

Frank J. Shih

Associate Professor
College of Science & Engineering
Seattle University

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Education

Ph.D., Mechanical Engineering, UCLA	2002
<i>Dissertation title: Lamb Wave Characterization of Impact Damage in Composite Plates</i>	
<i>Advisor: Professor Ajit K. Mal</i>	
M.S., Mechanical Engineering, UCLA	1997
M.S., Materials Science & Engineering, UCLA	1995
B.S., Mechanical Engineering, UC Irvine	1993

Academic Appointments

Associate Professor, Mechanical Engineering, Seattle University	9/09 – Present
Assistant Professor, Mechanical Engineering, Seattle University	9/03 – 6/09
Visiting Associate Professor, Bioengineering, UCLA	9/10 – 6/11
Lecturer, Mechanical & Aerospace Engineering, UCLA	9/02 – 6/03
Lecturer, Chemical Engineering & Materials Science, UC Irvine	4/03 – 6/03

Professional Experience

Consulting Engineer, Composite Solutions, Sumner, WA	7/18 – 8/18
Visiting Professor/Visiting Researcher, Bioengineering, UCLA	9/10 – 9/11
Welliver Faculty Fellow, The Boeing Company, St. Louis, MO & Seattle, WA	6/10 – 8/10
Associate Staff Scientist, Lasson Technologies, Inc., Culver City, CA	2/00 – 2/01
Consultant, Rockwell Science Center, Thousand Oaks, CA	2/98 – 1/00

Award & Honors

PACCAR Professor	2020 – 22
Thomas Bannan Chair of Engineering & Computer Science	2019 – 21
Spirit of Community Faculty Award	2014
Boeing Welliver Faculty Fellowship	2010
Best Paper Award, SPIE	2003
Tau Beta Pi – The Engineering Honor Society	
Sigma Xi – The Scientific Research Society	
Fellowship, UCLA	1993 – 94

Professional Affiliation

American Society of Mechanical Engineering (ASME)	1991 – Present
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Teaching

Courses Taught at Seattle University

MEGR 181: Innovative Design	Fall 2003
MEGR 2100 (210): Statics	Fall 2004
MEGR 2300 (230): Dynamics	Winter 2004, Spring 2004, 2017
MEGR 3500 (350): Materials Science	Winter 2005 – 7, Fall 2008 – 9, 2011 – 19
MEGR 3710 (371): Machine Elements	Fall 2005 – 6, Winter 2008 – 10, 2012 – 18
MEGR 3720 (372): Machine Elements II	Winter 2005 – 7, Spring 2008 – 10
MEGR 4050 (493): Introduction to Finite Elements	Fall 2003 – 4
MEGR 4320 (493, 492): Mechanical Vibration	Winter 2004, Spring 2008
MEGR 4510 (451): Mechanics of Composite Materials	Spring 2005, 07, 09, 14, 16, 18, Winter 2019
MEGR 492 (491): Introduction to Biomechanics	Winter 2010, Spring 2012
MEGR 5040: Advanced Engineering Materials	Fall 2018 – 19

Courses Taught at UCLA

MAE 157: Basic Mechanical & Aerospace Engineering Laboratory	Fall 2002, 2010, Spring 2003
MAE 156A: Advance Strength of Materials	Winter 2011

Courses Taught at UC Irvine

ENGR 54: Principles of Materials Science & Engineering	Spring 2003
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Senior Design Projects at Seattle University

- 2018 – The Boeing Company, Improved Windshield Wiper Mechanism
- 2017 – Romac, Pipe Coupler Redesign II
- 2016 – Romac, Pipe Coupler Redesign
- 2015 – The Boeing Company, Class Partition Composite Material Impact Energy Reduction
- 2014 – Electroimpact, Fiber Placement Spool Winding Mechanism
- 2014 – Microsoft, Game Accessory Attachment (1+ quarters)
- 2013 – FLOW, Waterjet Cutting Fixturing System
- 2012 – The Boeing Company, Composite Fluid Tube Development
- 2010 – ASME Student Design Competition, Automatic Waste Sorter (6th Place)
- 2009 – The Boeing Company, Multi-Motion Testing Machine
- 2008 – ASME Student Design Competition, Winrobo: Autonomous Window Washing Robot (1st Place)
- 2007 – Potters for Peace, Appropriate Technology Development for Clay Water Filters
- 2006 – The Boeing Company, Improve Test Method for Interlaminar Tensile Strength of Composites
- 2005 – The Boeing Company, Servovalve Calibration System
- 2004 – Ingersoll-Rand, Winch Spooling Device Improvement

