PER G. REINHALL

CURRICULUM VITAE

Professor of Mechanical Engineering
Adjunct Professor of Industrial & Systems Engineering
Founding Director of the Boeing Advanced Research Center
Co-Founder of Engineering Innovation in Health at UW
UW Presidential Entrepreneurial Faculty Fellow
Member of the Washington State Academy of Science

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EDUCATION

Ph.D.	Caltech, Applied Mechanics	1982
M.S.	Caltech, Applied Mechanics	1978
B. S.	University of Washington, Mechanical Engineering	1977

APPOINTMENTS

University of Washington:

2011 – 2021	Chair of the Department of Mechanical Engineering
2001 – Present	Professor of Mechanical Engineering,
2001 – Present	Adjunct Professor of Industrial & Systems Engineering,
1988 – 2001	Associate Professor of Mechanical Engineering.
2000 – 2001	Adjunct Associate Professor of Industrial & Systems Engineering
1982 – 1988	Assistant Professor of Mechanical Engineering

VICIS, Inc:

2013 – 2019 Chief Technology Officer, Cofounder

Marine Construction Technology, PBC:

2011 – Present Chief Technology Officer, Cofounder

RoseBiopsy Inc:

2020 – Present Cofounder, Board Member

Presurge

2024 – Present Cofounder, Board Member

COMMERCIALIZATION AND INDUSTRY COLLABORATION

Co-Founder, Companies:

Rotodyne, Inc - Design, nonlinear finite elements, vibrations, and acoustics.
VICIS - Football helmets and sports safety equipment.

Marine Construction Technologies - Noise attenuation technologies for the marine construction industry
RoseBiopsy Inc – Biopsy technology to extract and image tissue.
Presurge – Continuous blood pressure measurement technology

Founder, University of Washington:
Engineering Innovation in Health @ UW
Boeing Advanced Research Center @ UW
Advance Composite Center @ UW (Cofounder)
PACCAR Advanced Research Center @ UW
E-Truck @ UW

FIELDS OF EXPERTISE

Dynamics and vibrations, Biomedical devices, Structural mechanics and design, Computation, Impact dynamics, Acoustics & noise control, Nonlinear time series analysis & big data, Controls & robotics, Biomechanics,

AWARDS

University of Washington

- Best Instructor of the Year Nomination by the Class of 1987
- Outstanding Faculty Award presented by Minority Science and Engineering Program, 1991
- University Distinguished Teaching Award Nomination by the College of Engineering, 1997
- College Teaching Award Nomination by the College of Engineering, 1997
- ASME Journal of Dynamics, Measurement and Control Best Journal Paper of the Year Award, 2004
- College of Engineering Community of Innovator Nomination for the IGERT team, 2007
- Second best paper at the ASME 2nd Frontiers in Biomedical Devices Conference, June 7-8, 2007 in Irvine, CA
- First Price, Washington Department of Transportation competition to decrease underwater noise during pile driving, April 2008
- Outstanding Paper Award, Engineering and Urology Society, 2009
- Presidential Entrepreneurial Faculty Fellow, 2014
- University of Washington School of Medicine Inventor of the Year Award, 2016
- ASME Journal of Dynamics, Measurement and Control Kalman Best Journal Paper of the Year Award, 2017
- Listed as inventor in Time Magazine's Top 25 Inventions of 2017
- Member of the Washington State Academy of Science, 2019 -

VICIS

Top 25 Inventions of 2017, Time Magazine
Top 8 Most Innovative Startups for 2017, Inc. Magazine
Top 10 Most Innovative Companies in Sports for 2018, Fast Company
Top-Ranked NFL/NFLPA Laboratory Test for 2017 - present
Top Rated 5 STAR, 2018 - present, Virginia Tech STAR Ratings

ARCHIVAL PUBLICATIONS (h-index = 39)

