

Dr. Nabeel P M

Nabeel was born at Malappuram, Kerala in India, in 1991. He received his B.Tech. in Electrical & Electronics Engineering from Government Engineering College Barton-Hill, University of Kerala, India, in 2012. He received his M.S. and Ph.D. in Biomedical Instrumentation from the Indian Institute of Technology (IIT) Madras, Tamil Nadu, India, in 2019.

His doctoral research involved investigating biophysical models that characterize the arterial structural and functional properties, further developing indigenous technologies for the cuffless and calibration-free measurement of the central arterial blood pressure. These scientific endeavors are of global significance as it was developed in response to a grand challenge initiated by NIH-USA & DST-India, in 2014. As a recognition of his scholarly work and the mastery displayed by his scientific insight, he was awarded IIT Madras' 2018-19 Institute Research Award.

Currently, he is the Lead Research Scientist in the cardiovascular division of the Healthcare Technology Innovation Centre (HTIC) at IITM Research Park – a Research & Development Centre of IIT Madras. He focuses on cardiovascular research, and dealing with developing mathematical models, optimum sensors, instrumentation, and signal processing techniques for biomedical applications, simulation of the physiological systems, and performing experimental studies & clinical trials on humans and animal models. His research interests include vascular ageing, central blood pressure & hemodynamics, local assessment of vascular material properties & biomechanics, vascular toxicity, and gestational hemodynamics. His scientific contributions are reflected in the scope and quality of over 75 peer-reviewed publications, and two issued patents besides the 28 pending patents.



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Academics

| Degree | Institution | % / CGPA | Year of Graduation |
|---|---|----------|--------------------|
| M.S. & Ph.D. (Dual Degree) Biomedical Instrumentation | Indian Institute of Technology Madras, Chennai, Tamil Nadu | 8.6 | 2019 |
| B.Tech. Electrical & Electronics Engg. | Govt. Engineering College, Barton Hill, Trivandrum, Kerala | 8.0 | 2012 |
| Higher Secondary | St. Mary's Higher Secondary School, Pariyapuram, Kerala | 94% | 2008 |
| High School | Thangal Secondary School, Vadakkangara, Kerala | 92% | 2006 |

Professional Experience

- **Lead Research Scientist** at Healthcare Technology Innovation Centre – IIT Madras: Sep. 2021 – Present
- **National Director for Technology** at World Youth Heart Federation: Dec. 2020 – Present
- **Editorial Board Member** at Frontiers in Medical Technology Journal: Nov. 2019 – Present
- **Research Scientist** at Healthcare Technology Innovation Centre – IIT Madras: Aug. 2019 – Aug. 2021
- **Researcher** at Healthcare Technology Innovation Centre – IIT Madras: Feb. 2019 – Jul. 2019

