- Chair - Sponsorship Committee, IEEE International Symposium on Biomedical Imaging (ISBI) 2022
- Executive Committee Member, National Institute of Electronics, and Information Technology (NIELIT) Calicut
- Review Board Member, NPOL Kochi
- Regular mentor for internship students funded by Indian Academy of Sciences (1 student in 2019, 1 student in 2020, 3 students in 2021)
- Department Advisory Committee member for
 - Electrical Engineering, Rajiv Gandhi Institute of Technology Kottayam
 - Electrical Engineering, Government Engineering College Idukki
 - Instrumentation and Control Engineering, NSS College of Engineering Palakkad
 - Biomedical Engineering, Sahrudaya College of Engineering Thrissur
- Member, Technical Committee on Brain-Machine Interface Systems, IEEE Systems, Man and Cybernetics Society
- Member, IEEE Signal Processing Society
- Member, IEEE Circuits and Systems Society
- Member, IEEE Engineering in Medicine and Biology Society
- Member, IEEE Ultrasonics, Ferroelectrics, and Frequency Control Society
- Session Chair, Biomedical Systems, IEEE Region-10 Conference, TENCON 2020 and TENCON 2019
- Program Committees of International Symposium on Electronic System Design (ISED) 2011-2014, International Conference on Eco-friendly Computing and Communication Systems (ICECCS 2013), International Conference on Advances in Computing and Communications (ACC 2013)
- Track Chair, IEEE International Conference on Information, Communications and Signal Processing (ICICS 2009)

- Reviewer of IEEE Transactions on Neural Networks and Learning Systems, IEEE Transactions on Industrial Informatics, IEEE Transactions on Multimedia, IEEE Transactions on Human-Machine Systems, IEEE Sensors, IEEE Transactions on Biomedical Circuits and Systems, IEEE Access, IEEE Transactions on Signal Processing, IEEE Transactions on Circuits and Systems - I and II, IEEE Transactions on Vehicular Technology, IEEE Transactions on VLSI Systems, IET Transactions on Signal Processing, Elsevier Pattern Recognition, Springer Journal of Signal Processing Systems for Signal, Image and Video Technology and International conferences such as BioCAS, EMBC, ISCAS, ICCS, ICICS, TENCON, SPCOM.

6.3 Invited Talks (27 in total):

International Forums and Research Lectures

- “Cognitive Ultrasound: Towards adaptation of artificial intelligence techniques in diagnostic ultrasound imaging”, International Conference on Cognitive, Green and Ubiquitous Computing (IC-CGU 2025), 11 October 2025.
- “Cognitive Ultrasound: Towards adaptation of artificial intelligence techniques in diagnostic ultrasound imaging”, HEAL Friday, National Healthcare Group (NHG), Singapore, 10 October 2025.
- “Enhanced Needle Tracking in Biopsy through High Framerate Ultrasound Imaging”, Moscow Cancer Forum, 18–20 June 2025.
- “Cognitive Ultrasound: Towards adaptation of artificial intelligence techniques in diagnostic ultrasound imaging”, SITxUoG AI-Healthcare Forum, Singapore Institute of Technology, Punggol Campus, 7 February 2025.
- “Reconfigurable Low Complexity Digital Filters”, Military Radio Lecture Series, NTU, Singapore, February 2009.
- “Reconfigurable Low Complexity Spectrum Sensing”, Visitor Lecture Series, SUPELEC, Rennes, France, December 2008.

Workshops, Schools, Seminars and National Conferences

- “Ultrasound Beamforming: Imaging the Medium from the Ultrasound Echoes”, Workshop on Inverse Problems and Applications, NIT Surathkal, 7 March 2023.
- “Automated Lung Ultrasound – Inspired by Physics and Driven by Neural Networks”, CUSAT–INID (NTNU) School on Medical Images Understanding, CUSAT, 27 February 2023.
- “Video Summarization”, CapsNetwork Training School-2, NTNU, Norway, 29 April 2022.
- “Learning based beamforming algorithms for ultrasound imaging”, Forum on Trends in Multi Scale Signal and Image Processing for Biomedical Instrumentation, IEEE SPS Kerala Section, 17 December 2021.
- “Transmit Receive Beamforming in Ultrasound Imaging”, Virtual Workshop on Instrumentation and Signal Processing in Biomedical Imaging and Rehabilitation, IIT Gandhinagar, 25 October 2021.

- “Introduction to Convolutional Neural Networks and Applications in Image Processing”, 3-day Workshop on Generative Adversarial Networks (GANArt 2021), NIT Calicut, 20–22 May 2021.
- “Diagnostic Ultrasound Imaging Systems Overview and Advances”, 7th National Seminar on Advances in Scientific and Industrial Instrumentation (ASCII), CUSAT, 24 March 2021.
- “Digital Signal Processing – Journey from Physical Models to Statistical Models”, Workshop on Implementation of Signal Processing Algorithms on DSP Processors, PSG Coimbatore, 16 December 2019.
- “From the physical world to the digital world: enabling machine learning driven by domain knowledge”, IEEE SPS Kerala Section Colloquium on ML with Signal Processing for Data Analytics, CUSAT, Kochi, 28 September 2019.
- “Signal Processing in The Era of Big Data”, National Conference on Communication, Computing and System Design (NC33SD’19), PSGiTech, Coimbatore, 19 March 2019.
- “Compressive Sampling – A Paradigm Shift in Digital Signal Processing”, Workshop on Advances in Signal and Image Processing, GITAM University, Visakhapatnam, February 2014.
- “Reconfigurable Low Complexity Digital Filter Banks for Software Radio Receivers”, Graduate Students Workshop, IEEE Circuits and Systems Society, Singapore, September 2007.