1. Reinhall PG, Storti DW, "Modeling and Analysis of the Dynamics of a Drill Penetrating a Thin Plate," ASME Journal of Applied Mechanics, Sept 1986, 690-694.
2. Miles R.N, Reinhall PG, "An Analytical Model for the Vibration of Laminated Beams including the Effects of Both Shear and Thickness Deformation in the Adhesive Layer," ASME Journal of Vibration, Acoustic, Stress, and Reliability in Design, Vol. 108, 1986, 56-64
3. Reinhall, PG, Ghassaei S, Choo, V.K.S., "An Analysis of Rivet Design in Electromagnetic Riveting," ASME Journal of Vibration, Acoustic, Stress, and Reliability in Design, Vol. 110 (1), 1988, 65-69
4. Reinhall PG, Park K., "Analysis of Mechanical Bowing Phenomena of Fuel Assemblies in Passively Safe Advanced Liquid Metal Reactors," Nuclear Technology, Vol. 83 (2), 1988, 197-204
5. Reinhall, PG, Caughey TK, Storti DW, "Order and Chaos in a Discrete Duffing Oscillator; Implications on Numerical Integration," ASME Journal of Applied Mechanics, Vol.56, no.1; 1989; p.162-7
6. Choo, VKS, Reinhall, PG, Ghassaei S., "Effect of High Rate Deformation Induced Precipitation Hardening on the Failure of Aluminum Rivets," Journal of Material Science, , Vol.24, 1989, 599-608.
7. Reinhall PG, Miles RN, "The Effect of Damping and Stiffness on the Random Vibration of Non- Linear Periodic Plates," Journal of Sound and Vibration, Vol. 132(1), 1989, 33-42
8. Wang W, Yee S, Reinhall PG, “Optical Viscosity Sensor using Forward Light Scattering” Sensors-and-Actuators-B-(Chemical), vol.B25, no.1-3;1995, 753-5
9. Storti DW, Reinhall PG, “Stability of In-Phase and Out-of-Phase Modes for a Pair of Linearly Coupled van der Pol Oscillators” Stability, Vibration and Control of Systems, Vol. 2 (B),1995, 1-23
10. Scheibe RR, Reinhall PG, "Safety Monitoring of Air Brake Systems On Board Commercial Vehicles", Transportation Research Record, No. 1560, 1996, 40-47
11. Reinhall PG, Carstens R, “Achieving Effective Pallet Stack Unitizing in Intermodal Shipping” The Journal of Packaging Technology and Engineering, Vol. 7 (4), 1998, 30-36
12. Grande KJ, Cochran RP, Reinhall PG, Kunzelman KS, “Stress Variations in the Human Aortic Root and Valve: The Role of Anatomic Asymmetry”, Annals of Biomedical Engineering”, Vol. 26:, 1998, p. 534-545
13. Arola D, Reinhall PG, Iverson S, Jenkins M “An Experimental Stress Analysis of a Novel Bike Frame” Experimental Techniques, Vol. 23, No.3**,** 1998, 21-24.
14. Grande KJ, Cochran RP, Reinhall PG, and Kunzelman KS, “Mechanisms of Aortic Valve Incompetence in Aging: Finite Element Modeling”, Journal of Heart Valve Disease, Vol. 8 (2), 1999, p. 149-156
15. Wang W, Reinhall PG, Yee S, “Fluid Viscosity Measurement using Forward Light Scattering”, Journal of Measurement Science and Technology, Vol. 10: 1999**,** 316-322
16. Grande KJ, Cochran RP, Reinhall PG, Kunzelman KS, “Mechanisms of Aortic Valve Incompetence in Aortic Root Dilatation: Finite Element Modeling”, Annals of Thoracic Surgery, Vol. 69 (6):1851-1857, 2000

17. Grande KJ, Cochran RP, Reinhall PG, Verrier ED, Kunzelman KS, “Re-Creation of Sinuses is Important for Aortic Valve-Sparing: a Finite Element Study” Journal of Thoracic and Cardiovascular Surgery, 119(4):753-63, 2000
18. Storti DW, Reinhall PG,” Phase-Locked Mode Stability for Coupled van der Pol Oscillators”, Journal of Vibration and Acoustics Vol.122 (3): 318-23, 2000
19. Yellin JM, Shen IY, Reinhall PG, Huang YH “An Analytical and Experimental Analysis for a One-Dimensional Passive Stand-Off Layer Damping Treatment”, Journal of Vibration and Acoustics, Vol. 122(4), 2000
20. Kandt LD, Reinhall PG, Scheibe RR,”Determination of Air Brake Adjustment from Air Pressure Data”, Journal of Automobile Engineering, Part D, Vol. 215, 2001, 21-26.
21. Constantine WLB, Reinhall PG, “Wavelet Based In-band Denoising Technique for Chaotic Sequences”, Journal of Bifurcation and Chaos, 11 (2), 2001, 483-495
22. Grande KJ, Cochran RP, Reinhall PG, and Kunzelman KS, “Simulation of Aortic Valve-Sparing: Influence of Graft Shape and Stiffness”, IEEE Transactions in Biomedical Engineering, Vol. 48(6), 2001, 647-659
23. Huang YH, Reinhall PG, Shen IY, Yellin JM, “Thickness Deformation of Constrained Layer Damping: An Experimental Evaluation”, Journal of Vibration and Acoustics, Vol. 123(2), 2001, 213-221
24. Huang YH, Reinhall PG, Shen IY, “A Comment on Boundary Conditions in the Modeling of Beams with Constrained Layer Damping Treatments” Journal of Vibration and Acoustics, Vol. 123(2), 2001, 280-284
25. Grande KJ, Cochran RP, Reinhall PG, Kunzelman KS, “Mechanisms of Aortic Valve Incompetence: Finite Element Modeling of Marfan Syndrome, Journal of Thoracic and Cardiovascular Surgery, 2001, 122(5), 946-954
26. Huang YH, Reinhall PG, Shen IY, Kumar V, “Utilization of Microcellular Foam Materials in Constrained Layer Damping Treatments”, Journal of Cellular Polymers, Vol. 20(2), 2001, 101-114
27. Constantine W, Percival DB, Reinhall PG, Inertial Range Determination for Aerothermal Turbulence Using Fractionally Differenced Processes and Wavelets,' Phys Review E, 64, 2001, 036301
28. Wang WC, Fauer M, Ho JN, Seibel EJ, Reinhall PG, “Micro-machined Optical Waveguide as a Resonant Optical Scanner”, Sensors and Actuators A: Physical, Volume 102, Issues 1-2, 1 Dec, 2002, 165-175
29. Low LA, Reinhall PG, Storti DW, “A Numerical Investigation of Phase-Locked and Chaotic Behavior of Coupled van der Pol Oscillators”, Journal of Vibration and Acoustics, Vol. 125, No. 2, 2003, 162-169
30. Einstein DR, Reinhall PG, Nicosia M, Cochran RP, Kunzelman K, “Dynamic Finite Element Implementation of Nonlinear, Anisotropic Hyperelastic Biological Membranes”, Computer Methods in Biomechanics and Biomedical Engineering, Vol. 6, No.1, 2003, 33-44
31. Smithwick Q, Reinhall PG, Seibel EJ, Vagner J, “A Nonlinear State Space Model of a Resonating Single Fiber Scanner for Tracking Control Theory and Experiment”, ASME Journal of Dynamic Systems, Measurement, and Control, Vol. 126, 2004, 88-101. **The Winner of the 2014 ASME- Journal of Dynamics, Measurement and Control Best Journal Paper of the Year Award.**