Seattle University Undergraduate Researchers Mentored

- (degree and year, advanced degree, last known position)
- Cameryn Leberte, BSME 2022 (expected)
- Kevin Haaland, BSME 2022 (expected)
- David Schulman, BSME 2021 (expected)
- Thomas Ekstrom, BSME 2020, Mechanical Engineer, Cummins

Erica Goodman, BSME 2020, Mechanical Engineer, Boeing
 Owen Van Valkenburgh, BSME 2020, Field Engineer, Lasertec
 Nathan Yasuda, BSME 2019, Robotic Engineer, TigerStop
 DJ Traina, BSME 2018, Simulation Scientist/Engineer, CREST-UW Medicine
 Jean-Paul R. Wallis, BSCE 2018, MSCE 2019, UC Berkeley, Associate, Exponent
 Emily Mather, BSME 2018, Peace Corp Volunteer, Tanzania
 Michael Lo, BSME 2018, R&D Engineer, OMAX
 Ken Weaver, BSME 2018, Mechanical Engineer, Schweitzer Engineering Laboratories
 Kirstin Schauble, BSEE 2017, NSF GRFP, MSEE 2019, PhD Candidate, Stanford
 Kerry Lane, BSME 2017, NSF GRFP, MSME 2020, PhD Candidate, UCSB
 Alaina Bever, BSME 2016, MD-PhD Candidate, Harvard-MIT
 Peter Brown, BSME 2016, Program Manager II, Microsoft
 Ben Levy-Wendt, BSME 2015, NSF GRFP, MSME 2017, PhD Candidate, Stanford
 James Pentz, BSME 2015, Hargis Engineers
 Nick Wright, BSME 2015, Lead Software Engineer, Picnic
 Vit del Rosario, BSME 2015, Business Analyst, Union Bank
 Tim Venable, BSME 2013, Mechanical Engineer III, Blue Origin
 J D Dally, BSME 2012, MSME 2014, U. Washington, R&D Tech Lead, Philips
 Adrienne Beach, BSME 2010, Software Engineer, Uber
 Brock Jahner, BSME 2009, Sr. Controls Engineer, Continuous Composites
 Graham Bratzel, BSME 2009, NSF GRFP, MSME 2013, MIT, Mechanical Engineer, Astronics AES
 Andrew Lybarger, BSME 2007, MS Robotics 2014 Carnegie Mellon, HDT Global
 Nathan Heitzinger, BSME 2007, Mechanical Engineer, Smith Group
 Andrew Enke, BSME 2006, MSME 2010, UCLA, R&D Engineer, Lam Research
 Daniel Strickland, BSME 2006, NSF GRFP, PhD 2010, Stanford
 Chaowei Pang, BSME 2006, MSME 2008, RMIT, Australia
 James Lee, BSME 2006, Manufacturing Engineer, Boeing
 Jono Nicoln, BSME 2006, PT. Willbern Autoprime Indonesia
 Dain Engebretsen, BSME 2004, MSAutoE, Chalmers, Sweden

ASME Human Powered Vehicle Challenge Projects Mentored

Utility Entry: Optimus' Hawkenheimer (3rd place), Portland, OR	2009
Utility Entry: Leonard G Hawkenheimer (1st place), Reno, NV	2008
Utility Entry: Ricky Bobby Hawkenheimer, NASA Ames, Mountain View, CA	2007
Utility Entry: Larry O Hawkenheimer (3rd place), San Luis Obispo, CA	2006
Utility Entry: Carbonator Hawkenheimer (1st place), Fresno, CA	2005
Utility Entry: Rudy Hawkenheimer (3rd place), Corvallis, OR	2004

ASME Student Design Competition SU Entry Mentored

Automatic Waste Sorter (6th Place)	2010
Winrobo: Autonomous Window Washing Robot (1st Place)	2008

Publications

Patents

- T1 McKie, A. D. W., Klein, M. B., Pouet, B., & **Shih, F. J.**, (2002) Laser-based glass thickness measurement system and method, U.S. Patent No. 6,496,268. Washington, DC: U.S. Patent and Trademark Office

