

Senate Commerce Committee Nominee Questionnaire, 119th Congress

Instructions for the nominees: The Senate Committee on Commerce, Science, and Transportation (the "Committee") requests that you provide typed answers to each of the following questions. Do not leave any questions blank. Type "None" or "Not Applicable" if a question does not apply to you. Begin each section (*i.e.*, "A", "B", etc.) on a new sheet of paper. Electronically submit your completed questionnaire to the Committee in PDF format and ensure that sections A through E of the completed questionnaire are in a text searchable format and that any hyperlinks are active and can be clicked. Section F may be scanned for electronic submission and need not be searchable.

Incomplete questionnaires may delay the nomination process.

A. BIOGRAPHICAL INFORMATION AND QUALIFICATIONS

1. Name (Include any former names or nicknames used): **Arvind Raman**
2. Position to which nominated: **Undersecretary of Commerce for Standards and Technology and Director of NIST**
3. Date of Nomination: **January 13, 2026**
4. Address (List current place of residence and office addresses):

Residence: [REDACTED]

Office: [REDACTED]

5. Date and Place of Birth: [REDACTED]

6. Provide the name, position, and place of employment for your spouse (if married) or domestic partner, and the names and ages of your children (including stepchildren and children by a previous marriage).

Spouse: First name: Laura, Last name: Cayón Trueba, Academic-Industry Research Coordinator, Purdue- Eli Lilly strategic partnership, Purdue University.

Son: First name: Arun, Middle name: Cayón, Last name: Raman, 20 years old.

7. List all college and graduate schools attended, whether or not you were granted a degree by the institution. Provide the name of the institution, the dates attended, the degree received, and the date of the degree.

University of California at Berkeley, Berkeley, California, Doctor of Philosophy in Mechanical Engineering, 1999

Purdue University, West Lafayette, Indiana, Master of Science in Mechanical Engineering, 1993

Indian Institute of Technology, Delhi, India, Bachelor of Technology in Mechanical Engineering, 1991

8. List all post-undergraduate employment, including the job title, name of employer, and inclusive dates of employment, and highlight all management- level jobs held and any non-managerial jobs that relate to the position for which you are nominated.

Non-managerial positions:

Graduate Research Assistant, Purdue University, 1991-1993

Graduate Research Assistant, University of California, Berkeley, 1994-1999
Visiting Researcher, funded by the DAAD, Technical University Darmstadt, Germany, 1999
Assistant Professor, School of Mechanical Engineering, Purdue University, 2000-2005
Visiting Professor, Universidad Autónoma de Madrid, summer 2005
Associate Professor, School of Mechanical Engineering, Purdue University, 2005-2009
Professor, School of Mechanical Engineering, 2009-present

Managerial positions:

Associate Dean for Global Engineering programs, Purdue University, 2014-2017
Senior Associate Dean of the Faculty, College of Engineering, Purdue University, 2017-2019
Executive Associate Dean, College of Engineering, Purdue University, 2020-2023
John A Edwardson Dean of Engineering, Purdue University, 2023- present

9. Attach a copy of your resume.

CV attached.

10. List any advisory, consultative, honorary, or other part-time service or positions with Federal, State, or local governments, other than those listed above after 18 years of age.
None.

11. List all positions held as an officer, director, trustee, partner, proprietor, agent, representative, or consultant of any corporation, company, firm, partnership, or other business, enterprise, educational, or other institution.
None.

12. List all memberships you have had after 18 years of age or currently hold with any civic, social, charitable, educational, political, professional, fraternal, benevolent or religiously affiliated organization, private club, or other membership organization (You do not have to list your religious affiliation or membership in a religious house of worship or institution). Include dates of membership and any positions you have held with any organization. Please note whether any such club or organization restricts membership on the basis of sex, race, color, religion, national origin, age, or disability.

Member, American Society of Mechanical Engineers

Member, American Association for the Advancement of Science

Member, Tau Beta Pi Honor Society

13. Have you ever been a candidate for and/or held a public office (elected, non-elected, or appointed)? If so, indicate whether any campaign has any outstanding debt, the amount, and whether you are personally liable for that debt.
No.

14. List all memberships and offices held with and services rendered to, whether compensated or not, any political party or election committee within the past ten years. If you have held a paid position or served in a formal or official advisory position (whether compensated or not) in a political campaign within the past ten years, identify the particulars of the campaign, including the candidate, year of the campaign, and your title and responsibilities.

None.

15. Itemize all political contributions to any individual, campaign organization, political party, political action committee, or similar entity of \$200 or more for the past ten years.

None.

16. List all scholarships, fellowships, honorary degrees, honorary society memberships, military medals, and any other special recognition for outstanding service or achievements.

Fellow, American Association for the Advancement of Science (AAAS) (Election results under embargo until March 26)

Fellow, American Society of Mechanical Engineers (ASME)

Keeley Fellow, Wadham College, University of Oxford

Gustus L. Larson Memorial Awardee (ASME)

Eminent Engineer, Tau Beta Pi Honor Society

17. List all books, articles, columns, letters to the editor, Internet blog postings, or other publications you have authored, individually or with others. Include a link to each publication when possible. If a link is not available, provide a digital copy of the publication when available.

Journal Publications:

2025

P Oladipupo, A Raman, JF Pekny, “The Minimum Viable Pilot Plant (MVPP): A Lean Framework for De-Risking Chemical Process Technologies”, *Journal of Advanced Manufacturing and Processing* 7 (4), e70046, 2025.

2024

1. L. P. Cifuentes, A. Athamneh, Y. Efremov, A. Raman, T. Kim, D. M. Suter, “A modified motor-clutch model reveals that neuronal growth cones respond faster to soft substrates”, *Molecular Biology of the Cell* 35 (4), 2024.

2. P Brunese, MK Lee, A Bessenbacher, A Raman, Y Yih, “Maximising the potential of academic–practitioner collaborations in international development”, *Journal of International Development* 36 (2), 867, 2024.

2023

3. A. Deolia, A. Raman, R. B. Wagner, “Low frequency photothermal excitation of AFM microcantilevers”, *Journal of Applied Physics*, 122(31), 214502, 2023.

4. L. Pulido, A. Athamneh, Y. Efremov, A. Raman, T. Kim, D. M. Suter, "A New Computational Model for Mechanosensing and Mechanotransduction of Neuronal Growth Cones", *Molecular Biology of the Cell*, 34(2), 729, 2023.
5. D. Feng, N. Morrison, C. Armstrong, K. Moyers, A. Raman, R. B. Wagner, "Measurement of web tension using ambient vibrations in roll-to-roll manufacturing of flexible and printed electronics", *Flexible and Printed Electronics* 8 (4), 042001, 2023
6. P. Oladipupo, A. Raman, J. F. Pekny, "Minimum production scale for economic feasibility of a titanium dioxide plant", *Journal of Advanced Manufacturing and Processing*, 5 (4), e10167, 2023.
7. P. Oladipupo, A. Raman, J. J. Siirola, J. F. Pekny, "Comparative Analysis of an Expandable Modular Plant and a Stick-Built TiO₂ Plant", *ACS omega* 8 (47), 2023.

2022

8. B. Rajabifar, G. F. Meyers, R. Wagner, A. Raman, "A Machine-Learned Approach to Characterize the Adhesive and Mechanical Properties of Soft Polymers Using Peak Force Tapping AFM", *ACS Macromolecules*, 55(19), 8231, 2022.
9. Y. M. Efremov, Efremov, D. M. Suter, P. S. Timashev, A. Raman, "3D nanomechanical mapping of subcellular and sub-nuclear structures of living cells by multi-harmonic AFM with long-tip microcantilevers", *Scientific Reports*, 12 (1), 1, 2022.

2021

10. D. Kalafut, R. Wagner, M. J. Cadena, A. Bajaj, A. Raman, "Cantilever signature of tip detachment during contact resonance AFM", *Beilstein Journal of Nanotechnology*, 12 (1), 1286, 2021.
11. B. Rajabifar, A. K. Bajaj, R. G. Reifengerger, R. Proksch, A. Raman, "Discrimination of Adhesion and Viscoelasticity from Nanoscale Maps of Polymer Surfaces using Bimodal Atomic Force Microscopy", *Nanoscale*, 13, 17428, 2021.
12. B. Rajabifar, R. B. Wagner, A. Raman, "A fast first-principles approach to model atomic force microscopy on soft, adhesive, and viscoelastic surfaces", *Materials Research Express*, 8, 095304, 2021.
13. D. Feng, R. B. Wagner, A. Raman, "Measuring nonuniform web tension for roll-to-roll manufacturing of flexible and printed electronics", *Flexible and Printed Electronics*, 6(3), 035006, 2021.
14. D. Feng, J. Wang, G. T. C. Chiu, A. Raman, "Vibrations of air-coupled web systems", *Journal of Vibration and Acoustics*, 143 (1), 2021.

2020

15. N. H. Shaik, R. G. Reifengerger, A. Raman, "Nanomechanical mapping in air or vacuum using multi-harmonic signals in tapping mode atomic force microscopy", *Nanotechnology*, 31 (45), 455502, 2020

16. D. Kalafut, A. K. Bajaj, A. Raman, "Tristable capacitive microcantilever switches: Measurements and simulations", *International Journal of Non-linear Mechanics*, 119(103304), 2020.
17. N. H. Shaik, R. Reifengerger, A. Raman, "Nanomechanical mapping in air or vacuum using multi-harmonic signals in tapping mode atomic force microscopy", *Nanotechnology*, 31(45), 2020.
18. Y. Efremov, Y. M. Okajima, A. Raman, "Measuring viscoelasticity of soft biological samples using atomic force microscopy", *Soft Matter*, 16(1), 64, 2020.
- 2019
19. Y. Efremov, M. Velay-Lizancos, C. Weaver , A. Athamneh , P. Zavattieri , D. Suter, A. Raman "Anisotropy vs isotropy in living cell indentation with AFM", *Scientific Reports*, 2019.
20. F. H. Pastrana, A. X. Cartagena, A. Raman, A. Avila, "Evaluation of the Elastic Young's Modulus and Cytotoxicity Variations in Fibroblasts Exposed to Carbon-Based Nanomaterials", *Journal of Nanobiotechnology*, 17(32), 2019.
21. D. Feng, A. Raman, "Thermomechanics of axially moving webs in roll-to-roll manufacturing processes", *International Journal of Heat and Mass Transfer*, 129, 1317, 2019.
- 2018
22. Y. M. Efremov, A. X. Cartagena, A. I. M. Athamneh, D. M. Suter, A. Raman, "Mapping heterogeneity of cellular mechanics by multi-harmonic atomic force microscopy", *Nature Protocols*, 13(10), 2018.
23. B. Rajabifar, J. M. Jadhav, D. Kiracofe, G. F. Meyers, A. Raman, "Dynamic AFM on Viscoelastic Polymer Samples with Surface Forces", *Macromolecules*, 51(23), 9649, 2018.
24. M. J. Cadena, R. G. Reifengerger, A. Raman, "High resolution subsurface imaging using resonance-enhanced detection in 2nd-harmonic KPFM", *Nanotechnology*, 29(40), 405702, 2018.
- 2017
25. D. Kalafut, A. Bajaj, A. Raman, "Multistability of cantilever MEMS/NEMS switches induced by electrostatic and surface forces", *International Journal of Non-Linear Mechanics*, 95(209), 2017.
26. Y. Efremov, W. D. Wang, S. D. Hardy, R. Geahlen, A. Raman, "Measuring nanoscale viscoelastic parameters of cells directly from AFM force-displacement curves", *Scientific Reports (Nature Publishing Group)*, 7(1541), 2017.
27. D. Cruise, J. R. Chagdes, J. L. Liddy, S. Rietdyk, J. M. Haddad, H. N. Zelaznik, and A. Raman, "An active balance board system with real-time control of stiffness and time-delay to assess mechanisms of postural stability", *Journal of Biomechanics*, 60(48), 2017.
28. M. J. Cadena, Y. Chen, R. Reifengerger, A. Raman, "Sub-surface AFM imaging using tip generated stress and electric fields", *Applied Physics Letters*, 110(12), 2017.
29. M. J. Cadena, J. C. Parker, A. Raman, R. Refienberger, "Fabrication and characterization of mesopores in a silica gel matrix", *Materials Research Innovations*, 22(4), 242, 2017.
- 2016

30. N.H. Shaik, R. Reifengerger, A. Raman, "Enhancing the optical lever sensitivity of microcantilevers for dynamic atomic force microscopy via integrated low frequency paddles", *Nanotechnology*, 27(19), 2016.
31. JR Chagdes, S Rietdyk, JM Haddad, HN Zelaznik, ME Cinelli, L. T. Denomme, K. C. Powers, A. Raman,, "Limit cycle oscillations in standing human posture", *Journal of Biomechanics*, 49 (7), 1170, 2016.
32. M. J. Cadena; S. H. Sung, B. W. Boudouris, R. Reifengerger, A. Raman, "Nanoscale Mapping of Dielectric Properties of Nanomaterials from KiloHertz to Megahertz Using Ultrasmall Cantilevers", *ACS Nano*, 10(4), 4062, 2016.
33. R. B. Wagner, R. J. Moon, A. Raman, "Mechanical properties of cellulose nanomaterials studied by contact resonance atomic force microscopy", *Cellulose*, 23(2), 1031, 2016.
34. J. Chagdes, J.E Huber, M. Saletta, M. Darling-White, A. Raman, S. Rietdyk, H. N. Zelaznik, J. M. Haddad, "The relationship between intermittent limit cycles and postural instability associated with Parkinson's disease", *Journal of Sport and Health Science*, 2016.
- 2015
35. A. I.M. Athamneh, A. X. Cartagena-Rivera, A. Raman, D. M. Suter, "Substrate Deformation Predicts Neuronal Growth Cone Advance", *Biophysical Journal*, 109(7), 1358, 2015.
36. Y. Li, Z. Yan, A. Raman, X. Xu, "Three-dimensional mapping of optical near field with scattering SNOM", *Optics Express*, 23(14), 18730, 2015.
37. M. Hernando-Perez, A.X. Cartagena-Rivera, R. Pudgornik, A. Raman, P. J. dePablo, "Quantitative nanoscale electrostatics of viruses, *ACS Nanoscale*, 7(41), 172289, 2015.
38. A. X. Cartagena-Rivera, W-H. Wang, R. L. Geahlen, and A. Raman, "Fast, multi-frequency, and quantitative nanomechanical mapping of live cells using the atomic force microscope", *Scientific Reports (Nature Publishing Group)*, 5, 11692, 2015.
39. X. Xu, J. Mares, L. Groven, S. Son, R. Reifengerger, A. Raman, "Nanoscale Characterization of Mock Explosive Materials using Advanced Atomic Force Microscopy Methods", *Journal of Energetic Materials*, 33(1), 51, 2015.
40. A. Castaneda, A. Avila, R. Reifengerger, A. Raman, "Depth Sensitive Sub-surface Imaging of Polymer Nanocomposites using Second Harmonic Kelvin Probe Force Microscopy", *ACS Nano*, 9(3), 2938, 2015.
41. R. Wagner, J. P. Killgore, R. C. Tung, A. Raman, and D. C. Hurley, "Vibrational shape tracking of atomic force microscopy cantilevers for improved sensitivity and accuracy of nanomechanical measurements", *Nanotechnology*, 26(4), 045701, 2015.
42. M. Krisenko, A. Cartagena, A. Raman, R. Geahlen, Nanomechanical property maps of breast cancer cells by multi-harmonic atomic force microscopy reveal Syk-dependent changes in microtubule stability mediated by MAP1B", *Biochemistry*, 54(1), 60, 2015.
- 2014
43. M. Penedo, A. Raman, S. Hormeño, I. Fernández-Martínez, M. Luna, and F. Briones, Enhanced efficiency in the excitation of higher modes for atomic force

microscopy and mechanical sensors operated in liquids, *Applied Physics Letters*, 105(17), 173102, 2014.

44. S. Palit, X. Xu, A. Raman, M. A. Alam, "Implications of Rough Dielectric Surfaces on Charging-Adjusted Actuation of RF-MEMS", *IEEE Electron Device Letters*, 35(9), 948-950, 2014.

45. N. H. Shaik, R. Reifenger, A. Raman, "Microcantilevers with embedded accelerometers for dynamic Atomic Force Microscopy", *Applied Physics Letters*, 104(8), 083109, 2014.

46. A. Cartagena and A. Raman, "Local viscoelastic properties of live cells investigated using dynamic and quasi-static atomic force microscopy methods", *Biophysical Journal*, 106(5), 1033, 2014.

