# Milind Pandit, PhD

## RESEARCH INTERESTS

- I am interested in advancing novel micro sensor and actuator technologies with applications in health and wearables.
- I have contributed to fundamental research on micromachined ultrasound transducers (MUTs), inertial sensors, and nonlinear resonators using capacitive and piezoelectric transductions.
- I am currently focusing on developing a pMUT platform for ultrasound-based neural stimulation.
- I have expertise in process development, transducer design, technology transfer, and product development.

## EDUCATION

**University of Cambridge** 2015 - 2019
Doctor of Philosophy (PhD) in Microsystems Engineering. Cambridge, UK

**Thesis title**: Towards ultra-high resolution mode-localised MEMS sensors.
**Supervisor**: Prof. Ashwin Seshia.

- Investigated MEMS-based coupled resonators for high resolution and temperature insensitive gravimetric applications.
- Created FEM models for resonant accelerometers to optimize for scale factor, resolution, and anchor losses.
- Developed experimental instrumentation including a temperature control chamber and front end electronics to accurately validate the theory and models of the coupled resonator dynamics to optimize the sensing resolution.
- Researched fundamental resonator principles of drift, nonlinearity, noise, and resolution.

**University of British Columbia** 2011 - 2015
BASc (with Distinction) in Electrical and Computer Engineering Vancouver, Canada

Bachelor's thesis in a project in artificial muscle technology based on coiled-nylon for prosthetic and medical use.
*International Leader of Tomorrow Award*

## RESEARCH AND DEVELOPMENT EXPERIENCE

**IMEC** Leuven, Belgium
R&D Engineer 2025 - Present

- Led the development of pMUTs for neurostimulation by characterizing and benchmarking PZT and AlScN technologies resulting in project intakes of feasibility studies for technology companies and startups.
- Led the design and integration of a pMUT-based cuff for gesture recognition applications for a funded project.
- Evaluated the viability of cMUT as a fit for cardiac health monitoring for a new startup by interacting with investors, technology experts, foundries, performing FEM simulations, and measurements (electrical and acoustic).
- Mentored masters and doctoral students in theoretical and experimental research methodologies of MUTs leading to several coauthored paper dissemination.

**Pulsify Medical** Leuven, Belgium
Senior MEMS Development Engineer 2021 - 2025

- Contributed to applying and steering EU funded project (Listen2future) to advance flexible and high-frequency pMUTs for medical applications.
- Coordinated technology transfer from a R&D line to commercial foundry to qualify and validate a first-of-a-kind large area piezo-on-glass process.
- Led interactions with IMEC, foundries, and consultants for MEMS simulation & design, process development, and characterization of flexible piezoelectric ultrasound-based cardiac monitoring patches.

**Silicon Microgravity** Cambridge, UK
MEMS Design and Analytics Engineer 2019 - 2021

- Led the surface gravimeter team to create a first-of-a-kind prototype used in the field for underground cavity detection.
- Improved MEMS accelerometer resolution by 50x through system design optimization, experimental testing, and machine learning-based calibration.

## RESEARCH GRANTS

**Listen2future - Horizon Europe grant by CHIPS JU** 2023 - 2026
Contributed to writing, executing and managing a pan-European grant on developing acoustic sensor solutions with integrated digital technologies as part of Pulsify Medical and IMEC.

**PhD Studentship and Jishnu Rao Trust Award** 2015 - 2018
Funding from Silicon Microgravity and Dept. of Engineering, University of Cambridge to pursue PhD research.

**NSERC Undergraduate Student Research Award** 2015
Funding from NSERC and University of British Columbia, Canada to pursue undergraduate research internships.

**NSERC Undergraduate Student Research Award** 2015
Funding from NSERC and University of British Columbia, Canada to pursue undergraduate research internships.

**International Research Experience Program Scholarship** 2013
Funding from University of British Columbia, Canada to pursue undergraduate research at TU Darmstadt, Germany.

## PATENTS, PUBLICATIONS AND CONFERENCE PROCEEDINGS

### Published Patents

- A. Seshia, C. Zhao, G. Sobreviela, M. Pandit, P. Steinmann, and A. Mustafazade, *Multiply encapsulated micro electrical mechanical systems device*, 2020
- A. Seshia, C. Zhao, and M. Pandit, *Mode localised accelerometer*, 2021