Scientific Publications

Journal Articles

- K. V Raj, **P. M. Nabeel**, D. Chandran, M. Sivaprakasam, and J. Joseph, "High-frame-rate A-mode ultrasound for calibration-free cuffless carotid pressure: feasibility study using lower body negative pressure intervention," *Blood Pressure*, pp. 1–12, Jan. 2022.
- P. M. Nabeel**, D. S. Chandran, P. Kaur, S. Thanikachalam, M. Sivaprakasam, and J. Joseph, "Association of incremental pulse wave velocity with cardiometabolic risk factors," *Scientific Reports*, vol. 11, no. 1, p. 15413, 2021.
- R. Arathy, **P. M. Nabeel**, V. V. Abhidev, M. Sivaprakasam, and J. Joseph, "An Accelerometric Sensor System with Integrated Hydrostatic Pressure Correction to Assess Carotid Arterial Stiffness," *IEEE Sensors Journal*, vol. 21, no. 9, pp. 11163–11175, 2021,
- J. Joseph, **P. M. Nabeel**, R. Sudha Ramachandra, V. Ramachandran, M. I. Shah, and K. Prabhdeep, "Assessment of carotid arterial stiffness in community settings with ARTSENS®", *IEEE Journal of Translational Engineering in Health and Medicine*, vol. 9, pp. 1–11, 2021
- P. M. Nabeel**, V. Raj Kiran, J. Joseph, V. V. Abhidev, and M. Sivaprakasam, "Local pulse wave velocity: theory, methods, advancements, and clinical applications", *IEEE Reviews in Biomedical Engineering*, vol. 13, pp. 74–112, 2020.
- V. Raj Kiran, J. Joseph, **P. M. Nabeel**, and M. Sivaprakasam, "Automated measurement of compression-decompression in arterial diameter and wall thickness by image-free ultrasound: validation against CAROLAB and Carotid Studio," *Computer Methods and Programs in Biomedicine*, vol. 23, no. 194, p. 105557, 2020.
- J. Joseph, V. Raj Kiran, **P. M. Nabeel**, M. I. Shah, A. Bhasker, C. Ganesh, S. Seshadri, and M. Sivaprakasam, "ARTSENS® Pen – portable easy-to-use device for carotid stiffness measurement: technology validation and clinical-utility assessment," *Biomedical Physics and Engineering Express*, vol. 6, pp. 1–12, 2020.
- R. Arathy, **P. M. Nabeel**, J. Joseph, and M. Sivaprakasam, "Accelerometric patch probe for cuffless blood pressure evaluation from carotid local pulse wave velocity: design, development, and in-vivo experimental study," *Biomedical Physics and Engineering Express*, vol. 5, no. 4, pp. 045010, 2019.
- P. M. Nabeel**, J. Joseph, S. Karthik, M. Sivaprakasam, and M. Chenniappan, "Bi-modal arterial compliance probe for calibration-free cuffless blood pressure estimation," *IEEE Transactions on Biomedical Engineering*, vol. 65, no. 11, pp. 2392–2404, 2018. (Invited Article)
- P. M. Nabeel**, S. Karthik, J. Joseph, and M. Sivaprakasam, "Arterial blood pressure estimation from local pulse wave velocity using dual-element photoplethysmograph probe," *IEEE Transactions on Instrumentation and Measurement*, vol. 67, no. 6, pp. 1399–1408, 2018.
- J. Joseph, **P. M. Nabeel**, M. I. Shah, and M. Sivaprakasam, "Arterial compliance probe for cuffless evaluation of carotid pulse pressure," *PLoS ONE*, vol. 13, no. 8, p. e0202480, 2018.
- P. M. Nabeel**, J. Joseph, and M. Sivaprakasam, "Single-source PPG-based local pulse wave velocity measurement: A potential cuffless blood pressure estimation technique," *Physiological Measurements*, vol. 38, no. 12, pp. 2122–2140, 2017.
- P. M. Nabeel**, J. Joseph, and M. Sivaprakasam, "A magnetic plethysmograph probe for local pulse wave velocity measurement," *IEEE Transactions on Biomedical Circuits and Systems*, vol. 11, no. 5, pp. 1065–1076, 2017.

Abstracts Published in Journals:

- K. V Raj, **P. M. Nabeel**, and J. Joseph, "Dynamic time warping for measuring incremental pulse wave velocity: Demonstration on a porcine model," *Artery Research*, 2021 (in press).
- R. Manoj, K. V Raj, **P. M. Nabeel**, and J. Joseph, "Comparison of quantitative reflection indices of forward-backward pulse wave decomposition techniques: A virtual subject study," *Artery Research*, 2021 (in press).
- R. Manoj, K. V Raj, **P. M. Nabeel**, and J. Joseph, "Evaluation of arterial pulse reflection parameters using multi-gaussian decomposition model: association with stiffness markers," *Artery Research*, 2021 (in press).
- R. Arathy, K. V Raj, **P. M. Nabeel**, and J. Joseph, "Comparison of artery wall motion-based vascular index with conventional carotid stiffness markers for detection of vascular ageing," *Artery Research*, 2021 (in press).
- S. Sen, K. V Raj, **P. M. Nabeel**, D. Chandran, J. Joseph, and K. K. Deepak, "Evaluation of image-free wall tracking based measurement of low flow mediated arterial constriction in comparison to B mode imaging," *Artery Research*, 2021 (in press).
- R. Manoj, **P. M. Nabeel**, K. V Raj, J. Joseph, and M. Sivaprakasam, "Direct measurement of stiffness index β of superficial arteries without blood pressure estimation," *Artery Research*, vol. 26, no. Supplement 1, pp. S18–S18, 2020.
- R. Arathy, **P. M. Nabeel**, J. Jayaraj, V. V Abhidev, and S. Mohanasankar, "Ambulatory measurement of carotid stiffness with a novel accelerometric system," *Artery Research*, vol. 26, no. Supplement 1, pp. S62–S62, 2020.
- K. V Raj, **P. M. Nabeel**, J. Joseph, D. Chandran, and M. Sivaprakasam, "Measurement of pressure-dependent intra-beat changes in carotid pulse wave velocity using image-free fast ultrasound," *Artery Research*, vol. 26, no. Supplement 1, pp. S63–S63, 2020.
- D. Chandran, J. Joseph, S. Sen, K. Raj, **P. M. Nabeel**, and K. K. Deepak, "Feasibility evaluation of imaging-free ultrasound technology to measure diameters of brachial and radial arteries for assessment of endothelial function," *Artery Research*, vol. 26, no. Supplement 1, pp. S70–S70, 2020.

Conference Publications

- P. M. Nabeel**, V. Raj Kiran, M. Rahul, V.V. Abhidev, M. Sivaprakasam, and J. Joseph "High-framerate A-mode ultrasound for vascular structural assessments: In-vivo validation in a porcine model," in *43rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 2021, pp. 5602-5605.
- V. Raj Kiran, **P. M. Nabeel**, R. Manoj, M. I. Shah, M. Sivaprakasam, and J. Joseph "Phantom assessment of an image-free ultrasound technology for online local pulse wave velocity measurement," in *43rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 2021, pp. 5610-5613.
- V. Raj Kiran, **P. M. Nabeel**, M. I. Shah, M. Sivaprakasam, and J. Joseph "Gaussian-mixture modelling of a-mode radiofrequency scans for the measurement of arterial wall thickness," in *43rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 2021, pp. 5598-5601.
- R. Arathy, **P. M. Nabeel**, K. V Raj, V. V Abhidev, S. Mohanasankar, and J. Jayaraj, "Evaluation of vascular pulse contour indices over the physiological blood pressure ranges in an anesthetized porcine model," in *43rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 2021, pp. 5594-5597.
- R. Manoj, K. V Raj, **P. M. Nabeel**, M. Sivaprakasam, and J. Joseph, "Evaluation of nonlinear wave separation method to assess reflection transit time: a virtual patient study," in *43rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 2021, pp. 5551-5554.