47. R. C. Tung, A. Fruehling, D. Peroulis, A. Raman, "Multiple Timescales and Modeling of Dynamic Bounce Phenomena in RF MEMS Switches", *IEEE/ASME Journal of Microelectromechanical Systems*, 23(1), 137, 2014.

48. R. B. Wagner, A. Raman, R. Proksch, "Spatial spectrograms of vibrating atomic force microscopy cantilever coupled to sample surfaces", *Applied Physics Letters*, 103(6), 263102, 2014.

2013

49. H. Kim, N. H. Shaik, X. Xu, A. Raman, A. Strachan, "Multiscale contact mechanics model for RF-MEMS switches with quantified uncertainties", *Modelling and Simulation in Materials Science and Engineering*, 21(8), 085002, 2013.

50. A. Fruehling, R. Tung, A. Raman and D. Peroulis, "In-situ monitoring of dynamic bounce phenomena in RF MEMS switches", *Journal of Micromechanics and Microengineering*, 23, 115007, 2013.

51. J. Chagdes, S. Rietdyk, J. Haddad, H. Zelaznik, A. Raman, "Dynamic stability of a human standing on a balance board", *Journal of Biomechanics*, 46(15), 2593, 2013.

52. R. C. Tung, A. Fruehling, A. Raman, "Multiple Timescales and Modeling of Dynamic Bounce Phenomena in RF MEMS Switches", *Journal of Microelectromechanical Systems*, 23(1), 137, 2013.

53. A. Raman and D. Kiracofe, "Nonlinear dynamics of atomic force microscope microcantilevers in liquid environments - a review", *IEICE Nonlinear theory and its applications*, 4(3), 184, 2013.

54. D. Kiracofe, A. Raman, D. Yablon, "Multiple regimes of operation in bimodal AFM: understanding the energy of cantilever eigenmodes", *Beilstein Journal of Nanotechnology*, 4, 385, 2013.

55. A. Cartagena, M. Hernando-Perez, P. J. dePablo, A. Raman, "Mapping in vitro local material properties of intact and disrupted virions at high resolution using multi-harmonic atomic force microscopy", *RSC Nanoscale*, 5, 4729, 2013.

56. R. Tung, A. Kovacs, D. Peroulis, A. Raman, "Simultaneous measurement of residual stress, curvature, and boundary compliance of doubly clamped MEMS beams from their vibration response", *Journal of Micromechanics and Microengineering*, 23 (4), 045009, 2013

57. J. Melcher, D. Martinez-Martin, M. Jaafar, J. Gomez-Herrero, A. Raman, "High resolution dynamic atomic force microscopy in liquids with different feedback architectures", *Beilstein Journal of Nanotechnology*, 4(153), 2013.

58. M. J. Cadena, R. Misiego, K. C. Smith, A. Avila, R. B. Pipes, R. Reifenberger, A. Raman, "Sub-surface imaging of carbon nanotube-polymer composites using dynamic AFM methods", *Nanotechnology*, 24(135706), 2013.
59. H. T. Thompson, F. Barroso-Bujans, J. Gomez-Herrero, R. Reifenberger, A. Raman, "Subsurface imaging of carbon nanotube networks with DC-biased multifrequency atomic force microscopy", *Nanotechnology*, 24 (135701), 2013.
- 2012
60. D. Kiracofe, A. Raman, "Nonlinear dynamics of the atomic force microscope at the liquid-solid interface", *Physical Review B*, 86(20), 205405, 2012.
61. R. B. Wagner, B. Pittendrigh, A. Raman, "Local elasticity and adhesion of nanostructures on *Drosophila melanogaster* wing membranes studied using atomic force microscopy", *Applied Surface Science*, 259, 225, 2012.
62. M. Jaafar, D. Martinez-Martin, M. Cuenca, J. Melcher, A. Raman, J. Gomez-Herrero, "Drive-amplitude-modulation atomic force microscopy: from vacuum to liquids", *Beilstein Journal of Nanotechnology*, 3, 336, 2012.
63. G. Prakash, J. F. Rhoads, A. Raman, R. Reifenberger, "Parametric noise squeezing and resonance of microcantilevers in air and liquid environments", *Review of Scientific Instruments*, 83(6), 065109, 2012.
64. O. D. Peyton, L. Picco, D. Robert, A. Raman, M.E. Homer, A. R. Champneys, and M. J. Miles, "High speed atomic force microscopy in slow motion – understanding cantilever behavior at high scan velocities", *Nanotechnology*, 23, 205704, 2012.
65. X. Xu, M. Koslowski, A. Raman, "Dynamics of surface coupled microcantilevers in force modulation atomic force microscopy- magnetic vs. dither piezo excitation", *Journal of Applied Physics*, 111, 054303, 2012.
66. J. Gomez-Herrero, D. Martinez-Martin, C. Carrasco, M. Hernando-Perez, P. J. de Pablo, R. Perez, M. Garcia-Mateu, J. L. Carrascosa, D. Kiracofe, J. Melcher, A. Raman, "Resolving structure and mechanical properties at the nanoscale of Viruses with frequency modulation atomic force microscopy", *PLoS One*, 7(1), e30204, 2012.
67. D. Kiracofe, J. Melcher, A. Raman, "Gaining insight into the physics of dynamic atomic force microscopy in complex environments using the VEDA simulator", *Review of Scientific Instruments*, 83(1), 013702, 2012.
- 2011
68. M. R. Nellis, L. Yu, W. Zhang, Y. Zhao, C. Tang, A. Raman, S. Mohammadi, J. F. Rhoads, "Sources and implications of resonant mode splitting in Silicon nanowire devices", *Nanotechnology*, 22, 455502, 2011.
69. D. Kiracofe and A. Raman, "Quantitative force and dissipation measurements in liquids using piezo excited atomic force microscopy: a unifying approach", *Nanotechnology*, 22, 485502, 2011. (Chosen as Editor's pick, and online interview and tutorial shown on Nanotechnology website)
70. A. Raman, S. Trigueros, A. Cartagena, A. Stevenson, M. Susilo, E. Nauman, S. Contera, "Mapping the nanomechanical properties of live cells using multi-harmonic atomic force microscopy", *Nature Nanotechnology*, 2011.

71. R. B. Wagner, G. Shaw, J. Pratt, A. Raman, "Uncertainty quantification in nanomechanical measurements using the atomic force microscope", *Nanotechnology*, 22, 455703, 2011.
72. D. Kiracofe, M. Yazdanpanah, A. Raman, "Mass and stiffness calibration of nanowires using thermally driven vibration", *Nanotechnology*, 22, 95504, 2011.
73. O. D. Payton, L. Picco, A. R. Champneys, M. E. Homer, M. Miles, A. Raman, "Experimental observation of contact mode cantilever dynamics with nanosecond resolution", *Review of Scientific Instruments*, 82(4), 043704, 2011.
74. C. Carrasco, A. Luque, M. Hernando Perez, R. Miranda, J.L. Carrascosa, P. A. Serena, M. DeRidder, A. Raman, J. Gomez Herrero, I. A. T. Schaap, D. Reguera, P. J. de Pablo, Built-in mechanical stress in viral shells, *Biophysical Journal*, 100(4), 1100, 2011.
75. D. Kiracofe, K. Kobayashi, A. Labuda, A. Raman, H. Yamada, "High efficiency photothermal excitation of microcantilever vibrations in air and liquids", *Review of Scientific Instruments*, 82, 013702, 2011.
76. R. Tung, J. W. Lee, A. Raman, "Non-monotonic pressure dependence of resonant frequencies of microelectromechanical systems supported on squeeze films", *Journal of Micromechanics and Microengineering*, 21(2), 025003, 2011.
77. M. Postek, A. Vladar, J. Dagata, N. Farkas, B. Ming, R. Wagner, A. Raman, R. J. Moon, R. Sabo, T. H. Wegner, J. Beecher, "Development of imaging and metrology of cellulose nanocrystals", *Measurement Science and Technology*, 22, 024005, 2011.

2010

78. T. M. Huber, B. C. Abell, D. C. Mellema, M. Spletzer, A. Raman, "Mode-selective Noncontact Excitation of Microcantilevers and Microcantilever Arrays in Air Using the Ultrasound Radiation Force", *Applied Physics Letters*, 97(21). 214101, 2010.
79. J-L. Lozano, D. Kiracofe, J. Melcher, R. Garcia, A. Raman, "Calibration of higher-eigenmode spring constants of atomic force microscope cantilevers", *Nanotechnology*, 21(46), 465502, 2010.
80. J-W Lee, A. Mahapatro, D. Peroulis, A. Raman, "Vibration based monitoring and diagnosis of dielectric charging in RF-MEMS switches", *IEEE-ASME Journal of Micro-electromechanical Systems*, 19(6), 1490, 2010.
81. A. Jana, A. Raman, "Hydrodynamic impedance of vibrating disks in fluids: viscous vs. acoustic effects", *ASME Journal of Vibration and Acoustics*, 132(6), 061001, 2010.
82. D. Kiracofe, A. Raman, "Microcantilever dynamics in atomic force microscopy when using higher order eigenmodes in liquid environments", *Journal of Applied Physics*, 108, 034320, 2010.
83. L. Biedermann, R. Tung, A. Raman, R. Reifenberger, M. Yazdanpanah, R. Cohn, "High sensitivity, high bandwidth force and mass sensing using silver gallium nanocantilevers", *Nanotechnology*, 21(30), 305701, 2010.
84. M. Spletzer, R. Reifenberger, A. Raman, "Spatio-temporal dynamics of microcantilevers tapping on samples observed under an atomic force microscope integrated with a scanning laser Doppler vibrometer: applications to proper

- orthogonal decomposition and model reduction”, *Journal of Micromechanics and Microengineering*, 20(8), 085024, 2010.
85. R. Guo, E. C. Kinzel, Y. Li, S. M. Uppuluri, A. Raman, X. F. Xu, “Three-dimensional mapping of optical near field of a nanoscale bowtie antenna”, *Optics Express*, 18(5), 4961, 2010.
 86. R. Tung, T. Wutscher, D. Martinez-Martin, R. Reifenberger, F. Giessibl, A. Raman, “Higher-order eigenmodes of qPlus sensors for high resolution dynamic atomic force microscopy”, *Journal of Applied Physics*, 107(10), 104508, 2010.
 87. X. Zhang, A. Raman, T. Fisher, T. Sands, “Linear Coefficient of Thermal Expansion of Porous Anodic Alumina Thin Films from Atomic Force Microscopy”, *Nanoscale and Microscale Thermophysical Engineering*, 13(4), 243, 2010.
 88. M. C. Strus, A. Raman, “Identification of multiple oscillation states of carbon nanotube tipped cantilevers interacting with surfaces in dynamic atomic force microscopy”, *Physical Review B*, 80(22), 224105, 2010.
 89. X. Xu, J. Melcher, A. Raman, “Accurate force spectroscopy in tapping mode atomic force microscopy in liquids”, *Physical Review B*, 81, 035407, 2010, highlighted as Editor’s pick.
 90. D. Kiracofe, A. Raman, “On eigenmodes, stiffness, and sensitivity of atomic force microscope cantilevers in air versus liquids”, *Journal of Applied Physics*, 10, 7033506, 2010.
 91. R. Lahiji, X. Xu, R. Reifenberger, A. Raman, A. Rudie, R. B. Moon, “Atomic Force Microscopy characterization of cellulose nanocrystals”, *Langmuir*, 26(6), 4480, 2010.
 92. E. C. Kinzel, P. Srisungsitthisunti, A. Raman, X. F. Xu, “Extraordinary transmission from high-gain nanoaperture antennas”, *Applied Physics Letters*, 96, 21116, 2010.
- 2009
93. M. D. Vaughan and A. Raman, “Aeroelastic stability of axially moving webs coupled to incompressible flows”, *ASME Journal of Applied Mechanics*, 77(2), 021001, 2009.
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 96. M. C. Strus, R. R. Lahiji, P. Ares, V. Lopez, A. Raman, R. Reifenberger, “Strain energy and lateral friction force distributions of carbon nanotubes manipulated into shapes by atomic force microscopy”, *Nanotechnology*, 20(38), 385709, 2009.
 97. J. R. Chagdes, S. Rietdyk, J. M. Haddad, H. N. Zelaznik, A. Raman, C. K. Rhea, T. A. Silver, “Multiple timescales in postural dynamics associated with vision and a secondary task are revealed by wavelet analysis”, *Experimental Brain Research*, 197(3), 297-310, 2009.

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99. G. Prakash, S. Hu, R. Reifenger, A. Raman, "Theoretical basis of parametric resonance based atomic force microscopy", *Physical Review B*, 79(9), 094304, 2009.
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Refereed conference publications:

1. Y. Efremov, M. Velay-Lizancos, D. Suter, A. Raman, "Anisotropic Mechanical Properties of Living Cells Revealed by Integrated Spinning Disk Confocal and Atomic Force Microscopy", 62nd Annual Meeting of the Biophysical-Society Location: San Francisco, CA, February 17-21, 2018. Abstract published in *Biophysical Journal*, 114(3): S1, 513A-513A, 2018.

2. J. R. Chagdes, J. J. Liddy, J. E. Huber, H. N. Zelaznik, S. Rietdyk, A. Raman, and J. Haddad, "Dynamic instabilities induced through altered visual cues and their relationship to postural response latencies", ASME International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC/CIE), Charlotte, NC, August 21-24, 2016.

3. D. R. Cruise, J. R. Chagdes, A. Raman, "Dynamics of upright posture on an active balance board with tunable time-delay and stiffness", ASME International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC/CIE), Location: Charlotte, NC, August 21-24, 2016.

4. A. Athamneh, R. Amezcua, A. Raman, Y. Efremov, D. Suter, "Modeling Mechanically-Induced Growth Cone Advance Reveals the Importance of Micrometer-Scale Elastic Adhesion Structures in Rigidity Sensing", 60th Annual Meeting of the Biophysical-Society Location: Los Angeles, CA, Feb 27-March 2, 2016.

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8. D. Kiracofe and A. Raman, "Nonlinear frequency response of atomic force microscope cantilevers at the solid-liquid interface, ASME IDETC/CIE, Chicago, Aug 12-15, 2012, Proceedings of ASME IDETC/CIE, 5, 319-328 2012.
9. A. Cartagena, W-H Wang, R. L. Geahlen, A. Raman, "Quantitative mapping of local mechanical properties of living cells at near-physiological conditions using multi-harmonic atomic force microscopy", ASME Summer Bioengineering Conference (SBC), Fajardo, PR, June 20-23, 2012, Proceedings of the ASME Summer Bioengineering Conference, 523-524, 2012.
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15. M. Strus, L. Zalamea, C. Cano, A. Raman, R. B. Pipes, and C. V. Nguyen, "Interfacial energy between carbon nanotubes and polymers measured from nanoscale peel tests in the atomic force microscope", CNT-NET 2007, Cambridge, UK, 2009.
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44. Raman, A., Davies, P. and Bajaj, A.K., "Analytical Prediction of the Response of Nonlinear Systems to Nonstationary Excitation", 14th ASME Biennial Conference on Mechanical Vibration and Noise, Albuquerque, NM, September 1993.

Books and Book Chapters:

1. **150 Years of Purdue Engineering: Celebrating Our Consequential Impact on the World**, Purdue University Press, by Arvind Raman, Jim Small, 2025.
 2. **Engineering 50 Years from Today : A Purdue Engineering Community Perspective**, Purdue Scholarly Publishing Services, Edited by Arvind Raman, 2026.
 3. **Mechanics of Materials: A Lecturebook**, XanEdu Press, by Chuck Krousgrill, Kejie Zhao, and Arvind Raman, 2022.
 4. **Book chapter: S. Balasubhramaniam, D. Kiracofe, and A. Raman, Understanding surface forces using static and dynamic approach-retraction curves, in Scanning Probe Microscopy for Industrial Applications: Nanomechanical Characterization** by Dalia G. Yablon, Wiley, 2013.
 5. **Book chapter: A. Raman, R. Reifengerger, J. Melcher, R. Tung, Cantilever dynamics and nonlinear effects in atomic force microscopy, in Noncontact Atomic Force Microscopy, pp.pp.61-395, Vol. 2 in the Springer book series Nanoscience and Nanotechnology, Editors: S. Morita, F. J. Giessibl, R. Wiesendanger, 2009.**
 6. **Book chapter: D. Kiracofe, J. Melcher, A. Raman, Fundamentals of AFM cantilever dynamics in liquid environments, in Atomic Force microscopy in Liquid, Wiley VCH, Editors: A. Baró and R. Reifengerger, 2012.**
18. List all speeches, panel discussions, and presentations (e.g., PowerPoint) that you have given on topics relevant to the position for which you have been nominated. Include a link to each publication when possible. If a link is not available, provide a digital copy of the speech or presentation when available.
- I have not made any public speeches, presentations or participated in panel discussions where I have commented on NIST's programs.**
19. List all public statements you have made during the past ten years, including statements in news articles and radio and podcasts and television appearances, which are on topics relevant to the position for which you have been nominated, including dates. Include a link to each statement when possible. If a link is not available, provide a digital copy of the statement when available.
- I have not made any public statements in news articles, radio or podcasts or television appearances about NIST's programs.**
20. List all digital platforms (including social media and other digital content sites) on which you currently or have formerly operated an account, regardless of whether or not the account was held in your name or an alias. Include the full name of an "alias" or "handle", including the complete URL and username with hyperlinks, you have used on each of the named platforms. Indicate whether the account is active, deleted, or dormant. Include a link to each account if possible.