### Relevant Publications

- M. Pandit, M. Forlin, G. Massimino, P. Gijsenbergh, G. Keulemans, J. Aerts, E. Georgitzikis, J. Segers, D. Barbosa, P. Deruytere, P. Limaye, and E. Hijzen., "Multi-aperture ultrasound imaging for monitoring volumes of large anatomical organs," **In preparation**
- G. Massimino, M. Pandit, R. Ukropec, E. Georgitzikis, P. Gijsenbergh, and G. Keulemans, "Large-area flexible scaln-based pmut array patch manufactured via flat panel display processing for conformal ultrasound imaging," **In preparation**
- H. Zhang, H. Li, J. Sun, S. Kirkbride, G. Teng, Z. Liu, D. Chen, M. Parajuli, M. Pandit, G. Sobreviela, C. Zhao, W. Yuan, H. Chang, and A. Seshia, "Coherent energy transfer in coupled nonlinear microelectromechanical resonators," *Nature Communications*, 2025
- H. Zhang, M. Pandit, G. Sobreviela, M. Parajuli, D. Chen, J. Sun, C. Zhao, and A. A. Seshia, "Mode-localized accelerometer in the nonlinear duffing regime with 75 ng bias instability and 95 ng/$\sqrt{Hz}$ noise floor," *Microsystems & Nanoengineering*, Feb. 2022
- M. Pandit, A. Mustafazade, G. Sobreviela, C. Zhao, X. Zou, and A. A. Seshia, "Experimental observation of temperature and pressure induced frequency fluctuations in silicon mems resonators," *Journal of Microelectromechanical Systems*, Aug. 2021
- A. Mustafazade, M. Pandit, C. Zhao, G. Sobreviela, Z. Du, P. Steinmann, X. Zou, R. T. Howe, and A. A. Seshia, "A vibrating beam mems accelerometer for gravity and seismic measurements," *Scientific Reports*, Jun. 2020
- M. Pandit, C. Zhao, G. Sobreviela, and A. Seshia, "Practical limits to common mode rejection in mode localized weakly coupled resonators," *IEEE Sensors Journal*, Jul. 2020
- M. Pandit, "Towards ultra-high resolution mode-localised mems sensors," Ph.D. dissertation, University of Cambridge, 2019
- M. Pandit, C. Zhao, G. Sobreviela, X. Zou, and A. Seshia, "A high resolution differential mode-localized mems accelerometer," *Journal of Microelectromechanical Systems*, Oct. 2019
- M. Pandit, C. Zhao, G. Sobreviela, S. Du, X. Zou, and A. Seshia, "Utilizing energy localization in weakly coupled nonlinear resonators for sensing applications," *Journal of Microelectromechanical Systems*, Apr. 2019
- M. Pandit, C. Zhao, G. Sobreviela, A. Mustafazade, S. Du, X. Zou, and A. A. Seshia, "Closed-loop characterization of noise and stability in a mode-localized resonant mems sensor," *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*, Jan. 2019
- C. Zhao, M. Pandit, G. Sobreviela, A. Mustafazade, S. Du, X. Zou, and A. Seshia, "On the noise optimization of resonant mems sensors utilizing vibration mode localization," *Applied Physics Letters*, May 2018

**Conference proceedings**

- M. Pandit, R. Ukropec, and P. Gijsenbergh, "On chip noise cancellation for piezoelectric micromachined ultrasound transducers," in *Proceedings of the IEEE International Conference on Micro Electro Mechanical Systems (MEMS)*, IEEE, Jan. 2026
- M. Pandit, J. Aerts, D. Barbosa, M. Forlin, P. Deruytere, E. Georgitzikis, T. Kinoshita, V. Rochus, X. Rottenberg, and E. Hijzen, "Developing a phased pmut array patch for cardiac health monitoring," in *2024 IEEE Ultrasonics, Ferroelectrics, and Frequency Control Joint Symposium (UFFC-JS)*, IEEE, Sep. 2024, pp. 1–4
- M. Pandit, G. Sobreviela, C. Pili, P. Steinmann, D. Young, C. Zhao, C. Baker, and A. Seshia, "A 10 nano-g/rt-hz resonant mems accelerometer employing anti-aliasing control," *INERTIAL 2021 - 8th IEEE International Symposium on Inertial Sensors and Systems, Proceedings*, Mar. 2021
- M. Pandit, C. Zhao, G. Sobreviela, X. Zou, and A. A. Seshia, "Seismic recording using a mode localized mems accelerometer," *2019 20th International Conference on Solid-State Sensors, Actuators and Microsystems and Eurosensors XXXIII, TRANSDUCERS 2019 and EUROSENSORS XXXIII*, Jun. 2019
- M. Pandit, A. Mustafazade, C. Zhao, G. Sobreviela, X. Zou, P. Steinmann, and A. Seshia, "An ultra-high resolution resonant mems accelerometer," *Proceedings of the IEEE International Conference on Micro Electro Mechanical Systems (MEMS)*, Jan. 2019
- M. Pandit, C. Zhao, G. Sobreviela, and A. A. Seshia, "Immunity to temperature fluctuations in weakly coupled mems resonators," *Proceedings of IEEE Sensors*, Dec. 2018
- M. Pandit, C. Zhao, G. Sobreviela, A. Mustafazade, and A. A. Seshia, "Coupled nonlinear mems resonators for sensing," *IFCS 2018 - IEEE International Frequency Control Symposium*, Dec. 2018
- M. Pandit, C. Zhao, G. Sobreviela, A. Mustafazade, X. Zou, and A. A. Seshia, "A mode-localized mems accelerometer with 7$\mu$g bias stability," *Proceedings of the IEEE International Conference on Micro Electro Mechanical Systems (MEMS)*, Apr. 2018
- M. Pandit, C. Zhao, G. Sobreviela, A. Mustafazade, and A. A. Seshia, "Reduction of amplitude ratio dependence on drive level in mode localized resonant mems sensors," *Proceedings of IEEE Sensors*, Dec. 2017
- M. Pandit, C. Zhao, A. Mustafazade, G. Sobreviela, and A. A. Seshia, "Nonlinear cancellation in weakly coupled mems resonators," *2017 Joint Conference of the European Frequency and Time Forum and IEEE International Frequency Control Symposium, EFTF/IFC 2017 - Proceedings*, Oct. 2017
- M. Pandit, C. Zhao, G. Sobreviela, A. Mustafazade, and A. A. Seshia, "Closed-loop tracking of amplitude and frequency in a mode-localized resonant mems sensor," *2017 Joint Conference of the European Frequency and Time Forum and IEEE International Frequency Control Symposium, EFTF/IFC 2017 - Proceedings*, Oct. 2017