32. Einstein DR, Kunzelman K, Reinhall PG, Nicosia M, Cochran RP, “Haemodynamic Determinants of the Mitral Valve Closure Sound: A Finite Element Study”, IEEE Medical & Biological Engineering & Computing, 2004, 42(6), 832-46
33. Bardy GH, Lee KL, Mark DB, Poole JE, Packer DL, Boineau R, Domanski M, Troutman C, Anderson J, Johnson G, McNulty SE, Clapp-Channing N, Davidson-Ray LD, Fraulo ES, Fishbein DP, Luceri RM, Ip JH, the SCD-HeFT Investigators, “Amiodarone or an Implantable Cardioverter-Defibrillator for Congestive Heart Failure”, The New England Journal of Medicine, Vol. 352, No. 3, 2005, 225-237
34. Einstein DR, Kunzelman K, Reinhall PG, Nicosia M, Cochran RP, “The Relationship of Normal and Abnormal Microstructural Proliferation to The Mitral Valve Closure Sound.”, Journal of Biomechanical Engineering, Vol. 127, Issue 1, 2005, 134-147
35. Wang W-C, Dee J, Ledoux W, Sangeorzan B, Reinhall PG, “A Shear and Plantar Pressure Sensor Based on Fiber Optic Bend Loss”, Journal of Rehabilitation Research and Development, Vol.42 (3), May/Jun, 2005, 315-326
36. Einstein DR, Kunzelman K, Reinhall PG, Nicosia M, Cochran RP, “Nonlinear Fluid-Coupled Computational Model of the Mitral Valve” Journal of Heart Valve Disease Vol. 14, Number 3, May 2005
37. Mitchell JE, Battle J, Poole JE, SCD-HeFT Investigators, “Observations regarding outcome in minorities in the sudden cardiac death in heart failure trial” CIRCULATION 112 (17): U739-U739 3166 Suppl. 2, 2005
38. Wang W-C, Ho JN, Reinhall PG, “ Double-Sided Micromachining Process for Silicon Cantilever using a Parallel Capacitively Coupled Plasma”, Journal of Microlithography, Microfabrication, and Microsystems -- Volume 4, Issue 1, 2005.
39. Brown C, Reinhall PG, Seibel EJ, “Optomechanical Design and Fabrication of a Resonant Microscanner for a Scanning Fiber Endoscope” Journal of Optical Engineering, 45(4), 04300, 2006
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41. Mitchell JE, Hellkamp AS, Anderson J, SCD-HeFT Investigators, “Thyroid function and mortality in the sudden cardiac death in heart failure trial, CIRCULATION 114 (18): 805-806 Suppl. S OCT 31 2006
42. Low L, Goldman EB, Reinhall PG, Storti DW, “Coupled van der Pol Oscillators as a simplified Model for Generation of Neural Patterns for Jellyfish Locomotion”, Structural Control and Health Monitoring, 2006; 13: 417-429
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44. Smithwick Q, Vagner J, Reinhall PG, Seibel EJ, “An Error Space Controller of a Resonating Fiber Scanner: Simulation and Implementation”, ASME Journal of Dynamic Systems, Measurement, and Control, Journal of Dynamic Systems, Measurement, and Controls, 2006, December, Vol. 128: 899-913

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46. Yoon WJ, Reinhall PG, Seibel EJ, “Analysis of Electro Active Polymer Bending: A Component in a Low Cost Ultrathin Scanning Endoscope”, Sensors and Actuators: A. Physical, 133 (2007), 507-517
47. Dickinson MG, Ip JH, Olshansky B, Hellkamp AS, Anderson J, Poole JE, Mark DB, Lee KL, Bardy GH; SCD-HeFT Investigators. “Statin use was associated with reduced mortality in both ischemic and nonischemic cardiomyopathy and in patients with implantable defibrillators: mortality data and mechanistic insights from the Sudden Cardiac Death in Heart Failure Trial (SCD-HeFT)” Am Heart J 2007, 153(4):573-8.
48. Olshansky B, Bardy GH, Hellkamp AS, Poole JE, Mark DB, Lee KL, Anderson J, Johnson G, SCD-HeFT Investigators. “Where patients with mild - moderate heart failure die: Results from SCD-HeFT”, Am Heart J., 2007, 153(6):1089-94.
49. Panergo R, Liu C-S, Reinhall PG, Wang W-C, “Resonant Polymeric Optical Waveguide Cantilever Integrated for Image Acquisition”, Journal of Lightwave Technology, Vol 25(3), 2007, 850-860
50. Al-Khatib SM, Hellkamp AS, Lee KL, Anderson J, Poole JE, Mark DB, Bardy GH, the SCD-HeFT Investigators, “Implantable Cardioverter Defibrillator Therapy in Patients with Prior Coronary Revascularization in the Sudden Cardiac Death in Heart Failure Trial (SCD-HeFT)”, Journal of Cardiovascular Electrophysiology, Vol 19, Issue 10, 1059 – 1065, 2008
51. Poole JE, Johnson GW, Hellkamp AS, Anderson JA, Callans DJ, Raitt MH, Reddy RK,.Marchlinski FE, Yee R, Guarnieri T, Talajic M, Wilber DJ, Fishbein DP, Packer DL,.Mark DB, Lee KL and Bardy GH, SCD-HeFT Investigators, “Prognostic Importance of Defibrillator Shocks in Patients with Heart Failure” New Engl J Med 2008 359:1009-17.
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53. Blatt JA, Poole JE, Johnson GW, Callans DJ, Raitt MH, Reddy RK, Marchlinski FE, Yee R, Guarnieri T, Talajic M, Wilber DJ, Anderson J, Chung K, Wong WS, Mark DB, Lee KL, Bardy GH, the SCD-HeFT Investigators, “Defibrillation threshold testing not useful in primary prevention ICD implantation”, J. American College of Cardiology,Vol 52, Issue 7, 551-556, 2008
54. Pagel GA, Reinhall PG, Percival DB, “Should Second-order Structure Functions be used for Estimation of Inertial Range behavior in Measured Turbulence?: A comparative Study” Phys Review D, Nonlinear Phenomena, Volume 237, Issue 5, May 2008, 665-677
55. Wang W-C, Reinhall PG, “Polymeric Waveguide Design of a 2 D Display System”, IEEE/OSA Journal of Display Technology, Vol. 4, Issue 1, 28-38, 2008
56. Yoon WJ, Reinhall PG, Seibel EJ, “Development of an Automated Steering Mechanism for Bladder Urothelium Surveillance” Journal of Medical Devices, Vol.3, 2009