LinkedIn: <https://www.linkedin.com/in/arvind-raman-88b20a6a/>

Instagram: Oliverct30

Facebook: I used to have an account on Facebook. It was unused for many years and I have not been allowed to access it the last I checked.

ResearchGate: <https://www.researchgate.net/profile/Arvind-Raman>

21. Please identify each instance in which you have testified orally or in writing before Congress in a governmental or non-governmental capacity and specify the date, committee, and subject matter of each testimony.

None.

22. Given the current mission, major programs, and major operational objectives of the department/agency/commission/corporation to which you have been nominated, what in your background or employment experience do you believe affirmatively qualifies you for appointment to the position for which you have been nominated, and why do you wish to serve in that position?

Relevant background: As John A. Edwardson Dean of Purdue University's College of Engineering, I am responsible for a \$280M annual budget, 500 faculty and 500 staff, 14,000 undergraduate students, 5,000 graduate students, spread across two geographical locations – West Lafayette and downtown Indianapolis.

Since I was appointed Dean in early 2023, I have led Purdue Engineering to: (1) becoming the largest awardee of BS Engineers in the country in 2024-2025, based on available data, (2) it's highest overall US News Rankings score in this century in 2025, (3) it's No. 5 ranking (tied with Caltech) in 2025 out of nearly 200 ranked Engineering Colleges, (4) its rise to become the national market demand leader receiving more applications since 2024 for engineering majors than any other University in the country, based on available data, and (5) all while keeping tuition frozen for 14 years and counting; our in-state and out-of-state tuitions are the lowest among the top 50 Engineering Colleges.

With its excellence at scale, Purdue Engineering today is helping co-create jobs, talents, and innovation in the region, anchoring Purdue's partnerships with SK Hynix, Eli Lilly, and Rolls Royce, amplifying the impact of their Billions of dollars of investments in R and D facilities near Purdue.

In this role, I lead or support the development of new industry consortia/partnerships on strategic national/regional technology needs: *Smart Crossroads* (Wabash, Fedex, Goodyear, US Transcom etc), *Grid of Tomorrow* (PG and E, Schneider, Nvidia, Schneider, Duke, Tesla etc), *Nuclear Energy* (BWXT, Rolls Royce, GE/Hitachi, Google, Amazon, State of Indiana etc), *Chips and AI* (SKHynix, TSMC, Qualcomm, etc), *AI Assurance* (Meta, Amazon etc), etc.

Led the launch of three major new R and D facilities: *Manufacturing and Materials Labs* (40,000 sq ft, high bay state-of-the-art industry collaborative advanced manufacturing space); *Advanced Propulsion Research Labs* (\$75M investment in the largest hypersonics/advanced propulsion research facility among US Universities); and *William D. Young Institute for Advanced Manufacturing of Pharmaceuticals* (10,000 sq feet of scale up/testing facilities).

Led philanthropic fundraising for the college raising \$363M total in FY 24 and FY25, a 63% increase over prior two years, including the largest cash gift in the history of the College and four \$20M+ major gifts.

23. What do you believe are your responsibilities, if confirmed, to ensure that the department/agency/commission/corporation has proper management and accounting controls, and what experience do you have in managing a large organization?

If confirmed, it will be my responsibility to work with the Secretary of Commerce to carry out the directions, policies, and priorities of the President of the United States in implementing those laws of Congress pertaining to the Nation's technological competitiveness and innovation abilities.

In carrying out the funding programs of the Institute, it would be my responsibility to be a steward of taxpayer resources, which requires that management tasks and accounting controls operate at maximum efficiency to further a culture, within the Institute, that rewards execution and accountability for results.

I have significant experience in this area as the Dean of one of the largest engineering colleges in the nation. My current position requires me to serve as the chief academic, research, financial, and business development officer. I well understand the responsibility of managing a complex science-based organization with funding limitations.

24. What do you believe to be the top three challenges facing the department/agency/commission/corporation, and why?

***Talents and facilities:* Ensuring that NIST has world class facilities in Critical Emerging Technology (CET) areas and recruits and retains top talents in CET areas.**

***US Global Technology Standards leadership:* Ensuring that NIST executes on an intentional longer-term and industry-driven strategy, in coordination across the U.S. government, to advance American leadership in international standards development in CET areas.**

***US industrial leadership in CET areas:* Strong and effective partnership with US industry to ensure American dominance in CET areas including the AI Tech Stack, Quantum, Cybersecurity/Telecoms, Biotechnology, and AI enabled Advanced manufacturing.**

B. POTENTIAL CONFLICTS OF INTEREST

1. Describe all financial arrangements, deferred compensation agreements, and other continuing dealings with business associates, clients, or customers. Please include information related to retirement accounts, such as a 401(k) or pension plan.
All retirement accounts, bank balances, and investments are described in my OGE 278 submission. There are no deferred compensation agreements.
2. Do you have any commitments or agreements, formal or informal, to maintain employment, affiliation, or practice with any business, association, or other organization during your appointment? If so, please explain.

Purdue University. Institutions of higher education often have policies that enable leave of absence agreements in order to retain tenured faculty positions. I have been advised that the Ethics and Government Act, and its implementing regulations, may allow for me to retain affiliation with Purdue University, under its leave of absence policies, to retain my tenured position, so long as I do not participate personally and substantially in any particular matter that would directly and predictably affect the financial interests of myself or Purdue University. I would receive neither a salary nor earned income from the University during my leave of absence. There would be no supplementation of salary and my fiduciary responsibilities would be solely with the Institute.

3. Indicate any investments, obligations, liabilities, or other relationships which could involve potential conflicts of interest in the position to which you have been nominated. Explain how you will resolve each potential conflict of interest.
None other than what is declared in my OGE 278.
4. Describe any business relationship, dealing, or financial transaction which you have had during the last ten years, whether for yourself, on behalf of a client, or acting as an agent, that could in any way constitute or result in a possible conflict of interest in the position to which you have been nominated. Explain how you will resolve each potential conflict of interest.
None.
5. Identify any other potential conflicts of interest and explain how you will resolve each potential conflict of interest.

I believe I have disclosed any potential conflicts of interest in this questionnaire and in my OGE 278 financial disclosure. It is my understanding that I will work with senior agency ethics officials to formalize an ethics agreement that outlines the steps I will take to avoid conflicts of interest. I will divest assets where required and recuse from action where required.

6. Describe any activity during the past ten years, including the names of clients represented, in which you have been engaged for the purpose of directly or indirectly influencing the

passage, defeat, or modification of any legislation or affecting the administration and execution of law or public policy.

None.

C. LEGAL MATTERS

1. Have you ever been disciplined or cited for a breach of ethics, professional misconduct, or retaliation by, or been the subject of a complaint to, any court, administrative agency, the Office of Special Counsel, an Inspector General, professional association, disciplinary committee, or other professional group? If yes:
 - a. Provide the name of the court, agency, association, committee, or group;
 - b. Provide the date the citation, disciplinary action, complaint, or personnel action was issued or initiated;
 - c. Describe the citation, disciplinary action, complaint, or personnel action;
 - d. Provide the results of the citation, disciplinary action, complaint, or personnel action.

No.
2. Have you ever been investigated, arrested, charged, or held by any Federal, State, or other law enforcement authority of any Federal, State, county, municipal, or foreign government entity, other than for a minor traffic offense? If so, please explain.

No.
3. Have you or any business or nonprofit of which you are or were an officer ever been involved as a party in an administrative agency proceeding, criminal proceeding, or civil litigation? If so, please explain.

No.
4. Have you ever been convicted (including pleas of guilty or *nolo contendere*) of any criminal violation other than a minor traffic offense? If so, please explain.

No.
5. Have you ever been accused, formally or informally, of sexual assault, sexual harassment, or discrimination on the basis of sex, race, religion, or any other basis? If so, please explain.

No.
6. Please advise the Committee of any additional information, favorable or unfavorable, which you feel should be disclosed in connection with your nomination.

No.

D. RELATIONSHIP WITH COMMITTEE

1. Will you ensure that your department/agency/commission/corporation complies with deadlines for information set by congressional committees, and that your department/agency/commission/corporation endeavors to timely comply with requests for information from individual Members of Congress, including requests from members in the minority?

In reviewing requests from Congress, I will ensure that my agency follows the Executive Branch's longstanding policy to engage in the established process for working to accommodate congressional requests for information when those requests come from a committee, subcommittee, or chairman acting pursuant to oversight authority. Deadlines in such circumstances will of course be honored. Additionally, I will give due weight and sympathetic consideration to requests for information from individual members of Congress not delegated such authority.

2. Will you ensure that your department/agency/commission/corporation does whatever it can to protect congressional witnesses and whistleblowers from reprisal for their testimony and disclosures?

Yes.

3. Will you cooperate in providing the Committee with requested witnesses, including technical experts and career employees, with firsthand knowledge of matters of interest to the Committee?

Yes.

4. Are you willing to appear and testify before any duly constituted committee of the Congress on such occasions as you may be reasonably requested to do so?

Yes.

F. AFFIDAVIT

Arvind Raman being duly sworn, hereby states that he/she has read and signed the foregoing Statement on Biographical and Financial Information and that the information provided therein is, to the best of his/her knowledge, current, accurate, and complete.

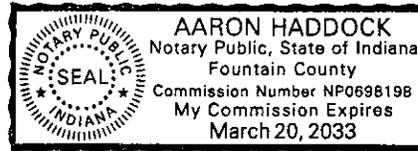


Signature of Nominee

Subscribed and sworn before me this 5th day of February, 2026.



Notary Public



**Addendum to the questionnaire submitted to the Senate Committee on
Commerce, Science, and Transportation, 119th Congress by Arvind Raman.**

Upon further review, I have identified additional information that is responsive to questions A.8, A.9, A.10, A.11, A.12, A.16, A.17, A.18, A.19, A.22, B.4, B.6, E.1 and E.2 on the Committee's questionnaire. They can be found in the attached documents.

The undersigned certifies that the information contained in the public addendum is true and correct.

Arvind
X Raman

Digitally signed by
Arvind Raman
Date: 2026.02.26
08:30:15 -05'00'

Arvind Raman

Arvind Raman Addendum
February 25, 2026

A.8

Principal Investigator and Director, LASER PULSE Consortium.

Podcast Host, Boilermaker Engineering Ingenuity Podcast.

A.9

My most recent CV is attached.

A.10

As Dean of Engineering, I am required by the National Science Foundation (NSF) to serve on the Council of Deans for all NSF Engineering Research Centers (ERC) that Purdue leads or plays a key role in. I serve on Dean's councils for three such ERC's: Center for Innovative and Strategic Transformation of Alkane Resources (CISTAR), the Internet of Things for Precision Agriculture (IoTforAg), and Advancing Self-sufficiency through Powered Infrastructure for Roadway Electrification (ASPIRE).

A.11

Member, Selemuse LLC (A company my son started while in high school and then subsequently closed a few years ago).

Member, Board of Governors for the Global Trusted Tech Standard (xGTT), Krach Institute of Tech Diplomacy (from which I intend to resign if confirmed).

Member, Academic Advisory Board, Plaksha University (2018-2025).

A.12

Member, American Society of Mechanical Engineers (2000-present).

Member, American Association for the Advancement of Science (2020-present).

Member, Tau Beta Pi Honor Society (2025-present).

A.16

Robert V. Adams Named Chair 2013.

Plenary speaker, NSF-CMMI grantees meeting, Atlanta 2011.

University Faculty Scholar 2008-2012.

B. F. S Schaefer Faculty Fellow 2006-2008.

College of Engineering Young Researcher Excellence Award 2005.

Discovery in Mechanical Engineering Award, Purdue University 2003.

NSF Early Career Development (CAREER) Award 2002-2007.

Purdue Teaching for Tomorrow Award 2002.

A.17

The following needs to be added:

2/17/2021: Article, [Engineering education: Solving India-specific grand challenges](#), Financial Times

The following needs to be removed

L. Pulido, A. Athamneh, Y. Efremov, A. Raman, T. Kim, D. M. Suter, “A New Computational Model for Mechanosensing and Mechanotransduction of Neuronal Growth Cones”, *Molecular Biology of the Cell*, 34(2), 729, 2023.

I would also like to provide links for the following publications

Journal Publications:

2025

1. [P Oladipupo, A Raman, JF Pekny, “The Minimum Viable Pilot Plant \(MVPP\): A Lean Framework for De-Risking Chemical Process Technologies”, *Journal of Advanced Manufacturing and Processing* 7 \(4\), e70046, 2025.](#)

2024

2. [L. P. Cifuentes, A. Athamneh, Y. Efremov, A. Raman, T. Kim, D. M. Suter, “A modified motor-clutch model reveals that neuronal growth cones respond faster to soft substrates”, *Molecular Biology of the Cell* 35 \(4\), 2024.](#)
3. [P Brunese, MK Lee, A Bessenbacher, A Raman, Y Yih, “Maximising the potential of academic–practitioner collaborations in international development”, *Journal of International Development* 36 \(2\), 867, 2024.](#)

2023

4. [A. Deolia, A. Raman, R. B. Wagner, “Low frequency photothermal excitation of AFM microcantilevers”, *Journal of Applied Physics*, 122\(31\), 214502, 2023.](#)

5. [D. Feng, N. Morrison, C. Armstrong, K. Movers, A. Raman, R. B. Wagner, "Measurement of web tension using ambient vibrations in roll-to-roll manufacturing of flexible and printed electronics", Flexible and Printed Electronics 8 \(4\), 042001, 2023](#)
6. [P. Oladipupo, A. Raman, J. F. Pekny, "Minimum production scale for economic feasibility of a titanium dioxide plant", Journal of Advanced Manufacturing and Processing, 5 \(4\), e10167, 2023.](#)
7. [P. Oladipupo, A. Raman, J. J. Siirola, J. F. Pekny, "Comparative Analysis of an Expandable Modular Plant and a Stick-Built TiO₂ Plant", ACS omega 8 \(47\), 2023.](#)

2022

8. [B. Rajabifar, G. F. Meyers, R. Wagner, A. Raman, "A Machine-Learned Approach to Characterize the Adhesive and Mechanical Properties of Soft Polymers Using Peak Force Tapping AFM", ACS Macromolecules, 55\(19\), 8231, 2022.](#)
9. [Y. M. Efremov, Efremov, D. M. Suter, P. S. Timashev, A. Raman, "3D nanomechanical mapping of subcellular and sub-nuclear structures of living cells by multi-harmonic AFM with long-tip microcantilevers", Scientific Reports, 12 \(1\), 1, 2022.](#)

2021

10. [D. Kalafut, R. Wagner, M. J. Cadena, A. Bajaj, A. Raman, "Cantilever signature of tip detachment during contact resonance AFM", Beilstein Journal of Nanotechnology, 12 \(1\), 1286, 2021.](#)
11. [B. Rajabifar, A. K. Bajaj, R. G. Reifengerger, R. Proksch, A. Raman, "Discrimination of Adhesion and Viscoelasticity from Nanoscale Maps of Polymer Surfaces using Bimodal Atomic Force Microscopy", Nanoscale, 13, 17428, 2021.](#)
12. [B. Rajabifar, R. B. Wagner, A. Raman, "A fast first-principles approach to model atomic force microscopy on soft, adhesive, and viscoelastic surfaces", Materials Research Express, 8, 095304, 2021.](#)
13. [D. Feng, R. B. Wagner, A. Raman, "Measuring nonuniform web tension for roll-to-roll manufacturing of flexible and printed electronics", Flexible and Printed Electronics, 6\(3\), 035006, 2021.](#)
14. [D. Feng, J. Wang, G. T. C. Chiu, A. Raman, Vibrations of air-coupled web systems, Journal of Vibration and Acoustics, 143 \(1\),2021.](#)