- R. Manoj, K. V Raj, **P. M. Nabeel**, M. Sivaprakasam, and J. Joseph, "Separation of forward-backward waves in the arterial system using multi-gaussian approach from single pulse waveform," in *43rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 2021, pp. 5547-5550.
- P. M. Nabeel**, V. Raj Kiran, M. I. Shah, V.V. Abhidev, M. Rahul, M. Sivaprakasam, and J. Joseph "An Image-Free Ultrasound Device for Simultaneous Measurement of Local and Regional Arterial Stiffness Indices," in *IEEE International Symposium on Medical Measurements and Applications (MeMeA)*, 2021, pp. 1-6.
- V. Raj Kiran, **P. M. Nabeel**, M. Sivaprakasam, and J. Joseph "Phantom Evaluation of a Time Warping Based Automated Arterial Wall Recognition and Tracking Method," in *IEEE International Symposium on Medical Measurements and Applications (MeMeA)*, 2021, pp. 1-6.
- M. Rahul, V. Raj Kiran, **P. M. Nabeel**, M. Sivaprakasam, and J. Joseph "Multi-Gaussian Model for Estimating Stiffness Surrogate using Arterial Diameter Waveform," in *IEEE International Symposium on Medical Measurements and Applications (MeMeA)*, 2021, pp. 1-6.
- P. M. Nabeel**, V. Raj Kiran, J. Joseph, and M. Sivaprakasam, "Evaluation of Central Arterial Blood Pressure on Urban, Rural, and Semi-Urban Population in India Using ARTSENS," in *Institute of Electrical Engineering of Japan Smart City Conference*, 2021, pp. 45-50, Art no. CMN21026.
- P. M. Nabeel**, M. Rahul, V V. Abhidev, J. Joseph, V. Raj Kiran, and M. Sivaprakasam, "High-throughput vascular screening by ARTSENS Pen during a medical camp for early-stage detection of chronic kidney disease," in *42th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Montreal, Canada*, 2020, pp. 2752-2755.
- M. Rahul, **P. M. Nabeel**, V V. Abhidev, V. Raj Kiran, J. Joseph, and M. Sivaprakasam, "Demonstration of pressure-dependent inter and intra-cycle variations in local pulse wave velocity using excised bovine carotid artery," in *42th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Montreal, Canada*, 2020, pp. 2707-2710.
- P. Ramakrishna, **P. M. Nabeel**, V. Raj Kiran, J. Joseph, and M. Sivaprakasam, "Cuffless blood pressure estimation using features extracted from carotid dual-diameter waveforms," in *42th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Montreal, Canada*, 2020, pp. 2719-2722.
- R. Arathy, **P. M. Nabeel**, J. Joseph, and M. Sivaprakasam, "Repeatability study of local vascular stiffness measurement using carotid surface acceleration plethysmogram," in *42th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Montreal, Canada*, 2020, pp. 2699-2702.
- M. Rahul, V. Raj Kiran, **P. M. Nabeel**, J. Joseph, and M. Sivaprakasam, "A bi-modal probe integrated with A-mode ultrasound and force sensor for single-site assessment of arterial pressure-diameter loop," in *IEEE International Symposium on Medical Measurements and Applications (MeMeA)*, Bari, Italy, 2020, pp. 1-6.
- V. Raj Kiran, J. Joseph, **P. M. Nabeel**, and M. Sivaprakasam, "A dynamic time warping method for improved arterial wall-tracking using A-mode ultrasound frames: a proof-of-concept," in *IEEE International Symposium on Medical Measurements and Applications (MeMeA)*, Bari, Italy, 2020, pp. 1-6.
- J. Joseph, H. Vijayakumar, **P. M. Nabeel**, T. Muralidharan, S. Thanikachalam, and M. Sivaprakasam, "Carotid stiffness variations in the presence of established risk factors: observations from a clinical study using ARTSENS," in *IEEE International Symposium on Medical Measurements and Applications (MeMeA)*, Bari, Italy, 2020, pp. 1-6.