57. Hoksbergen JS, Ramulu M, Reinhall PG, Briggs TM, "A Comparison of the Vibration Characteristics of Carbon Fiber Reinforced Plastic Plate with those of Magnesium Plates" Journal of Applied Composite Materials, Vol. 16, No. 5, 263-283, 2009
58. Wang W-C, Lee S, Reinhall P, Nuckley D, "Development of an Electro-Optic Scanner for Potential Endoscope Application", ASME Journal of Medical Devices, 2010, Vol 3(2)
59. Dahl MC, Kramer PA, Reinhall PG, Benirschke SK, Hansen ST, Ching RP, "The Efficacy of using Vibrometry to Detect Osteointegration of the Agility Total Ankle", Journal of Biomechanics, Vol 43(9), 1840-1843, 2010
60. Kundrat M, Reinhall PG, Seibel EJ, "High Performance Open Loop Control of Scanning with a Small Cylindrical Cantilevered Beam", Journal of Sound and Vibration, Vol. 330, 1762–1771, 2011
61. Kundrat M, Reinhall PG, Seibel EJ, "Method to Achieve High Frame Rates in a Scanning Fiber Endoscope", ASME Journal of Medical Devices, Vol 5(3), 2011
62. Reinhall PG, Dahl PH, "Underwater Mach Wave Radiation from Impact Pile Driving: Theory and Observation" J. Acoust. Soc. Am., Vol 130(3), 1209-1216, 2011
63. Yoon WJ, Brown MA, Reinhall PG, Sangtae P, Seibel EJ, "Design and preliminary study of custom laser scanning cystoscope for automated bladder surveillance", Minimally Invasive Therapy and Allied Technologies, 21(5):320-328, 2012
64. Wei-Chih Wang, Per G. Reinhall, "Liquid Viscosity Sensing Using Nonlinear Vibration of a Fiberoptic Sensor", Review of Scientific Instruments, Vol.84, Issue 7, 2013.
65. Dahl PH, Reinhall PG, "Beam Forming of the Underwater Sound Field from Impact Pile Driving", J Acoust Soc Am. 2013 Jul;134(1): EL1-6. doi: 10.1121/1.4807430
66. Eberle A, Reinhall PG, Daniel T," Fluid-Structure Interaction in Compliant Insect Wings" Bioinspiration & Biomimetics (9):025005, 2014
67. Yeoh I, Reinhall PG, Berg MC, Seibel EJ," Self-Contained Image Recalibration in a Scanning Fiber Endoscope Using Piezoelectric Sensing", ASME Journal of Medical Devices, 9(1), 011004, 2015
68. Eberlee A, Dickerson B, Reinhall PG, Daniel T, "A New Twist on Gyroscopic Sensing: Body Rotations lead to Torsion in Flapping, Flexible Insect Wings", J. of the Royal Society, Interface, 12(104), 2015;
69. Lee J-H, Reinhall PG and Yoon H-S, "Modeling and Characterization of Bio-Inspired Hydro-Acoustic Sensor," Journal of Vibration and Acoustics, 137(3), 031021, 2015
70. Au-yeung WM, Reinhall PG, Poole JE, Anderson J, Johnson G, Fletcher RD, Moore HJ, Mark DB, Lee KL, Bardy GH, "SCD-HeFT: Use of RR Interval Statistics for Long-term Risk Stratification for Arrhythmic Sudden Cardiac Death", Heart Rhythm, 2015 Oct;12(10):2058-66. doi: 10.1016/j.hrthm.2015.06.030. Epub 2015 Jun 19.
71. Yeoh IL, Reinhall PG, Berg MC, Chizeck HJ, Seibel EJ "Electro-Mechanical Modeling and Adaptive Feedforward Control of a Self-Sensing Scanning Fiber Endoscope", J. Dyn. Sys., Meas., Control 138(10), 101006, 2016 -**The 2017 winner of the ASME JDSMC Kalman Best Paper of the Year Award!**
72. Yeoh IL, Reinhall PG, Berg MC, Chizeck HJ, Seibel EJ, "Run-to-Run Optimization Control within Exact Inverse Framework for Scan Tracking" ASME Journal of Dynamic Systems, Measurement and Control, doi:10.1115/1.4036231, 2017
73. Cagle JC, Reinhall PG, Hafner BJ, Sanders JE, "Development of standardized material test protocols for prosthetic liners", J Biomech Eng 139(4), 045001, (12 pages), 2017