2020

15. [N. H. Shaik, R. G. Reifenberger, A. Raman, "Nanomechanical mapping in air or vacuum using multi-harmonic signals in tapping mode atomic force microscopy", Nanotechnology, 31 \(45\), 455502, 2020](#)
16. [D. Kalafut, A. K. Bajaj, A. Raman, "Tristable capacitive microcantilever switches: Measurements and simulations", International Journal of Non-linear Mechanics, 119\(103304\), 2020.](#)
17. [N. H. Shaik, R. Reifenberger, A. Raman, "Nanomechanical mapping in air or vacuum using multi-harmonic signals in tapping mode atomic force microscopy", Nanotechnology, 31\(45\), 2020.](#)
18. [Y. Efremov, Y. M. Okajima, A. Raman, "Measuring viscoelasticity of soft biological samples using atomic force microscopy", Soft Matter, 16\(1\), 64, 2020.](#)

2019

19. [Y. Efremov, M. Velay-Lizancos, C. Weaver, A. Athamneh, P. Zavattieri, D. Suter, A. Raman "Anisotropy vs isotropy in living cell indentation with AFM", Scientific Reports, 2019.](#)
20. [F. H. Pastrana, A. X. Cartagena, A. Raman, A. Avila, "Evaluation of the Elastic Young's Modulus and Cytotoxicity Variations in Fibroblasts Exposed to Carbon-Based Nanomaterials", Journal of Nanobiotechnology, 17\(32\), 2019.](#)
21. [D. Feng, A. Raman, "Thermomechanics of axially moving webs in roll-to-roll manufacturing processes", International Journal of Heat and Mass Transfer, 129, 1317, 2019.](#)

2018

22. [Y. M. Efremov, A. X. Cartagena, A. I. M. Athamneh, D. M. Suter, A. Raman, "Mapping heterogeneity of cellular mechanics by multi-harmonic atomic force microscopy", Nature Protocols, 13\(10\), 2018.](#)
23. [B. Rajabifar, J. M. Jadhav, D. Kiracofe, G. F. Meyers, A. Raman, "Dynamic AFM on Viscoelastic Polymer Samples with Surface Forces", Macromolecules, 51\(23\), 9649, 2018.](#)
24. [M. J. Cadena, R. G. Reifenberger, A. Raman, "High resolution subsurface imaging using resonance-enhanced detection in 2nd-harmonic KPFM", Nanotechnology, 29\(40\), 405702, 2018.](#)

2017

25. [D. Kalafut, A. Bajaj, A. Raman, "Multistability of cantilever MEMS/NEMS switches induced by electrostatic and surface forces", International Journal of Non-Linear Mechanics, 95\(209\), 2017.](#)

26. Y. Efremov, W. D. Wang, S. D. Hardy, R. Geahlen, A. Raman, "Measuring nanoscale viscoelastic parameters of cells directly from AFM force-displacement curves", Scientific Reports (Nature Publishing Group), 7(1541), 2017.
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28. M. J. Cadena, Y. Chen, R. Reifenberger, A. Raman, "Sub-surface AFM imaging using tip generated stress and electric fields", Applied Physics Letters, 110(12), 2017.
29. M. J. Cadena, J. C. Parker, A. Raman, R. Reifenberger, "Fabrication and characterization of mesopores in a silica gel matrix", Materials Research Innovations, 22(4), 242, 2017.

2016

30. N.H. Shaik, R. Reifenberger, A. Raman, "Enhancing the optical lever sensitivity of microcantilevers for dynamic atomic force microscopy via integrated low frequency paddles", Nanotechnology, 27(19), 2016.
31. JR Chagdes, S Rietdyk, JM Haddad, HN Zelaznik, ME Cinelli, L. T. Denomme, K. C. Powers, A. Raman, "Limit cycle oscillations in standing human posture", Journal of Biomechanics, 49 (7), 1170, 2016.
32. M. J. Cadena; S. H. Sung, B. W. Boudouris, R. Reifenberger, A. Raman, "Nanoscale Mapping of Dielectric Properties of Nanomaterials from KiloHertz to Megahertz Using Ultrasmall Cantilevers", ACS Nano, 10(4), 4062, 2016.
33. R. B. Wagner, R. J. Moon, A. Raman, "Mechanical properties of cellulose nanomaterials studied by contact resonance atomic force microscopy", Cellulose, 23(2), 1031, 2016.
34. J. Chagdes, J.E Huber, M. Saletta, M. Darling-White, A. Raman, S. Rietdyk, H. N. Zelaznik, J. M. Haddad, "The relationship between intermittent limit cycles and postural instability associated with Parkinson's disease", Journal of Sport and Health Science, 2016.

2015

35. A. I.M. Athamneh, A. X. Cartagena-Rivera, A. Raman, D. M. Suter, "Substrate Deformation Predicts Neuronal Growth Cone Advance", Biophysical Journal, 109(7), 1358, 2015.
36. Y. Li, Z. Yan, A. Raman, X. Xu, "Three-dimensional mapping of optical near field with scattering SNOM", Optics Express, 23(14), 18730, 2015.

37. M. Hernando-Perez, A.X. Cartagena-Rivera, R. Pudgornik, A. Raman, P. J. dePablo, "Quantitative nanoscale electrostatics of viruses, ACS Nanoscale, 7(41), 172289, 2015.
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39. X. Xu, J. Mares, L. Groven, S. Son, R. Reifenger, A. Raman, "Nanoscale Characterization of Mock Explosive Materials using Advanced Atomic Force Microscopy Methods", Journal of Energetic Materials, 33(1), 51, 2015.
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41. R. Wagner, J. P. Killgore, R. C. Tung, A. Raman, and D. C. Hurley, "Vibrational shape tracking of atomic force microscopy cantilevers for improved sensitivity and accuracy of nanomechanical measurements", Nanotechnology, 26(4), 045701, 2015.
42. M. Krisenko, A. Cartagena, A. Raman, R. Geahlen, Nanomechanical property maps of breast cancer cells by multi-harmonic atomic force microscopy reveal Syk-dependent changes in microtubule stability mediated by MAP1B", Biochemistry, 54(1), 60, 2015.

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44. S. Palit, X. Xu, A. Raman, M. A. Alam, "Implications of Rough Dielectric Surfaces on Charging-Adjusted Actuation of RF-MEMS", IEEE Electron Device Letters, 35(9), 948-950, 2014.
45. N. H. Shaik, R. Reifenger, A. Raman, "Microcantilevers with embedded accelerometers for dynamic Atomic Force Microscopy", Applied Physics Letters, 104(8), 083109, 2014.
46. A. Cartagena and A. Raman, "Local viscoelastic properties of live cells investigated using dynamic and quasi-static atomic force microscopy methods", Biophysical Journal, 106(5), 1033, 2014.
47. R. C. Tung, A. Fruehling, D. Peroulis, A. Raman, "Multiple Timescales and Modeling of Dynamic Bounce Phenomena in RF MEMS Switches", IEEE/ASME Journal of Microelectromechanical Systems, 23(1), 137, 2014.

48. R. B. Wagner, A. Raman, R. Proksch, “Spatial spectrograms of vibrating atomic force microscopy cantilever coupled to sample surfaces”, Applied Physics Letters, 103(6), 263102, 2014.

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52. R. C. Tung, A. Fruehling, A. Raman, “Multiple Timescales and Modeling of Dynamic Bounce Phenomena in RF MEMS Switches”, Journal of Microelectromechanical Systems, 23(1), 137, 2013.

53. A. Raman and D. Kiracofe, “Nonlinear dynamics of atomic force microscope microcantilevers in liquid environments - a review”, IEICE Nonlinear theory and its applications, 4(3), 184, 2013.

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2012

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66. J. Gomez-Herrero, D. Martinez-Martin, C. Carrasco, M. Hernando-Perez, P. J. de Pablo, R. Perez, M. Garcia-Mateu, J. L. Carrascosa, D. Kiracofe, J. Melcher, A. Raman, "Resolving structure and mechanical properties at the nanoscale of Viruses with frequency modulation atomic force microscopy", *PLoS One*, 7(1), e30204, 2012.
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A.18

2026: [Fireside Chat at Naples, FL](#)

- 2/2026: Speech, [Purdue @ Silicon Valley](#)
- 1/28/2026: Speech, [In-space manufacturing, quantum projects part of all-Boilermaker suborbital spaceflight](#)
- 1/15/2026: Speech, [Global Nuclear Energy Economic Summit advances Indiana's role in nuclear innovation, Purdue University](#)
- 10/17/2025, Speech, [Purdue Alumni Speech at the San Diego Air & Space Museum](#)
- 9/11/2025: Presentation, [Discussion with Cummins CEO Jennifer Rumsey](#)
- 8/2025: Panel, [Tech Diplomacy 2040, Krach Institute for Tech Diplomacy and Guidehouse Defense & Security](#)
- 8/2025: Fireside Chat, [2nd Grid of Tomorrow Consortium, San Ramon, CA](#)
- 6/3/2025: Speech, [Global Entrepreneurship Congress, Indianapolis](#)
- 5/2025: Speech, [Welcoming Address at the 23rd World Building Congress](#)
- 4/8/2024: Panel, [Bridgestone Americas and NASA – Astro, Racer, Engineer, Scientist & More](#)
- 4/4/2024, Fireside Chat, [Discussion with Sen. Todd Young and OSTP Director Arati Prabhakar on the CHIPS and Science Act](#)
- 2/4/2025: Fireside Chat, [Visionary Voices with Patti Poppe](#)
- 1/30/2025: Panel, [Grid of Tomorrow Consortium](#)
- 6/28/2023: Speech, [Conference Banquet Welcome/Opening Remarks, FPCM-15 Flow Processes in Composite Materials](#)
- 1/17/2023: Presentation, [College of Engineering Dean Candidate Forum](#)
- 9/2/2022: Presentation, [State Department Careers Conversation with Secretary of State Antony Blinken at Purdue University](#)
- 8/24/2022: Presentation, [LASER Focused – How to Apply for USAID Grants](#)
- 6/10/2021: [Webinar, Seminar Series: The LASER Experience, Integrating Research and Practice for Effective Development, Engineering for Change](#)
- 8/29/2018: Speech, [USAID selects Purdue-led center to research poverty challenges around world](#)

A.19

“Purdue partners pen hub for AI and robotics research in medicine”, [Jan. 27, 2026](#)

“Purdue, BWXT forge strategic collaboration to advance nuclear innovation”, [Nov. 5, 2025](#)

[Engenuity Boilermaker Engineering Podcast Episodes](#)

- [6/20/2025: Statement, Purdue University and Hello Sunshine partner on new platform to inspire the next generation of bold, curious young women](#)
- [3/5/2025: Podcast, Next Up! IE Podcast – Season 2, Episode 2; John A. Edwardson Dean, Arvind Raman](#)
 - [12/23/2023: Podcast, Blueprint #14: Arvind Raman – John A. Edwardson Dean of Engineering, Purdue University, Untapped Podcast](#)
 - [8/30/2023: Statement, A Message from the Dean, An introduction to this issue of ENGINEERING IMPACT magazine by Dean Arvind Raman](#)
 - [4/1/2023: TV Interview, Meet Arvind Raman, the John A. Edwardson Dean of the College of Engineering](#)
 - [2/8/2023: Article, Arvind Raman Selected as New Engineering Dean, Purdue Exponent](#)
 - [Winter 2023: Article, Once-in-a-Generation Opportunity](#)
 - [9/28/2021: Video, Laser Focused – Arvind Raman](#)
 - [10/2021: Video, Trailblazers in Engineering](#)
 - [4/28/2019, Video, Plashka MS in Artificial Intelligence](#)
 - [3/20/2017: Statement, Four keynote speakers highlight global engineering expo at Purdue](#)

A 20.

Our Instagram link

<https://www.instagram.com/oliverct30/?hl=en>

A 22.

I first came to the United States 35 years ago from India to study engineering at Purdue University, with a few hundred dollars in my pocket and my first paycheck as a research assistant was not due until a few months later. I got by thanks to a loan the University gave to students like me with no credit history and thanks to the Goodwill store. And today I am the Dean of Engineering at that great institution. So first, my wish to serve as Under Secretary of Commerce for Standards and Technology and Director of NIST comes from a deep sense of public service and wanting to give back to this great country. Secondly, after I returned to Purdue 25 years ago as a faculty member, I spent a month doing nanotechnology research at NIST, the start of many collaborations with NIST, so I also have a knowledge of NIST's mission, and deep respect for its researchers and their strong technical expertise. Finally, it's a remarkable time to make a difference and help American industries innovate in the AI tech stack, quantum, and biotech for our future prosperity.

B4.

I believe I have disclosed any potential conflicts of interest in this questionnaire and in my OGE 278 financial disclosure. It is my understanding that I will work with senior agency ethics officials to formalize an ethics agreement that outlines the steps I will take to avoid conflicts of interest. I will divest assets where required and recuse from action where required.

B6.

As part of the 150th anniversary celebration of Purdue Engineering, the Indiana state senate passed a celebratory resolution honoring Purdue Engineering for 150 consequential years. I accompanied a group of Indiana students to the [event](#).

[REDACTED]

[REDACTED]

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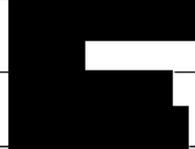
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ARVIND RAMAN

John A. Edwardson Dean, College of Engineering
Robert V. Adams Professor of Mechanical Engineering and Materials Engineering (Courtesy)

November 18, 2025

Education

University of California at Berkeley, Berkeley, California

Doctor of Philosophy in Mechanical Engineering, 1999

Advisor Professor C. D. Mote, Jr.; *Major* Dynamics; *Minors* Continuum Mechanics, Mathematics

Purdue University, West Lafayette, Indiana

Master of Science in Mechanical Engineering, 1993

Advisors Professors A. K. Bajaj and P. Davies

Indian Institute of Technology, Delhi, India

Bachelor of Technology in Mechanical Engineering, 1991

Professional appointments

Purdue University, West Lafayette, Indiana

John A. Edwardson Dean of Engineering, April 2023 - present

Executive Associate Dean, College of Engineering, Dec 2019-March 2023

Senior Associate Dean of the Faculty, College of Engineering, Dec 2017-Dec 2019

Associate Dean for Global Engineering Programs, College of Engineering, May 2014- Dec 2017

Robert V. Adams Professor, School of Mechanical Engineering, 2013-present

Professor, School of Mechanical Engineering, 2009-present

Associate Professor, School of Mechanical Engineering, 2005-2009

Assistant Professor, School of Mechanical Engineering, 2000-2005

University of Oxford, UK

Keeley Visiting Professor, Wadham College and Department of Physics, Clarendon Labs, 2010

Universidad Autonoma de Madrid, Spain

Visiting Professor, Experimental condensed matter physics, 2005, 2006

Technical University Darmstadt, Germany

DAAD Visiting Researcher, Institute for Mechanics, 1999

Summary accomplishments in academic administration

John A Edwardson Dean of Engineering, April 2023- present

Oversees a \$280M annual budget, 500 faculty and 500 staff, 14,000 undergraduate students, 5,000 graduate students, spread across two locations – West Lafayette and downtown Indianapolis.

Led Purdue Engineering to: (1) it's highest overall US News Rankings score in this century in 2025, (2) it's No. 5 ranking (tied with Caltech) in 2025 out of nearly 200 ranked Engineering Colleges, (3) its rise to become the national market demand leader receiving more applications since 2024 for engineering majors than any other engineering college in the country, based on available data, and (4) it's becoming the largest awarder of BS Engineers in the country in 2024-2025, based on available data (5) all while keeping tuition frozen for 14 years and counting; our in-state and out-of-state tuitions are among the lowest among the top 50 Engineering Colleges.

With its excellence at scale, Purdue Engineering today is helping co-create jobs, talents, and innovation in the region, anchoring Purdue's partnerships with SK Hynix, Eli Lilly, and Rolls Royce, amplifying the impact of their Billions of dollars of investments in R and D facilities near Purdue.

Leads and supports the development of new industry consortia/partnerships on strategic national/regional technology needs: *Smart Crossroads* (Wabash, Fedex, Goodyear, US Transcom etc), *Grid of Tomorrow* (PG and E, Nvidia, Schneider, Duke, Tesla etc), *Nuclear Energy* (BWXT, Rolls Royce, GE/Hitachi, Google, Amazon, State of Indiana etc), *Chips and AI* (SKHynix, TSMC, Qualcomm, etc), *AI Assurance* (Meta, Amazon etc).

Led the launch of three major new R and D facilities: *Manufacturing and Materials Labs* (40,000 sq ft, high bay state-of-the-art industry collaborative advanced manufacturing space); *Advanced Propulsion Research Labs* (\$75M investment in the largest hypersonics/advanced propulsion research facility among US Universities); and *William D. Young Institute for Advanced Manufacturing of Pharmaceuticals* (10,000 sq feet of scale up/testing facilities).