- U. P. Poojitha, K. Ram, **P. M. Nabeel**, V. Raj Kiran, J. Joseph, and M. Sivaprakasam, "Blood pressure estimation using arterial diameter: exploring different machine learning methods," in *IEEE International Symposium on Medical Measurements and Applications (MeMeA), Bari, Italy, 2020*, pp. 1–6.
- R. Arathy, **P. M. Nabeel**, J. Joseph, V. V. Abhidev, and M. Sivaprakasam, "Feasibility study of arterial stiffness monitoring based on reflected wave transit time using carotid acceleration plethysmogram," in *IEEE International Symposium on Medical Measurements and Applications (MeMeA), Bari, Italy, 2020*, pp. 1–6.
- P. M. Nabeel**, V. Raj Kiran, J. Joseph, and M. Sivaprakasam, "Determination of incremental local pulse wave velocity using arterial diameter waveform: mathematical modeling and practical implementation," in *IEEE International Conference in Computing in Cardiology, Singapore, 2019*, vol. 45, pp. 1–4.
- V. Raj Kiran, **P. M. Nabeel**, J. Joseph, and M. Sivaprakasam, "Incorporating arterial viscoelastic modelling for the assessment of changes in pulse wave velocity within a cardiac cycle using Bramwell-Hill equation," in *IEEE International Conference in Computing in Cardiology, Singapore, 2019*, vol. 45, pp. 1–4.
- R. Arathy, **P. M. Nabeel**, J. Joseph, V. V. Abhidev, and M. Sivaprakasam, "Evaluation of arterial diameter by mathematical transformation of APG for ambulatory stiffness evaluation," in *IEEE International Conference in Computing in Cardiology, Singapore, 2019*, vol. 45, pp. 1–4.
- P. M. Nabeel**, C. Vinay, V. Raj Kiran, J. Joseph, and M. Sivaprakasam, "Deep learning for blood pressure estimation: an approach using local measure of arterial dual diameter waveforms," in *IEEE International Symposium on Medical Measurements and Applications (MeMeA), Istanbul, Turkey, 2019*, pp. 1-6.
- V. Raj Kiran, **P. M. Nabeel**, J. Joseph, and M. Sivaprakasam, "Methodological and measurement concerns of local pulse wave velocity assessment," in *IEEE International Symposium on Medical Measurements and Applications (MeMeA), Istanbul, Turkey, 2019*, pp. 1-6.
- M. Rahul, **P. M. Nabeel**, V. Raj Kiran, J. Joseph, and M. Sivaprakasam, "Cuffless evaluation of arterial pressure waveform using flexible force sensor: a proof of principle," in *IEEE International Symposium on Medical Measurements and Applications (MeMeA), Istanbul, Turkey, 2019*, pp. 1-6.
- V. Raj Kiran, V. V. Abhidev, **P. M. Nabeel**, J. Joseph, M. Sivaprakasam, and M. I. Shah, "Arterial stiffness in elastic and muscular arteries: measurement using ARTSENS pen," in *IEEE International Symposium on Medical Measurements and Applications (MeMeA), Istanbul, Turkey, 2019*, pp. 1-6.
- V. Raj Kiran, J. Joseph, **P. M. Nabeel**, F. Hanna, M. Sivaprakasam, and M. I. Shah, "Analytic phase based approach for arterial diameter evaluation using A-mode ultrasound frames," in *IEEE International Symposium on Medical Measurements and Applications (MeMeA), Istanbul, Turkey, 2019*, pp. 1-6.
- P. Ramakrishna, **P. M. Nabeel**, and M. Sivaprakasam, "Novel geometric representation for one-dimensional model of arterial blood pulse wave propagation," in *41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Berlin, Germany, 2019*, pp. 506-509.
- V. Raj Kiran, **P. M. Nabeel**, J. Joseph, F. Hanna, M. Sivaprakasam, "Multimodal image-free ultrasound technique for evaluation of arterial viscoelastic properties: a feasibility study," in *41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Berlin, Germany, 2019*, pp. 5034-5037.
- R. Arathy, **P. M. Nabeel**, J. Joseph, V. V. Abhidev, and M. Sivaprakasam, "Continuous assessment of carotid diameter using an accelerometer patch probe for ambulatory arterial stiffness monitoring," in *41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Berlin, Germany, 2019*, pp. 5038-5041.