74. Cagle JC, Reinhall PG, Allyn KJ, McLean JB, Hinrichs P, Hafner BJ, Sanders JE, "A finite element model to assess transtibial prosthetic sockets with elastomeric liners", Medical & Biological Engineering & Computing, Volume 56, Issue 7, pp 1227–1240, 2018
75. Rajiv A, Zhou Y, Ridge J, Reinhall PG, Seibel EJ, "Electromechanical Model-Based Design and Testing of Fiber Scanners for Endoscopy" Journal of Medical Device, Vol 14, Issue 4, 041003, 2018
76. Pinkard BR, Gorman DJ, Tiwari K, Kramlich JC, Reinhall PG, Novesselov IV, "Review of Gasification of Organic Compounds in Continuous-Flow", Supercritical Water Reactors. Industrial & Engineering Chemistry Research 57(10), 34713481, 2018
77. Au-yeung WM, Reinhall PG, Bardy GH, "SCD-HeFT: Development and validation of warning system of ventricular tachyarrhythmia in patients with heart failure with heart rate variability data", PLoS One, 14;13(11):e0207215, 2018
78. Jacob Ruzevick J, Derek Wallin D, Per Reinhall PG, Samuel Browd S, "Novel football helmet design reduces CSDM15, A computational surrogate of diffuse axonal injury, compared to three commonly used helmets in a finite element head model" Journal of Neurosurgery, Vol 128, Issue 4, 2018
79. Pinkard BR, Gorman D, Tiwari K, Rasmussen E, Kramlich J, Reinhall PG, Novosselov I," Supercritical Water Gasification: Practical Design Strategies and Operational Challenges for Lab-Scale, Continuous Flow Reactors, Heliyon, 5(2), e01269, 2019
80. Mohren TL, Eberle AL, Reinhall PG, Fox JL, Daniel TL. "Coriolis and Centrifugal Forces Drive Haltere Deformations and Influence Spike Timing", Journal of Royal Society, Interface, Vol 16, Issue 153, 2019
81. Pinkard BR, Gorman DJ, Rasmussen EG, Kramlich JC, Reinhall PG, Novosselov IV, "Kinetics of Formic Acid Decomposition in Subcritical and Supercritical Water - A Raman Spectroscopic Study", International Journal of Hydrogen Energy' 44(60), 31745-31756, 2019
82. Pinkard BR, Gorman DJ, Rasmussen EG, Maheshwari V, Kramlich JC, Reinhall PG, Novosselov IV, "Raman spectroscopic data from formic acid decomposition in subcritical and supercritical water", Data in Brief 29, 105312 (2020).
83. Poole JE, Olshansky B, Mark DB, Anderson J, Johnson G, Hellkamp AS, Davidson-Ray L, Fishbein DP, Boineau R, Anstrom KJ, Reinhall PG, Packer DL, Lee KL, Bardy GH, for the SCD-HeFT Investigators," Outcomes of Implantable Cardioverter-Defibrillator Therapy in the SCD-HeFT (Sudden Cardiac Death in Heart Failure Trial)")" Journal of the American College of Cardiology, Volume 76, Issue 4, July 2020
84. Pinkard BR, Purohit P, Stuart M, Kramlich JC, Reinhall PG, Novosselov IV, "Partial oxidation of ethanol in supercritical water", Industrial & Engineering Chemistry Research, 59, 21, 9900–991, 2020
85. Pinkard BR, Shetty SI, Kramlich JC, Reinhall PG, Novosselov IV, Hydrolysis of Dimethyl Methylphosphonate (DMMP) in Hot-Compressed Water. The Journal of Physical Chemistry A 2020, 124 (41), 8383-8389.
86. Moore S, Pinkard B, Purohit A, Misquith, J, Kramlich J; Reinhall PG; Novosselov I, "Design of a Small-Scale Supercritical Water Oxidation Reactor. Part I: Experimental Performance and Characterization", Ind. Eng. Chem. Res, August, 2021
87. Thomas S, Elmadih W, Lipton J, Reinhall PG, "Design and Testing of Modular Expansion Joint Noise Mitigation Strategies, TRR Journal, in press, 2024

88. Wallin D, Ruzevick J, Klimo P, Browd S, Cagle J, Reinhall PG, ”Finite element modeling of brain injury following helmeted cranial impacts; analysis and impact on future helmet testing standard” British Journal of Sports Medicine, In Preparation
89. Krovvidi SC, Reinhall PG, Ramulu M, “Analytical Investigation of Dynamic Pecussive Riveting Manufacturing Process” ASME Journal of Computational and Nonlinear Dynamics, In Preparation
90. N Shah1, AM Clark1 , K Dwivedi1 , R Wiebe, P Reinhall, LR Meza, “Predictive Assembly of Composite Aerospace Components Using Finite Element Analysis”, In Preparation