*Full list of publications can be found on my website milindpandit.com*

## TEACHING AND SUPERVISION EXPERIENCE

**Engineering Lecturer 'MEMS Sensors and Actuators'** 2019
Bucsmore summer school, Fitzwilliam College, University of Cambridge

Lectured on the fundamentals of MEMS sensors and actuators to fifty undergraduate students.

**Laboratory Teaching Assistant 'Experimental Engineering: Spectrum Analysis'** 2017
Engineering Department, University of Cambridge

Oversaw the laboratory experiment of spectrum analysis of ten first year undergraduate students for two academic terms.

**Laboratory Teaching Assistant 'Technical Design Course for Engineers'** 2016
Engineering Department, University of Cambridge

Supervised a group of eight first year undergraduate students on mechanical design for one academic term.

**Postgraduate Supervision and Mentoring** 2025 - Present
Alex Ciocau (Master's Thesis student, KU Leuven and IMEC)
Maarten Luypaert (Master's Thesis student, KU Leuven and IMEC)

## INTERNATIONAL CONFERENCES

**European Symposium on Focused Ultrasound Therapy** 2026
Attendee and co-author of an oral presentation

**IEEE MEMS** 2018, 2019, 2023, 2026
Poster Presentations

**International Ultrasound Symposium** 2024
Oral Presentation

**Micro and Nano Engineering EUROSENSORS** 2022
Attendee

**IEEE Inertial** 2021
Lecture Presentation

**International Conference on Solid-State Sensors, Actuators and Microsystems (TRANSDUCERS)** 2019
Poster Presentation

**IEEE Sensors** 2017, 2018
Oral Presentations

**IEEE International Frequency Control Symposium (IFCS)** 2017, 2018
Poster and oral Presentation, Finalist Best Poster award 2017

## SERVICE

**Journal reviewer** 2018 - Present
Nature COMMS, TUFFC, JMEMS, IEEE Sensors Journal

**Conference reviewer** 2018
IEEE Sensors

**Nanoscience Centre Seminar - Convener** 2017 - 2018
Cavendish Laboratories, University of Cambridge

**Division C conference - Organizer** 2016
Department of Engineering, University of Cambridge

**College student union representative** 2016 - 2018
Hughes Hall, University of Cambridge

## TECHNICAL AND LANGUAGE SKILLS

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| **Hardware and characterization** | Precision acoustics UMS system, Verasonics, RF Analyzer, BOSE ElectroForce system, Spin coater, Wedge bonder, Polytec LDV, Zurich Instruments MFLI. |
| **Simulation and programming** | MATLAB and Simulink, Python, COMSOL, Lumerical mode, Altium, SPICE, Labview, K-wave, K-layout, Tanner tools, Arduino, C++, Autodesk suite. |
| **Work management** | Wrike, Atlassian Suite (Jira and Confluence), Clarity (Project management). |
| **Languages** | English (First language), Kannada (Fluent), Hindi (Fluent), Dutch (A2 level). |