Led philanthropic fundraising for the college raising \$363M total in FY 24 and FY25, a 63% increase over prior two years, including the largest cash gift in the history of the College and four \$20M+ major gifts.

Executive Associate Dean of Engineering, Dec 2019-March 2023

Promoted to this role overseeing all academic and staff operations, while the then Dean Chiang served as S and T advisor to Secretary of State in 2020 and returned with an additional role as University Vice President.

Oversaw nearly 14,000 undergraduate students, 5,000 graduate students, 450 faculty and 500 staff. Purdue Engineering emerged last year as No.1 in national market demand having received more applications for engineering majors than any other engineering college in the country.

In 2023-2024, Purdue Engineering received more applications than any other Engineering college, making it the No.1 in market demand. Also, in 2024-2025 we are on track to also become the largest producer of BS degrees in the country. Latest US News rankings are

stellar- the College is now the largest Engineering College ranking in the top 5 in the country (Graduate/research rankings). Significant new facilities for research were inaugurated, with a significant growth in philanthropic fundraising.

1. Executive Associate Dean of Engineering, Dec 2019-March 2023

2. Senior Associate Dean of the Faculty, College of Engineering, Dec 2017-Dec 2019

- Led Purdue Engineering's efforts to hire the best faculty talent, ensure the success and recognition of its 460+ faculty and 500+ staff, and creates and implements prestige-enhancing strategies for the USNWR 5th ranked graduate/research and 9th ranked undergraduate Engineering program in the nation; Responsible for faculty hiring, faculty and staff position allocations to schools and programs based on unit's needs, performance, and strategic priorities of the College; Since December 2019, supervised the College's Graduate and Undergraduate Education offices to ensure the success of its 10,000+ undergraduate students and 4000 graduate students, and coordinates diversity, equity, and inclusion initiatives across faculty, staff, graduate and undergraduate students. Hired 100+ faculty since Dec 2017.

Responsibilities

College of Engineering Faculty and Staff Resource allocation to Schools/Divisions

- Responsible for faculty and staff allocations to schools and programs based on unit's needs, performance, and strategic priorities of the College.
- Responsible for preparing annual faculty recruitment plan with the College of Engineering's Director of Financial Affairs to the Provost's office.
- Responsible for the allocation of equipment start-up funds budget (\$10-15M annually).

College of Engineering Faculty Recruitment and Success

- Created and implemented processes for 25-35 faculty searches annually in Engineering and ensures timeliness of search process and excellence and diversity of candidate pools.
- Created and implemented strategy for year-round dream/cluster hires/special opportunity hires, interfacing with external search firms, if needed, for executive searches.
- Integrated best practice and creates new strategies to recruit diverse candidates.
- Created strategies to engage with local alumnae/i, companies and higher educational institutions to successfully place dual career candidates. Works closely with other Colleges and Schools to ensure progress of previously placed clients. Supervises the College's Faculty Concierge program that combines dual career support and visa and immigration services.
- Closely collaborated with other Colleges and Schools for joint and dual career hiring.
- Created and launched [Purdue Engineering Trailblazers program](#) that attracts top finishing PhD's/postdocs in Engineering for a future faculty development workshop; Since 2020, 166 fellows have graduated from the program, with 45 of them having secured tenure track faculty positions, 52 continuing on as postdocs, and the rest in industry or completing their PhDs.
- Worked closely with Provost's, Treasurer's, University Benefits' offices to create and implement Engineering's Childcare Expense Reimbursement for Travel program ([featured in the journal Science](#)), one of the few such programs at public Universities.
- Worked closely with Engineering heads to launch and implement [Modified Duties for Childcare policy](#) that automatically provides one semester off teaching to any faculty with

primary caregiving responsibilities in case of childbirth or adoption, without the need to negotiate with the school head.

- Responsible for nominating Engineering women faculty for Drexel University's ELATES program, and acting as a mentor for professional development for future leadership roles.

Academic Programs Quality and Prestige-Enhancing programs

- Responsible for conducting once every 5 years external review of all 13 Purdue Engineering schools and divisions. These external reviews invite top national disciplinary leaders to provide feedback on the Unit's strategy for pre-eminence and its strengths and opportunities across all aspects of its mission.
- Responsible for creating and running prestigious visiting programs and initiatives to increase College visibility and post-pandemic thought leadership. These include [Lillian Gilbreth postdoctoral fellowships](#), [Neil Armstrong Distinguished Visiting Professorships](#), [Purdue Engineering Distinguished Lecturer Series](#), and the [Engineering Rising to the Challenge Initiative](#) during the COVID 19 pandemic.

Promotion and Tenure, Named and Distinguished Professorships

- In 2018, led a significant overhaul of the College P and T template to emphasize impact rather than numerical outputs.
- Responsible for coordinating P and T processes across the College. Ex-officio member of the College area promotions committee.
- Chairs the College's Named Professors Committee to review, modify, and implement criteria and processes.
- Responsible for Distinguished Professor nominations and processes.

Faculty Recognition

- Created, hired staff for, and implemented the College wide external recognition program to which makes 80+ nominations annually for prestigious recognitions for Engineering faculty.
- Worked closely with the Associate Dean for Research and Innovation to help prepare early career faculty for Young investigator awards from different federal agencies.
- Collaborated with College NAE members to create the Pathways to the Pinnacle Program (P2P) to identify mid-career/senior faculty to mentor and nominate for external recognitions creating a pathway for them to receive prestigious recognitions in the future.
- Worked closely with Purdue's Office of Technology Commercialization to identify and recognize the impact of patents related by faculty and their students.
- Responsible for faculty internal recognition programs in the College.

Alumnae/i Recognition and Fundraising

- Built relationships with potential donors to secure \$2.5M endowment to establish the Shah Family Global Innovation Lab, the largest endowed research and innovation center in the College of Engineering that has supported development innovation grants to more than 20 faculty with diverse on-the-ground partners in developing economies.

- Currently negotiating a \$1.5M College-level named chair endowment from Raytheon corporation.
- Responsible for Distinguished Engineering Alumnae/i awards, and for College nominations for Honorary Doctorate degrees. These alumnae/i are some of the most generous donors to Purdue Engineering and to the University's "Ever True" fundraising campaign that resulted in \$1B+ giving to Purdue Engineering alone – the most successful fundraising campaign for a public Engineering College in a University without a medical school.
- On behalf of the Dean host alumni at College events whenever they are unable to attend.

Graduate and Undergraduate Education

- Direct reports include the Associate Deans for Graduate and Undergraduate Education.
- Worked closely with the Associate Dean for Graduate Education on initiatives to increase the number of military researchers pursuing PhD's at Purdue Engineering; to increase the country-of-origin diversity of international applicants; and to increase the number, diversity and quality of domestic graduate students.
- Worked closely with the Associate Dean for Undergraduate Education on initiatives for the mental health of students; increasing the number and success of historically underrepresented minorities, women, and first-generation students; increasing the number of students who undertake global, research, internship, teaming experiences (which include the award-winning [EPICS](#) program and the [VIP program](#)).

Impact

- More than doubled the number of nominations of faculty for prestigious external awards and recognitions. In addition to seeing a significant increase in the number of Sloan Foundation, Moore Foundation, Packard Foundation fellowships, in 2020 and 2021 a record six Engineering faculty were inducted into the National Academy of Inventors, a first Guggenheim fellow was named, a College record of 13 prestigious early career awardees (NSF CAREER, DoD YIP) were named in 2021-22, and for the first time a Purdue Engineering faculty was presented the NAE Bueche Award.
- Today Purdue Engineering ranks as the largest Engineering College that is also ranked by USNWR in the top 5 in graduate/research, and in the top 10 for undergraduate (9th).

3. Inaugural Associate Dean for Global Engineering Programs, May 2014-Dec 2017

Responsibilities

- Responsible for scaling up transformative global experiences for engineering students.
- Launched [the Innovation for International Development Lab \(I2D Lab\)](#) to help faculty/graduate students identify innovation gaps and scale up low-cost technology solutions in developing countries. In 2019, secured a \$2.5 M endowment gift from Engineering alumnus Manu Shah to rename lab the "Shah Family Global Innovation Lab".
- Launched the College's global competency initiative (2018-2020) to significantly increase the global professional skills of engineering students through global and on-campus interventions. The initiative helps schools and study abroad programs build in intentional elements to promote intercultural development and rigorously assess global competencies (Intercultural Development Inventory) through online tools and with trained staff.

- Started signature programs to scale the number of engineering students studying abroad in Asia Pacific (China, Japan, Korea, Taiwan), and Latin America.

Impact

- Within three years, more than doubled the total number of global experiences (study abroad, projects, internships) undertaken by undergraduate engineering students in 2016-17 compared to 2013-14. The office won two highly competitive study abroad grants through the Department of State's 100K Strong in the Americas Program. A key feature of both grants was a partnership with Purdue's [Minority Engineering Program](#) to provide scholarships and promote the participation of under-represented minorities in study abroad experiences. Represented Purdue at the awards ceremony at the White House with then Vice-President Biden in 2015 December. The office also won two [Mandela Washington Leadership Institute awards](#) from the US Dept of State, for the first time at Purdue.
- With co-funding from key NGO's such as Catholic Relief Services, Save the Children, AMPATH etc., the Shah Family lab today supports graduate students in 20+ applied research, translation, and commercialization projects in sub-Saharan Africa. These partnerships have led to, for the first time, funding for Purdue engineering faculty from Gates Foundation grants, USAID, and multiple start-up companies.
- Invited in 2016 by the NSF's Engineering Education and Centers Division (EEC) division to advise NSF on the role of international partnerships in the next generation of Engineering Research Centers (ERC's). Invited in 2017 to the African Union/[NEPAD](#)'s high-level panel on emerging technology areas for Africa. Member of the Shanghai Jiaotong University's (China) advisory board on innovative engineering education. Served on a peer panel to evaluate the PhD in engineering program at the Universidad de los Andes in Colombia.

Leadership Roles in Strategic Initiatives

- Purdue representative in the Midwest Microelectronics Consortium led by Ohio State University, University of Michigan, Purdue and other Universities and community colleges to coordinate semiconductor workforce development and create a semiconductor innovation ecosystem in the tri-state region (Indiana, Ohio, Michigan).
- Named by Purdue President Daniels to the COVID 19 Response [Safe Campus Taskforce](#) in March 2020 with other University leaders to propose every change conceivably possible in the University's practices, procedures, physical facilities, or any operations to limit the degree of illness, flu or otherwise, on campus, and to manage it effectively when it does occur. Purdue's approach is widely considered successful for safely opening classes in Fall 2020.
- As Interim Executive Director Aug 2021- Jan 9, 2022, Global Development and Innovation Division, Purdue Applied Research Institute, the new non-profit applied research arm of Purdue University, chaired the committee tasked to envision the division's innovations in business models and focus areas based on comparative studies around the nation. Also helped hire the founding Executive Director and other key staff in the Division.
- College of Engineering representative on Honor's College's National and International Scholarships Office; helping Engineering students prepare for Rhodes, Marshall, and Mitchell scholarships through mock interviews and mentoring (2014-2018).
- In 2009, co-led a strategic planning team charged by Purdue's College of Engineering to re-think the College's global engagement portfolio using the rubrics of [blue-ocean strategy](#). The resulting report led to the creation in 2010 of the [Colombia-Purdue Initiative](#), a global

engagement platform to enable high-impact global partnerships across education, research, and engagement for Purdue University with the South American country. Led the initiative from 2010 through 2014 including Purdue's agreements with Colciencias (Colombian NSF) and another funding agencies (Colfuturo), and built partnerships with 18 Universities. Today 44 Colciencias-Fulbright/Colfuturo funded PhD/MS students are at Purdue when in 2010 there was 1 Colciencias supported student at Purdue. As a result of this effort, today Colombia is the top destination for Purdue students studying abroad in Latin America, dozens of Purdue faculty have active research collaborations with that country, and two Purdue Presidents France Córdoba (2013), and Mitch Daniels (2014) were invited to separate direct official meetings with President Santos of Colombia at the Presidential Palace in Bogotá.

- Along with many US academic leaders, member of Academic Advisory Board of Plaksha University in India a new, tech-centric University that is focused on re-imagining engineering education and research.

Summary of accomplishments as faculty

Scholarly Research

Raman's scholarly research applies the principles and methods of nonlinear dynamics, vibrations, nonlinear mechanics, and fluid-structure interactions, to solve multi-physics problems at the emerging frontiers of science and engineering. Raman is the PI of more than \$77M in extramural research awards and his research has been sponsored by national and international agencies NSF, NASA, USDA, USAID, NIH, NNSA, Colciencias-Fulbright, Korea Institute of Machinery and Materials, and corporate sponsors including Boeing, Procter and Gamble, Dow, ExxonMobil, Seagate, Apple Computers, Delphi-Delco Electronics, R.R. Donnelley and Sons etc. His research accomplishments include:

- a) the improvement of the Atomic Force Microscope through new experimental techniques, quantitative methods, and cyberinfrastructure-based simulations;
- b) the improvement of sensitivity and reliability, and development of novel micro- and nano-electromechanical systems (MEMS/NEMS) for sensing and communications applications;
- c) the development of new diagnostics tools and rehabilitative devices to improve upright balance for elderly people, or those suffering from neurological diseases (Parkinson's, Multiple Sclerosis etc.), diabetic neuropathy, concussions etc.
- d) the development of modeling and metrology tools for flexible web mechanics in roll-to-roll flexible electronics manufacturing/nano-manufacturing processes, and
- e) the improved design of piezoelectric fans for electronics cooling, rotating machinery etc. through computational models, analytical approaches, and experimental measurements.

Selected Research Impacts

- The published research from Raman's group on the nonlinear dynamics of the Atomic Force Microscope is frequently utilized by the scientific community to improve the performance of this key instrument for nanotechnology applications.

- The use of mode localization for ultrasensitive mass sensing, initially reported by Raman's group, is now a widely used method in the MEMS scientific community to improve mass resolution of microsensors.
- AFM simulation tool VEDA (Virtual Environment for Dynamic AFM) developed by Raman's group, is one of the most widely used simulation tools for the Atomic Force Microscope in the world, and has been used by thousands of users from industry and academia.

Research Center Leadership

Director, USAID funded LASER PULSE consortium, 2018-2023

Led 4-year business development plan to successfully compete for USAID's Higher Education Solutions Network's LASER program in 2018; Purdue's bid was the only one selected out of 100+ applications from most top Universities; PI for the resulting \$70M USAID award (2018-2023), among the top three sponsored program award amounts ever in Purdue history.

Responsibilities PI of LASER (Long-term Assistance and Services for Research) PULSE (Partners for University-Led Solutions Engine) which was a five-year, \$70M program funded through USAID's Innovation, Technology, and Research Hub, that delivered research-driven solutions to field-sourced development challenges in USAID partner countries. A consortium led by Purdue University, with core partners Catholic Relief Services, Indiana University, Makerere University, and the University of Notre Dame, implemented the LASER PULSE program through a growing network of 3000+ researchers and development practitioners in 76 countries. Responsible for helping USAID, government partners, and NGO's identify key research questions, funded researcher-practitioner teams to address critical bottleneck challenges to global development in all USAID partner countries and in all USAID technical sectors. 25% of the research funding was carried out at Purdue. Managed consortium partnerships, partnerships with international institutions, strategic planning, and budgets.

Impact LASER supported 30+ research awards with dozens of researchers and practitioners in 15 USAID partner countries and in the US that have had real impact on development policy and practice. For example:

- In Kenya LASER PULSE's research findings have supported Kenyan Ministry of Education in identifying and addressing challenges in their early grade reading program and outlining essential steps to enable the government in scaling and sustaining the program.
- LASER PULSE's research in Trafficking in Persons was presented to the South African Government and their Department of Justice was briefed on the research findings to be considered for relevant policy deliberations.
- Across multiple countries, LASER PULSE supported USAID Missions in creating evidence-based designs of some of their major aid programs, for example in South Sudan, LASER PULSE's research on psychosocial impact evaluation helped inform USAID South Sudan's mission's education activities to incorporate psychosocial and social-emotional skill development in addition to learning literacy and numeracy.
- LASER PULSE built a vast network of 3000+ researchers and practitioners from more than 76 countries. These members have access to the multitude of trainings, courses, casebooks, templates, tools, and guiding documents that are available for capacity building. In three years, more than 1700 members have enrolled in its courses.

Engagement

Raman's engagement interests lie in re-imagining engineering education and engineering research and innovation for impact around the globe especially:

- a) Engineering education innovations around the globe.
- b) Research and innovation for global development such as for poverty alleviation, food security, global health, education, empowering women among others.
- c) Global professional skills competencies and their assessment.