PATENTS

1. US Patent 4,121,967, Reinhall PG, Screw Conveyer in Pulp Making Equipment, 1979. (Patent granted in all major industrial countries)
2. US Patent 5,335,463, Reinhall PG, Composition for Vibration Damping, 1994.
3. US Patent 5,438,806, Reinhall PG, Composition for Vibration Damping, 1995.
4. US Patent 5,892,437, Reinhall PG and Scheibe RR, On-Board Brake Warning Device For Air Brake Equipped Vehicles, 1999.
5. US Patent 6,856,712, Fauver, Seibel, Reinhall, Brown, Smithwick, Micro-Optical Fabricated System for Imaging or Display using Pulled and/or Etched Optical Fibers, 2005
6. European Patent EP1671176, Wang, Seibel, Reinhall, Fauver, Brown, Integrated Optical Scanning Image Acquisition and Display, 2006
7. US Patent 7,233,710, Wang, Reinhall, Polymer Base Electro-Optic Scanner for Image Acquisition and Display, 2007
8. US Patent 7,295,724, Reinhall, Wang, Polymer Based Distributive Waveguide Sensor for Pressure and Shear Measurement, 2007
9. US Patent 7,512,294 B2, Reinhall, Wang, Polymer Based Distributive Waveguide Sensor for Pressure and Shear Measurement, 2009
10. US Patent 7,555,333, Wang, Seibel, Reinhall, Fauver, Brown, Integrated Optical Scanning Image Acquisition and Display, 2009
11. US Patent 7,700,908 B2, Wang, Reinhall, Two Dimensional Optical Scanning Image System, 2010
12. US Patent 7,784,697 B2, Johnston, Kundrat, Reinhall, Method of Driving a Scanning Beam to Achieve High Frame Rates, 2010
13. US Patent 7,879,004 B2, Seibel, Reinhall, Catheter Tip Displacement Mechanism, 2011
14. US Patent 8,396,535 B2, Wang, Seibel, Reinhall, Fauver, Brown, Integrated optical scanning image acquisition and display, 2013
15. US Patent 8,622,658, Reinhall and Dahl, Pile to Minimize Noise Transmission and Method of Pile Driving, 2014

16. US Patent, 8,867,803, Seibel, Miao, Coe, Reinhall, Optical Projection Tomography Microscopy (OPTM) for Large Specimen Sizes, 2015
17. US Patent, 9,080,301, Reinhall, Dahl, Dardis, Pile with Low Noise Generation during Driving, 2015
18. US Patent 9,345,424B2, Wang, Nuckley, Reinhall, Linders, Clinical Force Sensing Glove, 2016
19. US Patent 9,617,702, Reinhall, Dahl, Dardis, Pile with Sound Abatement, 2017
20. US Patent 9816246B2, Reinhall, Dardis, Pile with Sound Abatement for Vibratory Installation, 2017
21. US Patent 47207.02US2, Reinhall, Posner, Dardis, Leonard, Protective Helmets Including Non-Linearly Deforming Elements, 2020
22. CA2928241C, Reinhall, Posner, Browd, Marver, Dardis, Protective Helmets with Non-Linearly Deforming Elements, 2020
23. EP3086703B1, Yeoh, Reinhall, Seibel, Kundrat, Adaptive Control of a Fiber Scanner with Piezoelectric Sensing, 2021
24. US Patent 10966479B2 Reinhall, Browd, Posner, Marver, Dardis, Protective helmets with non-linearly deforming elements, 2021
25. US 20190145740A1 Czerski, Alferness, Marver, Neubauer, Kaplan, Reinhall, Browd Impact Absorbing Structures in Body Protective Equipment, 2021
26. US12178275B2, Reinhall, Leonard, Glover, Hunter Stone, Alferness, Fisher, Kaplan, Dardis, Browd, Layered Materials and Structure for Enhanced Impact Absorption, 2024
27. US121453346B2, Reinhall, Cagle, Wallin, Neubauer, Carricaburu, Johnson, Didier, Stone, Patel. Custom Manufactured Fit Pods, 2024
28. US12232555B2, Santiago, Fisher, Glover, Carricaburu, Frank, Stone, Neubauer, Reinhall, Marver, Position Specific Helmet, 2025

<u>Patents Pending</u>

1. Patent Pending (US20200000169A1), Reinhall, Leonard, et.al, Layered materials and structures for enhanced impact absorption, filed 2019
2. Patent Pending (US20190328071A1), Stone, Reinhall, et.al, Releasable impact mitigating fastener, filed 2019
3. Patent Pending (US20210323263A1), Cagle, Reinhall, et.al, Microlattice layers, filed 2019
4. Patent Pending 63/315,886, Schultz, Hurd, Jeong, Mao, Reinhall, Scoop Mechanical CPR Device, filed 2022
5. Patent Pending (US20240011229A1) 18/344,689, Reinhall, Lipton, Thomas, Elmadih, Modular expansion joints configured to minimize noise, bridges including the same, and methods of making and using the same, filed 2023
6. Patent Pending, Reinhall, et.al, Method for continuously measuring blood pressure, filed 2024

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Tapia M, Kunzelman KS, Reinhall PG, Cochran RP, “A Three-Dimensional Coupled Fluid-Structure Computational Model of Mitral Valve Function”, Proceedings of The First Joint BMES/EMB Conference, Oct 1999

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Dardis JT, Reinhall PG, "New Offshore Pile for Reduced Acoustic Emissions – Results from Full Scale Testing" Proceeding of the 22nd International Congress on Sound and Vibration, Florence, Italy, 2015

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Tiwari, K., B. Pinkard, D. Gorman, J. Davis, J. Kramlich, P. Reinhall, And I. Novosselov, "Computational modeling of mixing and gasification in continuous-flow supercritical water reactors", 12th International Symposium on Supercritical Fluids, Antibes, France (April 2018).