- J. Joseph, V. Raj Kiran, **P. M. Nabeel**, and M. Sivaprakasam, "Image-free ultrasound technique for calibration-free cuffless blood pressure measurement," in *41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Berlin, Germany*, 2019, p.1.
- P. M. Nabeel**, R. K. V, J. Joseph, and M. Sivaprakasam, "Local evaluation of variation in pulse wave velocity over the cardiac cycle using single - element ultrasound transducer," in *40th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, 2018, pp. 4560–4563.
- P. M. Nabeel**, S. Venkatramanan, J. Joseph, and M. Sivaprakasam, "Hemodynamic interventions for inducing blood pressure variation in laboratory settings," in *13th Russian-German Conference on Biomedical Engineering (RGC)*, 2018, pp. 104–107.
- P. M. Nabeel**, J. Joseph, and M. Sivaprakasam, "Variation in local pulse wave velocity over the cardiac cycle: in-vivo validation using dual-MPG arterial compliance probe," in *13th Russian-German Conference on Biomedical Engineering (RGC)*, 2018, pp. 100–103.
- P. M. Nabeel**, V. Raj Kiran, J. Joseph, and M. Sivaprakasam, "Noninvasive Assessment of Local Pulse Wave Velocity as Function of Arterial Pressure," in *IEEE International Symposium on Medical Measurements and Applications (MeMeA), Rome, Italy*, 2018, pp. 1–6.
- P. M. Nabeel**, V. Raj Kiran, J. Joseph, and M. Sivaprakasam, "Local pulse wave velocity and cuffless blood pressure assessment using ARTSENS," in *40th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Seogwipo*, 2018, p. 1.
- V. Raj Kiran, **P. M. Nabeel**, J. Joseph, S. Venkatramanan, M. I. Shah, and M. Sivaprakasam, "An in-vivo study on intra-day variations in vascular stiffness using ARTSENS Pen," in *40th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, 2018, pp. 4575–4578.
- R. Arathy, **P. M. Nabeel**, J. Joseph, and M. Sivaprakasam, "Carotid local pulse wave velocity measurement using dual element accelerometric patch probe," in *40th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, 2018, pp. 4571–4574.
- V. Raj Kiran, **P. M. Nabeel**, J. Joseph, M. I. Shah, and M. Sivaprakasam, "Measurement of arterial Young's elastic modulus using ARTSENS Pen," in *IEEE International Symposium on Medical Measurements and Applications (MeMeA), Rome, Italy*, 2018, pp. 1–6.
- V. Raj Kiran, **P. M. Nabeel**, J. Joseph, and M. Sivaprakasam, "Evaluation of Local Pulse Wave Velocity using an Image Free Ultrasound Technique," in *IEEE International Symposium on Medical Measurements and Applications (MeMeA), Rome, Italy*, 2018, pp. 1–6.
- R. Arathy, **P. M. Nabeel**, J. Joseph, and M. Sivaprakasam, "Vascular Wall Stiffness Indices Detection Using an Accelerometer-Based System," in *IEEE International Symposium on Medical Measurements and Applications (MeMeA), Rome, Italy*, 2018, pp. 1–6.
- V. Raj Kiran, **P. M. Nabeel**, J. Joseph, and M. Sivaprakasam, "Noninvasive assessment of arterial incremental elastic modulus variations within a cardiac cycle," in *13th Russian-German Conference on Biomedical Engineering (RGC)*, 2018, pp. 108–111.
- J. Joseph, **P. M. Nabeel**, M. I. Shah, K. V. Raj and M. Sivaprakasam, "Live demonstration of ARTSENS® Pen-an image-free ultrasound device for automated evaluation of vascular stiffness," *IEEE Sensors*, New Delhi, India, 2018, pp. 1-1.