Faculty Development Programmes and Webinars

- “Neural Networks for Accelerating Image Reconstruction in Ultrasound Imaging”, FDP on Advancements in Image Processing Applications, SCMS School of Engineering and Technology, Karukutty, 31 August 2022.
- “Automated lung ultrasound for Covid19 and beyond”, FDP on Advancements of Digital Health and Medical Innovations during Pandemic, Model Engineering College Kochi, 7 December 2021.
- “Diagnostic Ultrasound – The Journey from Imaging to Therapy and Beyond”, IEEE Malabar Hub Webinar Series #62, 5 August 2021.
- “Neural Networks for Diagnostic Ultrasonic Imaging”, ATAL FDP on Applications of AI in Healthcare, Model Engineering College Kochi, 25 February 2021.
- “Introduction to Convolutional Neural Networks and Applications in Image Processing”, ATAL FDP on Machine Learning and Deep Learning: A Hands-On Approach, CUSAT, 9 December 2020.
- “IoT for Biomedical (Imaging)”, ATAL FDP on Secure Internet of Things (IoT), IIT Palakkad, 19 October 2020.
- “Lung Ultrasound Imaging for COVID19, From Physics to Neural Networks”, IEEE Computer Society and IEEE Student Chapter Webinar, NIT Trichy, 15 August 2020.
- “Deep learning and Biomedical Applications”, Faculty Development Program on Artificial Intelligence and Machine Learning for Biomedical Applications, Sahrudaya College of Engineering, 17 July 2020.

- “Advances in Industrial Digital Signal Processing”, Technical Quality Improvement Program (TQIP) for Faculty on Advances in Digital Systems, Cochin University of Science and Technology (CUSAT), Kochi, June 2011.

7 PUBLICATIONS

Google Scholar: 1,736 citations, h-index: 18, i10-index: 31 (as of Oct 2026)

Scopus: 1,090 citations, h-index: 15 (as of Aug 2026)

[†] denotes a student or post-doctoral researcher supervised by M. R. Panicker; his name is shown in bold.

Selected Publications:

- [S1] Midhila Madhusoodanan[†], **Mahesh Raveendranatha Panicker**, and Abhilash Rakkunedeth Hareendranathan, “POCUS-Net: Beamforming Inclusive Image Translation Approach for High-Quality Pediatric Bone Visualization in Point-of-Care Ultrasound,” *IEEE Transactions on Ultrasonics*, vol. 73, no. 5, pp. 495–510, May 2026. DOI: 10.1109/TUSON.2026.3681226
Deep-learning image translation that brings adaptive-beamforming image quality to standard point-of-care ultrasound for paediatric bone imaging.
- [S2] Mimisha M. Menakath[†], **Mahesh Raveendranatha Panicker**, and Hareesh G., “Orthogonal Linear Array-Based Product Beamforming for Real Time Underwater 3-D Acoustical Imaging,” *IEEE Journal of Oceanic Engineering*, vol. 51, no. 1, pp. 561–575, Jan. 2026. DOI: 10.1109/JOE.2025.3633536
Real-time underwater 3-D acoustic imaging from L-shaped orthogonal linear arrays and product beamforming, avoiding the cost of full planar arrays.
- [S3] Abdul Rahooft[†], Vivek Chaturvedi, **Mahesh Raveendranatha Panicker**, and Muhammad Shafique, “CapsBeam: Accelerating Capsule Network-Based Beamformer for Ultrasound Non-steered Plane-Wave Imaging on Field-Programmable Gate Array,” *IEEE Transactions on Very Large Scale Integration (VLSI) Systems*, vol. 33, no. 7, pp. 1934–1944, Jul. 2025. DOI: 10.1109/TVLSI.2025.3559403
An FPGA-accelerated capsule-network beamformer for plane-wave ultrasound on edge hardware, with 32% higher in vitro contrast than delay-and-sum.
- [S4] A.N. Madhavanunni[†] and **Mahesh Raveendranatha Panicker**, “Beam multiply and sum: A tradeoff between delay and sum and filtered delay multiply and sum beamforming for ultrafast ultrasound imaging,” *Biomedical Signal Processing and Control*, vol. 85, Aug. 2023, Art. no. 104807. DOI: 10.1016/j.bspc.2023.104807
Beam multiply and sum: a beamformer that trades off the low cost of delay-and-sum against the image quality of filtered delay-multiply-and-sum for ultrafast imaging.
- [S5] Gayathri Malamal[†], Hans-Martin Schwab, and **Mahesh Raveendranatha Panicker**, “Enhanced Needle Visualization With Reflection Tuned Apodization Based on the Radon Transform for Ultrasound Imaging,” *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*, vol. 70, no. 11, pp. 1482–1493, Nov. 2023. DOI: 10.1109/TUFFC.2023.3316284
Reflection-tuned apodization from the Radon transform of plane-wave RF data, improving needle visibility in ultrasound-guided interventions.

<https://www.pulseecho.in/>

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