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BOOK CHAPTERS

Storti DW, Reinhall PG, "Stability of In-Phase and Out-of-Phase Modes for a Pair of Linearly Coupled van der Pol Oscillators", Nonlinear Dynamics, Series on Stability, Vibration and Control of Systems, Series B, Volume 2, Ed. By Ardeshir Guran, World Scientific, pp. 1-21, 1997

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Wang W-C, Reinhall PG, "Liquid Viscosity Sensing Using Nonlinear Higher Order Harmonic Excitation in Fiberoptic Vibrating Sensor", Progress in Optomechatronic Technologies, Springer, 2014

Igor Novosselov, Brian Pinkard, John Kramlich, Per Reinhall, Technologies Gasification Kinetics in Continuous Supercritical Water Reactors, Advanced Supercritical Fluids. Prioro, London: IntechOpen

INVITED LECTURES AND SEMINARS

Electromagnetic Riveting, Boeing, 89
Parametric Excitation in Rotating Machinery, Boeing 91.
Nonlinear Dynamics in Cardiology, University of Washington., School of Medicine, Oct94
Shipping Vibration & Package Design, ISTACON'97, Association for Transport Packaging, April 97
The Finite Element Method, NSR Laboratory, University of Washington, May 97
Preventing Shipping Damage, Keytech Inc, Nov 98
Nonlinear Dynamics and the ECG, SCDHeFT Annual Meeting, March 98
Intermodal Shipping Vibration, Miller Brewing Company, Jan 98
Machine Diagnostics, General Electric, May 98
Nonlinear Dynamics in Manufacturing, Part I, Ed Wells Initiative, Work Shop, Dec 98, Boeing
Intermodal Shipping Vibration, Jan 99, Miller Brewing Company
Nonlinear Dynamics in Manufacturing, Part II, Ed Wells Initiative, Work Shop, Jan 99, Boeing
Nonlinear Dynamics and the ECG, April 99, SCDHeFT Annual Meeting
Coupled van der Pol Oscillators, Dept. Applied Mathematics, University of Washington, May, 2000
Nonlinear Analysis of ICD Data, SCDHeFT Annual Meeting, Sept, 2000
Time Series Analysis of the Human Heart, the Karolinska Institute, Stockholm, Sweden, Nov, 2000
Nonlinear Dynamics and the ECG, SCDHeFT Annual Meeting, Sept 2001
Improving the Function of the Sick Human Heart through Engineering, Southern Taiwan University of Technology, Taiwan, Dec, 2004
Improving the Function of the Sick Human Heart through Engineering, NTU, Taiwan, Dec, 2004

The Effects of Shock and Vibrations on Humans, The Karolinska Institute, Stockholm, Sweden, 2007
Ultrathin Endoscopes using Resonant Fiber Scanning, The Karolinska Institute, Stockholm, Sweden, Aug, 2008
Fluid Structure Interaction, Cardiac Science, Seattle, Jan, 2010
Analysis of pile driving structural acoustics, WSDOT, Aug, 2010
How can additional sound attenuation be achieved during pile driving? WSDOT, 2010
Acoustic Radiation from a Submerged Pile during Pile Driving, Measurement, Characterization, and Mitigation of Underwater Anthropogenic Noise, ASA, 2011
Sensor and Actuator Development for Below Knee Prosthetics, LSU, March 2012
Sensor and Actuator Development for Below Knee Prosthetics, Nabtesco Workshop, April 2012
Attenuation of Noise from Pile Driving in Water Using an Acoustic Shield, ECUA, July 2012
Novel Development in Attenuating Noise from Pile Driving, BOEM Quieting Technologies Workshop, Feb, 2013
Decreasing Noise during Pile Driving, Navy, Keyport, June, 2013
Analysis of Impact Pile Driving Structural Acoustics, WSDOT Workshop on Pile Driving Noise Attenuation Research, Sept 2013
How can additional sound attenuation be achieved during pile driving?, WSDOT Workshop on Pile Driving Noise Attenuation Research, Sept 2013
Engineering in Medicine Initiative, Swedish Hospital, Nov, 2013
Advances in Noise Attenuation from Impact Pile Driving, ASA, June, 2014
Review of Current Noise Mitigation Techniques, WSDOT Pile Drive Symposium, 2015
New Method in Impact Pile Driving Noise Attenuation, WSDOT Pile Drive Symposium, 2015
Boeing Advanced Research Center, Texas A&M, Dec, 2015
Two problems with impact, University of Michigan, Jan, 2016
A Safer Football Helmet, Washington State University, March, 2016
Noise Attenuation Effectiveness and Potential Safety Benefits of New Double-Walled Pile Technology, Super Pile Conference, 2017
Engineered Materials for Impact Protection, Hewlett-Packard, 2022

PROFESSIONAL SOCIETY ACTIVITY

- Mechanical Engineering Department Heads Workshop, 2012 - 2021
- Active participant of ASME Technical Committee on Vibrations and Sound 1997-present
- Co-organizer, Workshop on New Concepts for Active Materials, Actuators and Bioinspired Sensing-Actuation Control, April 19-20, 2012
- Vice Chair of Seattle Chapter, Acoustical Society of America, 2009 - 2017
- Co-Chair of session on Structures and Materials and Nondestructive Evaluation for Health Monitoring and Diagnostics, 2005 SPIE 12th Annual International Symposium on Smart Structures and Materials.
- Co-Chair of session on Smart Structures and Materials and Nondestructive Evaluation for Health Monitoring and Diagnostics, SPIE, San Diego, 2003

- Organizer and Chair of ASME Symposium on Coupled Nonlinear Oscillators for the 1999 Biennial ASME Vibration and Design Conference
- Organizer of two sessions on damping technology for the Winter Annual Meeting, Nov, 1999
- Finance Chair for the IEEE 1998 International Conference on Acoustics, Speech and Signal Processing
- Member of ASME Technical Committee on Vibrations and Sound. 1994-1997
- Active reviewer and planner of sessions for Various ASME conferences including the recent 15th, 16th and the 17th Biennial ASME Conference; Symposium on Time-Varying Systems and Structures, 1995- present
- Session chair, 16th Biennial ASME Conference; Symposium on Time-Varying Systems and Structures, 1997
- Session chair, 15th Biennial ASME Conference; Symposium on Time-Varying Systems and Structures, 1995
- Member of American Society of Mechanical Engineers
- Member of Society of Industrial and Applied Mathematics
- Member of Tau Beta Pi