- P. M. Nabeel**, S. Karthik, J. Joseph, M. Chenniappan, and M. Sivaprakasam, “Cuffless blood pressure measurement using ultrasound and dual photoplethysmograph transducer,” in *39th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Seogwipo*, 2017, p. 1.
- P. M. Nabeel**, S. Karthik, J. Joseph, and M. Sivaprakasam, “Experimental validation of dual PPG local pulse wave velocity probe,” in *IEEE International Symposium on Medical Measurements and Applications (MeMeA), Rochester, MN*, 2017, pp. 408–413.
- P. M. Nabeel**, S. Karthik, J. Joseph, and M. Sivaprakasam, “Measurement of carotid blood pressure and local pulse wave velocity changes during cuff induced hyperemia,” in *39th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Seogwipo*, 2017, pp. 1700–1703.
- V. Raj Kiran, **P. M. Nabeel**, J. Joseph, and M. Sivaprakasam, “Brachial artery stiffness estimation using ARTSENS,” in *39th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Seogwipo*, 2017, pp. 262–265.
- R. Arathy, **P. M. Nabeel**, J. Joseph, M. Sivaprakasam, and V. Awasthi, “An accelerometer probe for local pulse wave velocity measurement,” in *IEEE International Symposium on Medical Measurements and Applications (MeMeA), Rochester, MN*, 2017, pp. 1–6.
- P. M. Nabeel**, J. Joseph, V. Awasthi, and M. Sivaprakasam, “Single source photoplethysmograph transducer for local pulse wave velocity measurement,” in *38th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Orlando, FL*, 2016, pp. 4256–4259.
- J. Joseph, **P. M. Nabeel**, and M. Sivaprakasam, “Cuffless evaluation of pulse pressure with arterial compliance probe,” in *38th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Orlando, FL*, 2016, p. 1.
- J. Joseph, **P. M. Nabeel**, M. I. Shah, and M. Sivaprakasam, “Arterial compliance probe for calibration free pulse pressure measurement,” in *IEEE International Symposium on Medical Measurements and Applications (MeMeA), Benevento*, 2016, pp. 1–6.
- P. M. Nabeel**, J. Joseph, and M. Sivaprakasam, “Arterial compliance probe for local blood pulse wave velocity measurement,” in *37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Milan*, 2015, pp. 5712–5715.
- J. Joseph, **P. M. Nabeel**, and M. Sivaprakasam, “A calibration free method for cuff less evaluation of pulse pressure,” in *37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Milan*, 2015, p. 1.
- P. M. Nabeel**, J. Joseph, and M. Sivaprakasam, “Magnetic plethysmograph transducers for local blood pulse wave velocity measurement,” in *36th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Chicago, IL*, 2014, pp. 1953–1956.

Patents

Patents Issued

- J. Joseph, M. Sivaprakasam, and **P. M. Nabeel**, “System for cuff-less blood pressure (BP) measurement of a subject,” European Patent EP3157416B1, Jul. 15, 2020.
- J. Joseph, M. Sivaprakasam, and **P. M. Nabeel**, “Method and system for cuff-less blood pressure (BP) measurement of a subject,” United States Patent US10709424B2, Jul. 14, 2020.