Honors and Awards

Fellow, American Academy for the Advancement of Science, 2025 (news embargoed until December 2025).

Robert V. Adams Named Chair, 2013-present

Purdue Seed of Success Award, awarded annually by the Executive Vice President for Research and Partnerships at Purdue to PI's of \$1M plus research awards, for USAID LASER PULSE, **2018, 2019, 2020**

Purdue Seed of Success Award for NSF Scalable Nano-manufacturing grant, **2014**

Purdue Seed of Success Award for Colciencias-Fulbright fellows program, **2014**

Fellow, American Society of Mechanical Engineers (ASME), for significant engineering achievements and 10+ years of ASME membership, **2012**

ASME Gustus Larson Memorial Award, for outstanding achievement in mechanical engineering, within ten to twenty years following graduation with a baccalaureate degree in Mechanical Engineering or related field, **2011**

Plenary speaker, NSF-CMMI grantees meeting, Atlanta, selected among all grantees of NSF's CMMI division, **2011**

Keeley Fellow, Wadham College, University of Oxford, UK, awarded competitively to provide visiting academics at Oxford with a social and academic base where they can meet academics with a broader range of interests than might otherwise be likely within a single Faculty or Department, encouraging interdisciplinary collaboration, **2010**

University Faculty Scholar, Purdue, of 15 awarded competitively across Purdue's campus to recognize outstanding mid-career faculty who are on an accelerated path for academic distinction, **2008-2012**

B. F. S Schaefer Outstanding Young Faculty Scholar Award, Purdue School of Mechanical Engineering, **2006-2008**

College of Engineering Young Researcher Excellence Award, awarded annually to one early career **2005**

Discovery in Mechanical Engineering Award, Purdue School of Mechanical Engineering, **2003**

NSF Early Career Development (CAREER) Award, NSF's most prestigious award in support of early-career faculty who have the potential to serve as academic role models in research and education and to lead advances in the mission of their department or organization, **2002-2007**

Purdue Teaching for Tomorrow Award, recognizes up to 12 assistant professors (or recently promoted associate professors) across campus for demonstrated talent for teaching, **2002**

Short-term research grant, German Academic Exchange Council (DAAD), awarded for 1-6 months to highly qualified candidates (PhD's or postdocs) to undertake collaborative research at TU Darmstadt, **1999**

Regents Fellowship, University of California, Berkeley, awarded to recruit doctoral students of outstanding achievement and potential, **1993-1994**

Six consecutive merit awards for 4.0 semester GPA's, IIT Delhi, **1988-1991**

Journal Publications

Total journal articles published: 164

Total citations: 11682 ([google citation A. Raman](#))

h-index: 61 ([google citation A. Raman](#))

i10-index: 160 ([google citation A. Raman](#))

Number of articles with ≥ 100 citations: 39

Journals: Nature Nanotechnology, Scientific Reports (Nature Publishing Group), Proceedings of the National Academy of Sciences (direct submission), ACS Nano, RSC Nanoscale, Nano Letters, Physical Review Letters, Journal of Fluid Mechanics, Proceedings of the Royal Society, Journal of the Acoustical Society of America, Journal of Applied Mechanics, Journal of Biomechanics etc; Including 1 Cover feature of Review of Scientific Instruments (2008) and 1 for RSC Nanoscale (2015) (see below), 1 Editor's pick for Physical Review B, 1 invited review article for Nano Today

2025

P Oladipupo, A Raman, JF Pekny, "The Minimum Viable Pilot Plant (MVPP): A Lean Framework for De-Risking Chemical Process Technologies", **Journal of Advanced Manufacturing and Processing** 7 (4), e70046, 2025.

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1. L. P. Cifuentes, A. Athamneh, Y. Efremov, A. Raman, T. Kim, D. M. Suter, "A modified motor-clutch model reveals that neuronal growth cones respond faster to soft substrates", **Molecular Biology of the Cell** 35 (4), 2024.
2. P Brunese, MK Lee, A Bessenbacher, A Raman, Y Yih, "Maximising the potential of academic-practitioner collaborations in international development", **Journal of International Development** 36 (2), 867, 2024.

2023

3. A. Deolia, A. Raman, R. B. Wagner, "Low frequency photothermal excitation of AFM microcantilevers", *Journal of Applied Physics*, 122(31), 214502, 2023.
4. L. Pulido, A. Athamneh, Y. Efremov, A. Raman, T. Kim, D. M. Suter, "A New Computational Model for Mechanosensing and Mechanotransduction of Neuronal Growth Cones", **Molecular Biology of the Cell**, 34(2), 729, 2023.
5. D. Feng, N. Morrison, C. Armstrong, K. Moyers, A. Raman, R. B. Wagner, "Measurement of web tension using ambient vibrations in roll-to-roll manufacturing of flexible and printed electronics", **Flexible and Printed Electronics** 8 (4), 042001, 2023
6. P. Oladipupo, A. Raman, J. F. Pekny, "Minimum production scale for economic feasibility of a titanium dioxide plant", **Journal of Advanced Manufacturing and Processing**, 5 (4), e10167, 2023.
7. P. Oladipupo, A. Raman, J. J. Siirola, J. F. Pekny, "Comparative Analysis of an Expandable Modular Plant and a Stick-Built TiO₂ Plant", **ACS omega** 8 (47), 2023.

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8. B. Rajabifar, G. F. Meyers, R. Wagner, A. Raman, "A Machine-Learned Approach to Characterize the Adhesive and Mechanical Properties of Soft Polymers Using Peak Force Tapping AFM", **ACS Macromolecules**, 55(19), 8231, 2022.
9. Y. M. Efremov, Efremov, D. M. Suter, P. S. Timashev, A. Raman, "3D nanomechanical mapping of subcellular and sub-nuclear structures of living cells by multi-harmonic AFM with long-tip microcantilevers", **Scientific Reports**, 12 (1), 1, 2022.

2021

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Refereed conference papers

1. Y. Efremov, M. Velay-Lizancos, D. Suter, A. Raman, “Anisotropic Mechanical Properties of Living Cells Revealed by Integrated Spinning Disk Confocal and Atomic Force Microscopy”, 62nd Annual Meeting of the Biophysical-Society Location: San Francisco, CA, February 17-21, 2018. Abstract published in *Biophysical Journal*, 114(3): S1, 513A-513A, 2018.
2. J. R. Chagdes, J. J. Liddy, J. E. Huber, H. N. Zelaznik, S. Rietdyk, A. Raman, and J. Haddad, “Dynamic instabilities induced through altered visual cues and their relationship to postural response latencies”, ASME International Design Engineering Technical Conferences and

- Computers and Information in Engineering Conference (IDETC/CIE), Charlotte, NC, August 21-24, 2016.
3. D. R. Cruise, J. R. Chagdes, A. Raman, "Dynamics of upright posture on an active balance board with tunable time-delay and stiffness", ASME International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC/CIE), Location: Charlotte, NC, August 21-24, 2016.
 4. A. Athamneh, R. Amezcua, A. Raman, Y. Efremov, D. Suter, "Modeling Mechanically-Induced Growth Cone Advance Reveals the Importance of Micrometer-Scale Elastic Adhesion Structures in Rigidity Sensing", 60th Annual Meeting of the Biophysical-Society Location: Los Angeles, CA, Feb 27-March 2, 2016.
 5. J. R. Chagdes, D. Cruise, J. M. Haddad, S. Rietdyk, H.N. Zelaznik, A. Raman, "Understanding the role of time-delay on maintaining upright stance on rotational balance boards", ASME IDETC/CIE, Boston, MA, August 2-5, 2015.
 6. J. Bhardwaj, B. Yao, A. Raman, "Auto-parametric resonance in cable-actuated systems", IEEE International Conference on Robotics and Automation (ICRA), Hong Kong, May 31-June 07, 2014.
 7. A. Fruehling, R. Tung, A. Raman, D. Peroulis, "In situ monitoring of dynamic bounce phenomena in RF MEMS switches, 12th International Workshop on Micro and Nanotechnology for Power Generation and Energy Conversion Applications (PowerMEMS), Atlanta, Dec 02-05, 2012.
 8. D. Kiracofe and A. Raman, "Nonlinear frequency response of atomic force microscope cantilevers at the solid-liquid interface, ASME IDETC/CIE, Chicago, Aug 12-15, 2012, Proceedings of ASME IDETC/CIE, 5, 319-328 2012.
 9. A. Cartagena, W-H Wang, R. L. Geahlen, A. Raman, "Quantitative mapping of local mechanical properties of living cells at near-physiological conditions using multi-harmonic atomic force microscopy", ASME Summer Bioengineering Conference (SBC), Fajardo, PR, June 20-23, 2012, Proceedings of the ASME Summer Bioengineering Conference, 523-524, 2012.
 10. J. R. Chagdes, S. Rietdyk, J. M. Haddad, H. N. Zelaznik, A. Raman, "Nonlinear dynamics and bifurcations in postural control on rigid surfaces and rotational balance boards", ASME Summer Bioengineering Conference (SBC) Fajardo, PR, June 20-23, 2012, Proceedings of the ASME Summer Bioengineering Conference, 1075-1076, 2012.
 11. D. Kiracofe and A. Raman, "Unifying theory of quantitative atomic force microscopy using piezo excitation in liquids", ASME IDETC/CIE, Washington, DC, Aug 28-31, 2011, Proceedings of the ASME IDETC/CIE, 7 (507-524), 2012.
 12. D. Kiracofe and A. Raman, "Nonlinear dynamics of microcantilevers in liquid environment atomic force microscopy when operating at the second eigenmode: subharmonics, multiple impacts, and chaos", ASME IDETC/CIE, Montreal, Aug 15-18, 2010, Proceedings of the ASME IDETC/CIE, 4(477-487), 2010.
 13. J. Melcher and A. Raman, "Compositional mapping in dynamic atomic force microscopy in high-Q vs. low-Q environments: effects of cantilever nonlinear dynamics", A ASME IDETC/CIE, Montreal, Aug 15-18, 2010, Proceedings of the ASME IDETC/CIE, 4(525-531), 2010.
 14. X. Wu, R. Wagner, A. Raman, R. Moon, A. Martini, "Elastic Deformation Mechanics of Cellulose Nanocrystals", TMS 2010 Annual Meeting Supplemental Proceedings on Materials Processing and Properties, Seattle, 2010.
 15. M. Strus, L. Zalamea, C. Cano, A. Raman, R. B. Pipes, and C. V. Nguyen, "Interfacial energy between carbon nanotubes and polymers measured from nanoscale peel tests in the atomic force microscope", CNT-NET 2007, Cambridge, UK, 2009.

16. M. Strus, L. Zalamea, A. Raman, R. B. Pipes, and C. V. Nguyen, "Nanomechanical peeling of carbon nanotubes and nanocoils studied using the atomic force microscope", ASME-IDETC, Brooklyn, 2008.
17. R. Bidkar, M. Kimber, A. Raman, A. K. Bajaj, "Nonlinear aerodynamic damping of beams at high oscillatory Reynolds numbers", 9th International Conference on Flow-induced Vibration, Prague, Czech Republic, 327, 2008.
18. M. Strus, A. Raman, "Interfacial peeling of carbon nanotubes and nanocoils using the atomic force microscope", ASME-International Design Engineering Technical Conferences, Brooklyn, 2008.
19. J-W. Lee, H. Sumali, A. Raman, "Squeeze film camping of flexible microcantilevers at low ambient pressures", ASME-International Design Engineering Technical Conferences, Brooklyn, 2008.
20. R. Tung, A. Jana, A. Raman, "Hydrodynamic damping of microcantilevers oscillating near solid walls at low Knudsen numbers", ASME-International Design Engineering Technical Conferences, Brooklyn, 2008.
21. R. Bidkar, A. Raman, and A. K. Bajaj, "Aeroelastic stability of thin ribbons and wide webs", ASME-IDETC, Las Vegas, 2007.
22. M. Strus, L. Zalamea, A. Raman, R. B. Pipes, and C. V. Nguyen, "Nanomechanical peeling studied using the Atomic Force Microscope", ASME-IDETC, Las Vegas, 2007.
23. M. Spletzer, A. Raman, and R. Reifenberger, "Elastometric sensing using higher modes of microcantilevers", ASME-IDETC, Las Vegas, 2007.
24. M. C. Strus, A. Raman, "Peeling of Carbon Nanotubes using an Atomic Force Microscope," International Conference on Nanoscience and Technology, Basel, Switzerland, 2006.
25. S. Basak, A. Raman, "Dynamics of microcantilevers tapping on nanostructures in liquid environments", International Mechanical Engineering Congress and Exposition 2006, Chicago, Illinois, 2006.
26. S. Basak, A. Raman, A., S. Garimella, "Hydrodynamic loading of vibrating microcantilevers in liquids", International Mechanical Engineering Congress and Exposition, Orlando, Florida, 2005.
27. S. Hu, and A. Raman, "Subharmonics and chaos in tapping mode atomic force microscopy", International Mechanical Engineering Congress and Exposition, Orlando, Florida, 2005.
28. R. A. Bidkar, A. Raman, A. K. Bajaj, "Aeroelastic flutter at the free edges of uni-axially tensioned webs and thin films", International Mechanical Engineering Congress and Exposition, Orlando, Florida, 2005.
29. M. Spletzer, A. Raman, R. Reifenberger, A. Wu and X. Xu, "Biochemical Mass Detection Using Mode Localization in Microcantilever Arrays", International Mechanical Engineering Congress and Exposition, Orlando, Florida, 2005.
30. Lee S-I, Raman, A., S. Howell, R. Reifenberger, C. Nguyen, M. Meyyapan, "Complex dynamics of carbon nanotube tips", ASME International Mechanical Engineering Conference and Symposium, New Orleans, November, Washington DC, 2003.
31. Conley, W. G., Raman, A., Krousgrill, C. M., "Nonlinear dynamics in Tomlinson's model of atomic scale friction", ASME International Mechanical Engineering Conference and Symposium, New Orleans, November, Washington DC, 2003.
32. Kang N. and Raman, A. "Aeroelastic Flutter of a Flexible Disk Rotating in an Enclosed Compressible Fluid," ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, Chicago, September 2003.

33. Basak, S., Raman, A., and Garimella, S., "Dynamic response optimization of asymmetrically configured piezoelectric fans", Symposium on Piezoelectric and Magnetostrictive Actuators Including MEMs Devices, ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, Chicago, September 2003.
34. Jana, A., and Raman, A., "Aeroelastic flutter of a rotating disk in an unbounded compressible inviscid fluid", ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, Chicago, September 2003.
35. Raman, A., Hansen, M., and Mote Jr., C. D., "Post-flutter Dynamics of a Rotating Disk", 2nd MIT Conference on Computational Fluid and Solid Mechanics, MIT, Cambridge, MA, June 2003.
36. Vaughan, M., and Raman, A., "Vibration and Stability of Axially Moving Webs Coupled to Surrounding Air", International Web Handling Conference, Stillwater, OK, June 2003 (winner of the best paper award).
37. Lee, S-I, Raman, A., Howell, S., Refenberger, R. "Nonlinear Tapping Tip Dynamics in Atomic Force Microscopy", at the MEMS symposium, ASME International Mechanical Engineering Conference and Symposium, New Orleans, November, 2002.
38. Bürmann, P, Raman, A., Garimella, S., "Dynamics and Topology Optimization of Piezoelectric Fans", Thermal Challenges in the next Generation Electronic Systems (THERMES), Santa Fe NM, January 2002.
39. Jana, A., and Raman, A., "Nonlinear Dynamics of a Flexible Spinning Disc Subjected to Combined External and Parametric Excitation", 18th ASME Biennial Conference on Mechanical Vibration and Noise, Pittsburgh, PA, September 2001.
40. Raman, A., Wolf, K. D., and Hagedorn, P., "Observations on the Vibrations of Paper Webs", International Web Handling Conference, Stillwater, OK, June 2001.
41. Vyas, A., Bajaj, A. K., and Raman, A., "Performance Enhancement of an Autoparametric Vibration Absorber using Multiple Pendula", IMECE, Orlando, FL, November 2000.
42. Raman, A. and Mote Jr., C.D., "Slowly Modulated Traveling Waves in Imperfect Disks Spinning Near Critical Speed", 17th ASME Biennial Conference on Mechanical Vibration and Noise, Las Vegas, Nevada, September 1999.
43. Raman, A. and Mote Jr., C.D., "Nonlinear Oscillations of Circular Plates near Critical Speed", Symposium on Nonlinear Dynamics and Stochastic Mechanics, IMECE, Dallas, TX, 1997.
44. Raman, A., Davies, P. and Bajaj, A.K., "Analytical Prediction of the Response of Nonlinear Systems to Nonstationary Excitation", 14th ASME Biennial Conference on Mechanical Vibration and Noise, Albuquerque, NM, September 1993.