PEER REVIEW ACTIVITY

Journal Review

IEEE / ASME Transactions on Mechatronics
Sensors and Actuators A: Physical
Journal of Sound and Vibrations
Journal of Vibration and Acoustics
Journal of AIAA
Annals of Biomedical Engineering
Journal of Applied Mechanics
Society of Industrial and Applied Mathematics

Proposal Review

National Science Foundation
NSF Panel Reviews
NSF
Office of Naval Research
NASA
NIH SBIBL
NIH Center for Scientific Review - site visit review panel/ study section
RRF
WTC

Book Review

Annals of Biomedical Engineering
Prentice Hall

TEACHING

Courses Taught

ME 230 Dynamics
ME 373 System Dynamics
ME 374 System Dynamics
ME 469 Advanced Dynamics
ME 470 Vibrations
ME 478 Finite Element Analysis
ME 495 Senior Design
ME 495 Engineering in Medicine
ENGR 498 Applications of Acoustics
ENGR 498 Product Safety and Liability
ME 499 Fuel Cell Design
ME 525 Applied Acoustics
ME 564 Mechanical Engineering Analysis
ME 565 Mechanical Engineering Analysis
ME 588 Dynamics and Vibrations
ME 589 Nonlinear Vibrations
ME 590 Random Vibrations
ME 599 Applied Acoustics

Teaching Awards

- Best Instructor of the Year Nomination by the Class of 1987, TYEE
- Outstanding Faculty Award presented by Minority Science and Engineering Program, 1991

- University Distinguished Teaching Award Nomination by the College of Engineering, 1997
- College Teaching Award Nomination, 1997

Course Development

- **ME 495 E-Truck Capstone and the E-Truck RSO**
- **ME 495 Engineering in Health**

Focused capstone design course to address clinically important problems. Integration with other engineering disciplines in addition to industrial design, business, & marketing. The focus is on how to increase value (improve healthcare outcomes and reduce cost) of healthcare delivery through identification of important clinical challenges and engineering of transformative solutions.

- **ME 499 Engineering Innovation in Medicine**

Seminar course to introduce the modern influence of engineering on medicine and health sciences. It is designed for junior and senior level engineering students who are interested in pursuing a capstone/senior design project in the area of health.

- **ME 525/ME 498 and ME 526 - Applied Acoustics**

This new undergraduate/graduate course sequence in applied acoustics been provides an introduction to the general principles of acoustics with applications taken from the fields of industrial and medical ultrasound, underwater acoustics, aeroacoustics, room acoustics and noise control. These courses were co-developed with Professor Peter Dahl.

- **ME 495 Fuel Cell Design**
  In this capstone design course the students develop their own fuel cell systems. The course is interdisciplinary in nature with chemical engineering, electrical engineering and mechanical engineering working together during the design process.
- **ME 498/599 - The Effect of Product Safety and Liability on the Design Process**
  Initiated and developed this new course together with Dr. Rob Scheibe. The course exposes the student to the engineering and legal aspects of product liability, risk analysis, and product safety.
- **ME 478 - Finite Element Analysis**
  Introduced and developed our undergraduate finite element course. Topics covered include structural analysis, material modeling, dynamics, heat transfer, plasticity and nonlinear analysis. This course is under continued development and is now our largest option course.
- **ME 588, 589, 590 – Dynamics and Vibrations**
  Performed a total reorganization and modernization of these graduate vibration and dynamics courses. This sequence covers analytical dynamics, linear vibrations, random vibrations, and nonlinear dynamics.
- **ENGR 210, 220, and 230 - Statics, Solid Mechanics, and Dynamics**
  Responsible for introducing, overseeing and leading the development of weekly tutorials, hardware, and software tools for enhanced learning in these introductory engineering courses.

TEACHING

Courses Taught

ME 230 Dynamics
ME 373 System Dynamics
ME 374 System Dynamics
ME 469 Advanced Dynamics
ME 470 Vibrations
ME 478 Finite Element Analysis
ME 495 Senior Design
ME 495 Engineering in Health
ENGR 498 Applications of Acoustics
ENGR 498 Product Safety and Liability
ME 499 Fuel Cell Design
ME 525 Applied Acoustics
ME 564 Mechanical Engineering Analysis
ME 565 Mechanical Engineering Analysis
ME 588 Dynamics and Vibrations
ME 589 Nonlinear Vibrations

ME 590 Random Vibrations
ME 599 Applied Acoustics

Teaching Awards

- Best Instructor of the Year Nomination by the Class of 1987, TYEE
- Outstanding Faculty Award presented by Minority Science and Engineering Program, 1991
- University Distinguished Teaching Award Nomination by the College of Engineering, 1997
- College Teaching Award Nomination, 1997

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- **ENGR 210, 220, and 230 - Statics, Solid Mechanics, and Dynamics**
  Responsible for introducing, overseeing and leading the development of weekly tutorials, hardware, and software tools for enhanced learning in these introductory engineering courses.

TECHNOLOGY TRANSFER

- 28 issued patents
- 6 pending and provisional patents
- Founded five startup companies (Rotodyne, MCT, VICIS, RoseBiopsy, Presurge)
- Founded the Boeing Advanced Research Center (BARC) with the aim of connecting local industry with UW
- Founded the Paccar Advanced Research Center (PARC) with the aim of connecting local industry with UW
- Co-Founded Engineering Innovation in Health with the aim of connecting the UW Medical school and local health institution with the UW College of Engineering
- Co-Founded the Advanced Research Center at UW