Patents Pending

- J. Joseph, C. Dinu, **P. M. Nabeel**, V. Raj Kiran, and M. Sivaprakasam, "Augmented multimodal flow mediated dilatation," PCT/IN2021/050880, Sep. 17, 2021.
- J. Joseph, V. Raj Kiran, **P. M. Nabeel**, and M. Sivaprakasam, "Methods for identifying the boundaries of a blood vessel," PCT/IN2021/050411, May. 11, 2021.
- J. Joseph, V. Raj Kiran, **P. M. Nabeel**, and M. Sivaprakasam, "Method for tracing the motion of blood vessel boundaries," PCT/IN2021/050412, May. 11, 2021.
- J. Joseph, **P. M. Nabeel**, M. I. Shah, V. Raj Kiran, and M. Sivaprakasam, "Image-free ultrasound for noninvasive assessment of early vascular health markers," United States Patent 17/175707, Feb. 15, 2021.
- J. Joseph, **P. M. Nabeel**, M. I. Shah, V. Raj Kiran, and M. Sivaprakasam, "Image-free ultrasound for noninvasive assessment of early vascular health markers," European Patent 20217975.0, Dec. 30, 2020.
- J. Joseph, **P. M. Nabeel**, M. I. Shah, V. Raj Kiran, and M. Sivaprakasam, "Image-free ultrasound for noninvasive assessment of early vascular health markers," Australian Patent 2020294344, Dec. 30, 2020.
- J. Joseph, C. Dinu, **P. M. Nabeel**, V. Raj Kiran, and M. Sivaprakasam, "Augmented multimodal flow mediated dilatation," Indian Patent 202041042567, Sep. 30, 2020.
- P. M. Nabeel**, J. Joseph, M. Rahul, V. Raj Kiran, and M. Sivaprakasam, "A system for noninvasive calibration-free blood pressure (BP) measurement," Indian Patent 202041033513, Aug. 05, 2020.
- P. M. Nabeel**, J. Joseph, M. Sivaprakasam, and V. Raj Kiran, "Multi-modal ultrasound probe for calibration-free cuff-less evaluation of blood pressure," European Patent 19816111.9A, Jul. 10, 2020.
- P. M. Nabeel**, J. Joseph, M. Sivaprakasam, and V. Raj Kiran, "Multi-modal ultrasound probe for calibration-free cuff-less evaluation of blood pressure," European Patent 19815655.6A, Jul. 10, 2020.
- P. M. Nabeel**, J. Joseph, M. Sivaprakasam, and V. Raj Kiran, "Multi-modal ultrasound probe for calibration-free cuff-less evaluation of blood pressure," European Patent 19815901.4A, Jul. 10, 2020.
- P. M. Nabeel**, J. Joseph, M. Sivaprakasam, and V. Raj Kiran, "Multi-modal ultrasound probe for calibration-free cuff-less evaluation of blood pressure," European Patent 19815325.6A, Jul. 10, 2020.
- P. M. Nabeel**, J. Joseph, M. Sivaprakasam, and V. Raj Kiran, "Multi-modal ultrasound probe for calibration-free cuff-less evaluation of blood pressure," United States Patent 16/765836, May 20, 2020.
- P. M. Nabeel**, J. Joseph, M. Sivaprakasam, and V. Raj Kiran, "Multi-modal ultrasound probe for calibration-free cuff-less evaluation of blood pressure," United States Patent 16/765837, May 20, 2020.
- P. M. Nabeel**, J. Joseph, M. Sivaprakasam, and V. Raj Kiran, "Multi-modal ultrasound probe for calibration-free cuff-less evaluation of blood pressure," United States Patent 16/766289, May 22, 2020.
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Scholastic Achievements

- Best poster award of 2020 ARTERY-20 conference for the paper titled “Measurement of pressure-dependent intra-beat changes in carotid pulse wave velocity using image-free fast ultrasound”.
- Institute Research Award 2018-19 for the best Ph.D. research, Indian Institute of Technology Madras.
- Best paper award of 2018 Russian-German Conference on Biomedical Engineering, Aachen, Germany for the paper titled “Variation in local pulse wave velocity over the cardiac cycle: in-vivo validation using dual-MPG arterial compliance probe”.
- Indo-US Grand Challenge Initiative [Phase II] – Affordable blood pressure technologies for low resource settings, A joint NIH USA and SERB-DST India funding program. Project: Arterial compliance probe for cuff-less blood pressure measurement, Duration: 2016 – 2017.
- Indo-US Grand Challenge Initiative [Phase I] – Affordable blood pressure technologies for low resource settings, A joint NIH USA and SERB-DST India funding program. Project: Arterial compliance probe for cuff-less blood pressure measurement, Duration: 2014 – 2015.
- Indian President’s Rashtrapati Award for the service in Bharath Scout: 2006.
- Kerala Governor’s Rajya Puraskar Award for the service in Bharath Scout: 2005.

Media Coverages

- Featured Article of IEEE Transactions on Biomedical Engineering (2018, Oct. 20). *Bi-modal arterial compliance probe for calibration-free cuffless blood pressure estimation.*

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