Books and book chapters

1. *150 Years of Purdue Engineering: Celebrating Our Consequential Impact on the World*, Purdue University Press, by Arvind Raman, Jim Small, 2025.
2. *Engineering 50 Years from Today : A Purdue Engineering Community Perspective*, Purdue Scholarly Publishing Services, Edited by Arvind Raman, 2026.
3. *Mechanics of Materials: A Lecturebook*, XanEdu Press, by Chuck Krousgrill, Kejie Zhao, and Arvind Raman, 2022.
4. *Book chapter: S. Balasubhramaniam, D. Kiracofe, and A. Raman, Understanding surface forces using static and dynamic approach-retraction curves*, in Scanning Probe Microscopy

for Industrial Applications: Nanomechanical Characterization by Dalia G. Yablon, Wiley, 2013.

5. *Book chapter*: A. Raman, R. Reifenberger, J. Melcher, R. Tung, *Cantilever dynamics and nonlinear effects in atomic force microscopy*, in *Noncontact Atomic Force Microscopy*, pp.61-395, Vol. 2 in the Springer book series Nanoscience and Nanotechnology, Editors: S. Morita, F. J. Giessibl, R. Wiesendanger, 2009.
6. *Book chapter*: D. Kiracofe, J. Melcher, A. Raman, *Fundamentals of AFM cantilever dynamics in liquid environments*, in *Atomic Force microscopy in Liquid*, Wiley VCH, Editors: A. Baró and R. Reifenberger, 2012.

Patents

Non-provisional

1. A. Raman, D. Feng, R. B. Wagner, "Systems and methods for measuring tension distribution in webs of roll-to-roll processes" (PRF 69365-02 and 69365-03), based on collaboration with Applied Materials, non-provisional patent filed April 2022.
2. A. Raman, and S. Garimella, "Piezoelectric Device with Feedback Sensor" (US Patent 6 713 942).

Provisional

1. Raman, R. Reifenberger, J. Melcher, "Atomic Force Microscope including accelerometer", US 20110041224 A1.
2. R. Reifenberger, A. Raman, L. Biedermann, M. Yazdanpanah, "Ultrasoft atomic force microscopy device and method", 12/709118
3. K. Bajaj, A. Raman, Peroulis D., "Nonlinear Internal Resonance Based Micromechanical Resonators", 11/496881

Plenary/Invited/Department Colloquium talks

1. Keynote speaker, Royal Microscopy Society's Annual AFM/SPM conference. Sheffield, UK, 2022.
2. Keynote speaker, Bionanomechanics conference, Madrid, Spain, 2021.
3. Keynote speaker, Multi-frequency Atomic Force Microscopy Conference, Madrid, 2021.
4. Keynote speaker, AFM for Biomedicine conference, Muenster, Germany, 2019.
5. Invited speaker, Multi-frequency Atomic Force Microscopy conference, Madrid, 2018.
6. Keynote speaker, Micro and Nanosystems Conference, ASME International Design Engineering Technical Conferences, Cleveland, OH, 2017.
7. Keynote speaker, 2017 SEM Annual Conference & Exposition on Experimental & Applied Mechanics, Indianapolis, IN, 2017.
8. Invited speaker, International Scanning Probe Microscopy Conference, Grindenwald, Switzerland, 2016.
9. Invited Speaker, IMA workshop on Quantum and Nanoscale control, April 2016.
10. Invited speaker, SPM on SPM conference, Toronto, 2014.

11. Invited speaker, MRS Fall conference, Boston, 2014.
12. Invited speaker, MRS Spring conference San Francisco, 2014.
13. Invited speaker, University of Massachusetts, Amherst, Polymer Science and Engineering Department, 2014.
14. Invited speaker, Seeing at the Nanoscale Conference, Northwestern University, April, 2013.
15. Colloquium speaker, *New York University*, February 2013.
16. Invited speaker, International Colloquium on Scanning Probe Microscopy, Okinawa, Japan, 2012.
17. Colloquium speaker, *Penn State University*, October 2012.
18. Invited Speaker, American Chemical Soc Conference, Philadelphia, 2012.
19. Invited Speaker, Multi-frequency Atomic Force Microscopy Conference, Madrid, 2012.
20. Invited speaker, International Materials Research Conference, Cancun Mexico, 2012.
21. Colloquium speaker, *University of Pennsylvania*, April 2012.
22. Plenary speaker (one of 4 selected out of >1000 NSF grantees in the CMMI Division) at the NSF-CMMI grantees meeting, Atlanta, 2011.
23. Invited Speaker, 2011 MRS conference, Scanning Probe Microscopy Symposium, Boston 2011.
24. Invited Speaker, Multi-frequency Atomic Force Microscopy Conference, Madrid, 2011.
25. Invited speaker, Korea Nano and IEEE nano conference, Seoul 2010.
26. Colloquium speaker, *Mc Gill University*, Canada, Nov 2010.
27. Colloquium speaker, *University of Bristol*, Engineering Mathematics, 2010.
28. Colloquium speaker, *University of Oxford*, Biomedical Engineering Department, May 2010.
29. Colloquium speaker, *University of Pittsburgh*, Mechanical Engineering and Materials Science, 2010.
30. Invited speaker, Microscopy and Microanalysis conference, Oregon, 2010.
31. Invited speaker, Linz Workshop on single molecule research and nanoscience, Austria, 2010.
32. Invited speaker, Workshop on dynamics and control at the nanoscale, IBM Zurich, Dec 2009.
33. Invited speaker, International Conference on Scanning Probe Microscopy, Madrid, 2009
34. Invited speaker, Southwest European Nano conference, Bordeaux, November, 2008
35. Physics colloquium speaker, *Yeshiva University*, 2007.
36. Colloquium speaker, *Duke University*, 2006.
37. Colloquium speaker, *Cornell University*, September 2004.
38. Colloquium speaker, *Yale University*, November 2003.
39. Colloquium speaker, *University of Illinois*, Urbana Champaign, October 2003.
40. Invited speaker at NSF workshop on the role of Mechanical Engineering in Nanoscale science, Arlington, VA, June 2003.
41. Invited speaker at the NSF Dynamic Systems and Control (DSC) division sponsored workshop on Nanoscale Dynamics, Sensing, and Control, Denver, June 2003.
42. Invited speaker, *California Institute of Technology*, Pasadena, CA, 2003.
43. Colloquium speaker, *Carnegie Mellon University*, Pittsburgh, PA, 2002.

Selected Press Coverage

1. *For academic parents, work travel can be costly—but some universities are stepping up their support*, Science Magazine, 2019
2. *Measures of Subtle Movements While Standing Detects Neurologic Problems in MS Patients and Athletes with Concussions*, Multiple Sclerosis News, 2016.

3. *Technique measures 'postural sway' to diagnose neuromuscular disorders*, Science Daily, 2016.
4. *Atomic force microscope advance leads to new breast cancer research*, physics.org, 2015.
5. *Microscope probes living cells at the nanoscale*, Physics World, 2011.
6. *New medical research tool possible by probing cell mechanics*, R&D Magazine, 2011
7. *Nanotechnology uncovers the mechanical complexion of live cells*, Oxford University Martin School, 2011.
8. *Atomic Force Microscopy maps nanomechanical properties of cells*, National Cancer Institute, 2011
9. *A framework to evaluate the uncertainties of AFM nanomechanical measurements*, Nanowerk spotlight, 2011.
10. *Discovery to aid study of biological structures, molecules*, featured on NSF, physnews.org, 2009.
11. *Virtual world is sign of future for scientists, engineers*, PhysOrg.com, Science Daily, 2008.
12. *Sticky nanotubes hold key to future technologies*, Nano Today, EETimes.com, Inside Purdue, Bio-Medicine.org, Indo-Asian News Service, Nanotech Now, Nanotechwire.com, PhysOrg.com, Science Daily, Small Times, 2008.
13. *Purdue engineers solve chaos mystery in use of high-tech microscope*, Nature Materials, R and D magazine, Electronic Engineering Times, innovations-report.com, monstersandcritics.com, Nanotechnology Now, nanovip.com, PressZoom, Science Daily, TMCNet.com, UPI, YubaNet, 2006.
14. *Engineers point way to better use of nanotubes as measuring tips*, monstersandcritics.com, Nanotechnology Now, PhysOrg.com, Science Daily, UPI
15. *Flap over hot chips*, **The Economist**, Quarterly Technology Review, March 2002. **WISH TV**, Indianapolis, 5:30 pm News, January 22, 2002.
16. *Wiggling Fans and Other Ways to Keep a Computer Cool*, **New York Times**, October 18, 2001.
17. *Swaying fans may cool new chips*, **New Scientist**, December 17, 2001.
18. *Le refroidissement intégré in Six technologies qui peuvent tout changer (Six technologies that can change everything)*, Section on future technologies, **L'ordinateur Individuel**, France, July 2002.

Sponsored Research

PI of Extramural Grants Totaling \$77.2 M

Funding Sources: National and international agencies NSF, NASA, USDA, USAID, NIH, NNSA, Colciencias-Fulbright, Korea Institute of Machinery and Materials, and corporate sponsors including Boeing, Procter and Gamble, Dow, ExxonMobil, Seagate, Apple Computers, Delphi-Delco Electronics, R.R. Donnelley and Sons etc.

1. USAID, LASER PULSE, \$70M cooperative agreement 2018-2023 (PI). Project granted unprecedented 5 year no-cost extension to accommodate \$20M of new research.
2. NSF, CMMI, GOALI: Multi-frequency dynamics in the Atomic Force Microscope, 2017-2022, \$ 542K (PI, co-I's A. Bajaj and R. Reifenger).
3. USAID, Food process innovation lab, Preliminary Testing and evaluation of a Solar Powered Small Batch Crop Dryer with Frameless Inflatable Channel, 2016-17, \$20K (PI, co-I is Prof. Strohshine, ABE).

4. NSF, Scalable Nanomanufacturing Program, Large scale manufacturing of low-cost functionalized carbon nanomaterials for energy storage and biosensor applications, 2013-2017, \$1.487M (PI).
5. NSF, Nonlinear Dynamics and Bifurcations of Human Posture on Tunable Balance Boards, 2013-2016, \$550K (PI).
6. *Purdue- Colciencias-Fulbright fellowship program*, 2011-2014, \$ 1.492M (PI).
7. NSF, US-Colombia workshop on Nanotechnology Applications in Energy and Medicine, 2012, \$49K.
8. USDA (Forest Products Laboratory), *Metrology of Cellulose Nanoparticles and Composites*, 2009-2013, \$120K. (PI)
9. Engineering, Physical Science Research Council (UK), *Advanced dynamic atomic force microscopy methods for high-resolution in vitro biomechanical assays of cancer cells*, with Dr. S. Contera, Biophysics, Oxford, 2010 (funding for sabbatical research at Univ. of Oxford), \$100K.
10. NSF, Materials World Network and the biomaterials program, (a cooperation with the Departamento de la fisica de la materia condensada, Universidad Autonoma de Madrid), *Probing in-vitro structure-property-function of viruses at high resolution using advanced dynamic atomic force microscopy methods*, 2010-2013, \$320,000 (PI).
11. Dow Chemicals, *The computational atomic force microscope*, 2010-2013, \$300,000 (PI).
12. NSF, *GOALI: Nonlinear, multi-modal, and stochastic dynamics of low-stiffness microcantilevers in liquid environment Atomic Force Microscopy*, 2009-2012, \$360,000 (PI).
13. National Institutes of Health, STTR, *Ultrasoft atomic force microscope technology using nano-cantilevers for high-resolution imaging of biological molecules*, 2009-2010, \$67,000 (co-PI, Prof. Raman's share was \$34K).
14. National Nuclear Safety Administration: *PRISM –Center for predictive reliability, integrability, and survivability of microsystems*, 2008-2013, \$17M (co-PI, Prof. Raman's share was \$500K).
15. NSF, *Parametric amplification and resonance in nanotube and nanowire resonators*, 2008-2011, (co-PI, Prof. Raman's share was \$100,000)
16. Phantom Works (Boeing): *Boeing-Purdue project: atoms to aircraft program*, 2009-2012, \$1.25 M (co-PI, Prof. Raman's share was \$250,000).
17. NSF: *NIRT- Cyber enabled predictive models for polymer nanocomposites:multi-resolution simulations and experiments*, 2009-2012, \$1.25 M (co-PI, Prof. Raman's share was \$310,000).
18. NSF, *NIRT/GOALI: Development of a Multiscale Hierarchical Nanomanufacturing Tool*, 2007-2011 (co-PI, PI is Xianfan Xu), \$1M (Prof. Raman's share was \$ 50K).
19. NSF, *Nonlinear dynamics of microcantilevers interacting with nanostructures – new paradigms for ultrasensitive atomic force microscopy*, 2007-2010, \$250,000 (PI).
20. Sandia National Laboratories, (NSF- Sandia program on “Engineering sciences for modeling and simulation based life-cycle engineering and manufacturing”), *Fluid-structure interactions in microsystems*, 2006-2009, \$375, 000 (PI).
21. Milltec Corporation, *Characterizing the QPI nanoTrek Sensor*, 2007-2008, \$ 165,060 (co-PI, Prof. Raman's share was \$82,000).
22. NSF, *NIRT: Chemically tunable nanoelectronic and nanoelectromechanical systems*, 2005-2009 (co-PI, PI is Moonsub Shim, University of Illinois, other co-PI's include N. Aluru, M. Strano, Univ. of Illinois, and M. Saeedi, Purdue University), \$1M (Prof. Raman's share was \$120,000).

23. Network for Computational Nanotechnology (NCN), Purdue University, 2006-2008, *VEDA- a Virtual Environment for Dynamic AFM*, \$100,000 (PI).
24. Purdue Research Foundation, 2006-2007, *Parametric resonance based atomic force microscopy*, \$15,000 (PI).
25. Purdue Center for Advanced Manufacturing 2004, *Dynamics of high-speed axially moving flexible materials in web handling and processing systems*, \$30,000 (PI).
26. NSF, 2004-2007, *Nonlinear dynamics of microcantilevers interacting with nanostructures – applications to biomolecular sensing and nanotribology*, \$220,000, (PI).
27. M2N Inc, Korea, 2005-2007, *Mechanics and vibrations of carbon nanotube tipped atomic force microscopy probes*, \$65,000 (PI).
28. Korean Institute of Machinery and Materials, 2003-2005, *Mechanics and vibrations of carbon nanotube tipped atomic force microscopy probes*, \$117,388 (PI).
29. Institute for Nanoelectronics and Computation (NASA-URETI), Purdue University, 2003-07, *Carbon nanotube vibrations and applications to novel nanoscale sensors and probes*, \$130,000 (PI).
30. Procter and Gamble, Corporate R and D center, 2003-4, gift to support research in the area of *traveling web mechanics*, \$106,000 (PI).
31. NSF, 2003-04, SGER for *Development of a Multiscale Manufacturing Center*, \$100,000 (co-PI, Prof. Raman's share was \$15,000)
32. Molecular Imaging, 2003, donation for research collaboration towards the purchase of a new AFM system, \$20,000 (PI).
33. Purdue Research Foundation, 2003-2005, *Exploiting nonlinear dynamics in atomic force microscopy for the novel mechanical property characterization of nanostructures*, \$27,000 (PI).
34. Purdue Graduate School, special initiatives fellowship, 2003-04, *Novel spectroscopy methods in AFM and their applications to modern structural cell biology*, \$15,000 (PI).
35. Gelcore Inc, 2003-2005, *Piezoelectric fans for lighting applications*, \$128,000 (co-PI, Prof. Raman's share was \$64,000).
36. Cooling Technologies Research Consortium, Purdue University, 2003-2005, *Ultrasonic Piezoelectric Fans*, \$ 60,000 (co-PI, Prof. Raman's share was \$30,000).
37. NSF, CAREER award, 2002-2007, *Nonlinear Mechanics and Aeroelastic Stability of High-Speed Rotating Disks and Translating Webs*, \$400,000 (PI).
38. R.R. Donnelley and Sons, 2002-2003, *Web Vibration Prediction and Control*, \$ 55,522 (PI).
39. NSF, 2001-2005, *Vibrations and Nonlinear Dynamics of Microcantilevers Interacting with Nanoscale Structures-Applications to Atomic Force Microscopy*, \$214,045 (PI).
40. Seagate Technologies, 2002, gift for research in the area of *flow structure interactions in rotating disks*, \$10,000 (PI).
41. Delphi-Delco Electronics, 2002, *Microscale Pumping Technologies for Microchannel Heat Sinks*, \$ 10,000 (co-PI, Prof. Raman's share was \$5,000).
42. Apple Computers (my share 50%), 2001, *Miniaturized Piezoelectric Fans for Thermal Management of Laptop Computers*, \$10,000 (co-PI, Prof. Raman's share was) \$5,000.
43. Cooling Technologies Research Consortium, Purdue University, 2001-2003, *Smart, Miniaturized Piezoelectric Fans for Small Scale Cooling Applications*, \$ 60,000 (co-PI, Prof. Raman's share was \$30,000).
44. TRASK award, Office of Technology Commercialization, Purdue University, 2000-2001, *Smart Resonant Bimorph Devices for Small Scale Cooling Applications*, \$99,500 (co-PI, Prof. Raman's share was \$49,750).

45. Purdue Research Foundation Research Grant, 2000-2002, *Self-excited Oscillations of High-speed Rotating Disk Systems*, \$27, 000 (PI).
46. Purdue Research Foundation Summer Faculty Grant, 2001, *Nonlinear Dynamics and Vibrations of Microcantilevers in High-speed Atomic Force Microscopy*, \$6,000 (PI).
47. IBM Technical Gifts Program, 2000, two optical tables, and one laminar flow hood, approximately \$28,000 when new (PI).

Teaching

Professor Raman taught the following classes at Purdue University with an average instructor rating of 4.3/5:

1. ENGR 103, Global Learning Community, Fall 2015 (5.0 instructor rating)
2. ME 297, Pre-departure class for Spain and Colombia, Fall 2015
3. Upper division Mechanics of Materials, ME 323 in Spring 2000, Fall 2000, Fall 2001, Spring 2003, Fall 2003, Fall 2004, Spring 2005, Fall 2005, Spring 2006, Fall 2006, Fall 2007, Fall 2009, Fall 2011, Fall 2012.
4. Graduate level Vibrations of Discretized systems, ME 564/664, Spring 2001, Spring 2002, Spring 2004, Spring 2009
5. Graduate level Nonlinear Engineering Systems, ME 580, Fall 2002, Fall 2008.
6. Graduate level Advanced Dynamics, ME562 in Spring 2008, Spring 2011, Spring 2012
7. Graduate level course on Atomic Force Microscopy, Summer 2004, Spring 2005, Spring 2006, Fall 2009, Fall 2010, Fall 2012.

Professor developed/adapted the following new classes at Purdue University:

1. *Fundamentals of Atomic Force Microscopy*– full semester class on the theory of Atomic Force Microscopy co-developed with Ron Reifenger (Physics). Full semester lectures posted on nanoHUB have been accessed more than 10,000 times worldwide.
2. *nanoHUB University - Fundamentals of Atomic Force Microscopy*: 10 week online course on fundamental theory of AFM co-developed with Ron Reifenger (Physics). ~150 students registered worldwide (\$50 for registration).
3. *Global engineering capstone design* – Senior capstone design pairing ME capstone design teams with local NGO's, small businesses, and entrepreneurs in Kenya, Ethiopia, Nigeria, and India to develop market-driven frugal innovations for sustainable development challenges (see photos below).
4. *Global Engineering Learning Community* – for freshman engineering students at Purdue to learn about global grand challenge problems, state of the art, geopolitical developments around the globe and what challenges/opportunities they imply for engineering-based US businesses.



Examples of undergraduate design projects: Robbery proof hard soap dispenser for schools in Ethiopia in collaboration with Catholic Relief Services at left, and low-cost solar/battery powered small batch corn dryer with the Kenyan Agricultural and Livestock Research Organization (KALRO) at right.

Doctoral students supervised (Twenty three, two currently supervised)

1. Dan Feng, PhD 2021, *Thermomechanics and vibrations of roll to roll nanomanufacturing and functional printing processes*. Currently postdoctoral associate at Purdue.
2. Bahram Rajabifar, PhD 2021, *Dynamic AFM on polymer surfaces*. Currently at 3M Inc.
3. Devin Kalafut, PhD 2021, *Uncertainty quantification in nonlinear dynamical systems*. Currently at Boston Scientific.
4. Maria Jose Cadena, PhD 2019, *Advanced Dynamic AFM methods to probe materials for energy applications*. Currently at Bruker corporation.
5. Denise Cruise, PhD 2019, *Dynamics of Humans standing on balance boards*. Currently at Guidance Engineering.
6. Nurul Huda Shaik, PhD 2017, *New multi-harmonic techniques for sensing tip-sample interactions and nanomechanical material property mapping in dynamic atomic force microscopy*. Currently at Siemens.
7. Alexander Cartagena, PhD 2014, *New dynamic AFM modes for highly sensitive biomechanical assays and molecular recognition on biological samples in liquids*, Stadtman fellow and Tenure Track Investigator at NIH NIBIB, Head of Cell Mechanobiology section.
8. Ryan Wagner, PhD 2014, *Advanced atomic force microscopy techniques for characterizing the properties of cellulosic nanomaterials*, currently Research Assistant Professor, Purdue University.
9. James Chagdes, PhD, 2012, *Nonlinear dynamics in human postural control*, Assistant Professor at Miami University, Ohio.
10. Ryan Tung, PhD, 2012, *Nonlinear dynamics and Fluid structure interactions in microsystems*, Assistant Professor at University of Nevada, Reno.
11. Daniel Kiracofe, PhD, 2012, Graduate School doctoral fellow, *Nonlinear dynamics in liquid environment atomic force microscopy*, currently at the University of Cincinnati.
12. John Melcher, PhD, 2011, *Nonlinear dynamics in atomic force microscopy*, Applied Physics Lab, Johns Hopkins University.
13. Gyan Prakash, PhD, 2010 (co-advised with Prof Reifengerger), *Parametric resonance based atomic force microscopy and mass-sensing in ambient and liquid environments*, Intel Corp.
14. Mark Strus, PhD, 2009, *Carbon nanotube mechanics in scanning probe microscopy*, NRC research fellow, NRC postdoc fellow at NIST Boulder, currently at SEAKR Engineering, Denver.
15. William G. Conley, PhD, 2009, *Nonlinear dynamics in nanomechanical systems*, Staff Scientist at Navsea-Crane, Indiana, currently at Office of Undersecretary of Defense.

16. Xin Xu, PhD, 2009, *Dynamic atomic force microscopy in liquids and applications to biological samples*, Postdoc at University of Colorado, Boulder.
17. Rahul Bidkar, PhD, 2008, *Flow-structure interactions in flexible structures*, GE research.
18. Matthew G. Spletzer, PhD, 2008, *New paradigms in microcantilever based sensors*, Staff engineer, Sandia national Labs.
19. Anirban Jana, PhD, 2008, *Aeroelastic flutter and fluid-structure interactions in rotating and stationary vibrating disks*, Senior Scientist, Pittsburgh Supercomputing Center, PA.
20. Shuiqing Hu, PhD, 2007, *Nonlinear dynamics and force spectroscopy in dynamic atomic force microscopy*, Bruker Scanning Probe Microscopy Division, Santa Barbara, CA.
21. Ashwin Vyas, PhD, 2007, (co-advised with Profs Bajaj and Peroulis), *Microresonator designs based on nonlinear 1:2 internal resonance between flexural-flexural and torsional-flexural structural modes*, Cummins Inc.
22. Sudipta Basak, PhD, 2007, *Dynamics of oscillating microcantilevers in viscous fluids*, Tasnix Corp, Australia.
23. Nam-Cheol Kang, PhD, 2004, *Aeroelastic stability of enclosed high speed rotating disks*, Professor, Department of Mechanical Engineering, Kyungpoon National University, S. Korea.

MS students supervised (fourteen)

1. Denise Hickman, MSME, 2014, *Balance platforms for studying human postural bifurcations*.
2. Leyla Yamin, MSME, 2013, *Exploiting cantilever dynamics signatures for mapping local material properties of live cells using AFM*.
3. Hank Thompson, MSME, 2013, *Nanomechanics of carbon nanotube and graphene interactions with polymers*.
4. Ryan Tung, MSME, 2008, *Flow-structure interactions of microcantilevers in viscous fluids*.
5. Trevor Slack, MSME, 2005, *Mathematical modeling and simulation of flexible media in web handling systems*.
6. Mauritz DeRidder, MSME, 2005, *Virus capsid mechanics* (non-thesis).
7. Lawrence Bradley Sharos, MSME, 2004, *High sensitivity mass detection using modal coupling phenomena in microcantilever and carbon nanotube resonators*.
8. Sydney Wait, MSME, 2004 (with Prof. Garimella), *Ultrasonic piezoelectric fans*.
9. Sudipta Basak, MSME, 2003 (with Prof. Garimella), *Mathematical modeling and optimization of the dynamics of piezoelectric fans and resonators*.
10. Merrill Vaughan, MSME, 2003, *Aeroelastic stability of axially moving webs coupled to incompressible flows*.
11. Tolga Acikalin, MSME, 2002 (with Prof. Garimella), *Thermo-fluid mechanics of piezoelectric fans*.
12. Ashwin Vyas, MSME, 2001 (with Prof. Bajaj), *Investigations into wideband autoparametric vibration absorbers for flexible structures*.
13. Philipp Bürmann, MSME, 2001, *Modeling and analysis of resonant piezoelectric fans* (non-thesis).
14. Mike Tiller, MSME, 2000, (with Prof. Krousgrill), *Vibrations and eigenvalue veering phenomena of coupled circular plates with applications to ultrasonic motor design* (non-thesis).

Postdoctoral fellows supervised (six)

1. Randi Potekin, *Nonlinear dynamics in multi-frequency AFM*, 2019-2020, currently at L3 Harris corporation.

2. Dr. Yuri Efremov, *AFM and cell biology*, 2015-2017, currently at Institute for Regenerative Medicine, Sechenov University, Russia.
3. Dr. Jim Chagdes, *Nonlinear dynamics of human balance*, 2013-2015, Associate Professor at Miami University, Ohio.
4. Dr. Xin Xu, 2011-onwards, *AFM applications in composites and Microsystems*, currently at CU Boulder.
5. Dr. Jin Woo Lee, 2007-2009, currently Assistant Professor in Ajou University, S. Korea, *Fluid structure interactions in MEMS*.
6. Dr. Nam-Cheol Kang, 2006, PhD Purdue University, currently Professor, Kyungpoon National University, S. Korea, *Mechanics and vibrations in web handling systems*.
7. Dr. Richard Zhang, 2004, PhD Purdue University, (co-advised with Prof. T. Fisher), currently at GE Research, *Nanothermomechanics*.
8. Dr. Soo-Il Lee, 2001-2003, currently Professor, University of Seoul, S. Korea, *Nonlinear dynamics and vibrations of microcantilevers in MEMS and scanning probe microscopy*.

Visiting scholars supervised (twelve)

1. Prof. Yuhang Chen, University of Science and Technology of China, 2016.
2. Prof. Mauricio Giraldo, NEXUS-Fulbright scholar, Head of Mechanical Engineering, Universidad Pontificia Bolivariana, Medellín, Colombia, 2013, *Nanofluidics of ion filtration in mangrove roots*.
3. Juan Vasquez Cifuentes, PhD student, Universidad Pontificia Bolivariana, Medellín, Colombia, Jan –Aug, 2013, *Gas damping of microcantilevers with slip*.
4. Alejandro Castañeda, PhD student, Department of Electronic Engineering, Universidad de los Andes, Bogotá, Colombia, 2013, *Multi-frequency electrical AFM methods for nanocomposites characterization*.
5. Mercedes Hernando-Pérez, PhD student, Condensed Matter Physics, Universidad Autónoma de Madrid, Spain, spring 2011, 2012, 2013, *Dynamic AFM methods for mapping physical properties of viruses*.
6. Maria Jose Cadena, MS student, Department of Electronic Engineering, Universidad de los Andes, Bogotá, Colombia, Feb-Aug 2012, *Multi-frequency electrical AFM methods for nanocomposites characterization*.
7. Oliver Peyton, PhD student, University of Bristol, 2011, *Laser vibrometry studies of cantilever dynamics in high-speed AFM*.
8. Juan Camilo Muñera, MS student, Universidad EAFIT, Medellín, Colombia, March, 2012, *Dynamic AFM studies of bitumen*.
9. Prof. Changsoo Han, Korean Institute of Machinery and Materials, 2003-2004, *Carbon nanotube probe fabrication and mechanics*.
10. Hyungwoo Lee, KAIST, Korea, 2003-2004, *Carbon nanotube probe fabrication and mechanics*.
11. Prof. Jong-Gil Lee, Andong University, Korea, 2003-2004, *Vibrations of carbon nanotube resonators*.
12. Jin-Woo Lee, Seoul National University, Korea, 2001, *Acoustic structure interaction in hard disk drives*.
13. Sebastian Rützel, Darmstadt University of Technology, Germany, 2000/2001, *Dynamic response of atomic force microscopes in high-speed scanning applications*.

Undergraduate researchers supervised for credit (eleven)

1. Matt Stienstra, 2012, ME 497 student, *Vibrations of nanowires*.
2. Tridib Saha, SURF student, 2011, *New control strategies for high speed AFM scanning*.
3. Steven Johnson, 2007, ME 497 student, *Shape optimization of AFM microcantilevers for operation in liquids*.
4. Melanie Kemerling, 2007, ME 497 student, *Cantilever biosensors using stem cells*.
5. Jin Xin, Spring intern, 2007, Purdue GEARE program, *Electronics for energy harvesting*.
6. Juliann Henderlong, 2006, NASA- Microgravity University project, *Microcantilever sensors under microgravity conditions*.
7. Luis Moreno, 2006, NASA- Microgravity University project, *Microcantilever sensors under microgravity conditions*.
8. Kedar Hippalgaonkar, 2006, Honor's thesis, *Wavelet transformed dynamic Atomic Force Microscopy*.
9. John Melcher, 2006, Honor's thesis, *Point mass models of continuous atomic force microscopy probes*.
10. Bill Conley, 2002, Honor's thesis, *Nonlinear dynamics in atomic scale friction*.
11. Spencer Patterson, 2002, ME 497 student, *Design of a web handling test system*.

Professional society activities

Associate Editor, ASME Journal of Applied Mechanics, 2006-2011.

Associate Editor, Journal of Fluids and Structures, 2006-2009.

Co-organizer MRS Symposium on Advances in Scanning Probe Microscopy methods, 2013

Co-Founder, past Chair of the ASME Technical Committee on Micro- and Nanosystems

Member, ASME Technical Committee on Sound and Vibration, 2003-2009.

Guest Editor, ASME Journal of Dynamic Systems Measurement and Control, for special issue on dynamic modeling, measurement and control in nanoscale systems, 2008.

Program Chair, ASME DED's 1st International Conference on Micro- and Nanosystems, 2007, Conference

Conference Chair, ASME DED's 2nd International Conference on Micro- and Nanosystems, 2008.

Symposium co-organizer, symposia on nonlinear dynamics and dynamics of micro and nanosystems at ASME DETC2003, DETC 2005, DETC 2007, DETC 2008, DETC 2009, DETC2010, DETC2011, IMECE 2003, 2004, 2005, 2006, "Flow-structure interaction in information storage systems" at the ASME Information Storage and Processing Systems Conference, Santa Clara, 2001, 2002, Symposium co-organizer, "Structural Dynamics and Stability", Society of Engineering Science (SES) 39th Annual Technical Meeting, Penn State University, 2002.

Reviewer for: Journal of Sound and Vibration, Nonlinear Dynamics, Journal of the Acoustical Society of America, Journal of Fluids and Structures, International Journal of Non-linear Mechanics, Journal of Vibration and Control, ASME Journal of Applied Mechanics, ASME Journal of Vibration and Acoustics, ASME Journal of Dynamic Systems, Measurement and Control, Zeitschrift für Angewandte Mathematik und Physik (ZAMP), Journal of Physical Chemistry, Proceedings of the Royal Society of London, Ultramicroscopy, Nature, Applied Physics Letters, Physical Review Letters, Physical Review B, Proc. Natl. Acad. Sci.

Cyber-infrastructure initiatives

Cloud based simulation tools for the AFM community: Developed the world's most-used computational simulation tool for AFM – the Virtual Environment for Dynamic Atomic Force Microscopy (VEDA) and deployed it on the cyber-infrastructure of the nanoHUB delivering state-of-the-art simulation tools for AFM to thousands of users worldwide. It has been adopted by many companies such as Asylum Research, Exxon Mobil, and Dow Chemicals. Launched the first on-line class called Fundamentals of Atomic Force Microscopy on the theoretical fundamentals of AFM on nanoHUB University with the lectures available as Podcasts or streaming videos, and assignments requiring the use of online simulation tools (VEDA).