Book Chapters

- B1 Banerjee, S., Ricci, F., **Shih, F.**, & Mal, A., (2007) Health monitoring of composite structures using ultrasonic guided waves. In Kundu, T., (Eds.), *Advanced Ultrasonic Methods for Material and Structure Inspection* (pp 43-88). Wiley-ISTE Publishing. (ISBN: 978-1-905209-69-9)

Peer-Reviewed Journal Articles (undergraduate students underlined)

- J7 **Shih, F. J.**, Bratzel, G. H., Enke, A. D., Pang, C., Nicoln, J. L., Lee, J. H., & Beach, A. E. (2010) Geometric dependence of interlaminar tensile strength in L-shaped composite specimens. *Journal of Advanced Materials*, 42(2), 41-48.
- J6 Mal, A., Ricci, F., Banerjee, S., & **Shih, F.** (2005). A conceptual structural health monitoring system based on vibration and wave propagation. *Structural Health Monitoring*, 4(3), 283–293. <https://doi.org/10.1177/1475921705055254>
- J5 Mal, A. K., **Shih, F. J.**, & Prosser, W. H. (2003). Lamb Waves from Impact Damage in Composite Plates. *Instrumentation Mesure Métrologie, Special Issue on Ultrasonic Methods for Material Characterization*, 3, 11-37.
- J4 Ogawa, T., Ozawa, S., **Shih, J. H.**, Ryu, K. H., Sukotjo, C., Yang, J. M., & Nishimura, I. (2000). Biomechanical evaluation of osseous implants having different surface topographies in rats. *Journal of Dental Research*, 79(11), 1857–63. <https://doi.org/10.1177/00220345000790110701>
- J3 **Shih, J.-H.**, Mal, A. K., & Vemuri, M. (1998). Plate wave characterization of stiffness degradation in composites during fatigue. *Research in Nondestructive Evaluation*, 10(3), 147–162. <https://doi.org/10.1080/09349849809410023>
- J2 Wolfenstine, J., & **Shih, J.-H.** (1994). Creep behaviour and dislocation substructure evolution in the Kbr-KI system. *Journal of Materials Science*, 29(23), 6199–6206. <https://doi.org/10.1007/BF00354560>
- J1 **Shih, J.-H.**, Wu, J.-Y., & Lavernia, E. J. (1993). Coarsening behavior of primary Si in melt-spun al-22 wt. % Si. *Scripta Metallurgica Et Materialia*, 29(1), 31–36. [https://doi.org/10.1016/0956-716X\(93\)90249-R](https://doi.org/10.1016/0956-716X(93)90249-R)

Peer-Reviewed Conference Proceedings (*presenting author, undergraduate students underlined)

- C10 Van Valkenburgh, O. F., Ekstrom, T. C., Goodman, E. M., Leborte, C. C., Haaland, K. M., Yasuda, N. K., & **Shih, F. J.*** (2019) Energy absorption characteristics of a nested curved column reinforced elastomer composite. *Proceedings of the ASME 2019 International Mechanical Engineering*

- Congress and Exposition*. 12. Salt Lake City, Utah, USA. November 11–14, 2019. V012T10A033. ASME. <https://doi.org/10.1115/IMECE2019-12096>
- C9 Traina, D. J., Ekstrom, T. C., Van Valkenburgh, O. F., Wallis, J.-P. R., Schulman, D. S., Mather, E. R., Yasuda, N. K., & Shih, F. J.* (2018) A three-dimensional nested reinforcing mesh in elastomers for crashworthy applications. *Proceedings of the ASME 2018 International Mechanical Engineering Congress and Exposition*. 12. Pittsburgh, Pennsylvania, USA. November 9–15, 2018. V012T11A024. ASME. <https://doi.org/10.1115/IMECE2018-88471>
- C8 Yasuda, N. K., Schulman, D. S., Traina, D. J., Mather, E. R., Lane, K. V., Lo, M. E., Weaver, K. D., & Shih, F. J.* Investigation of energy absorption characteristic of ceramic fiber reinforced elastomer composites. *Proceedings of the ASME 2017 International Mechanical Engineering Congress and Exposition*. 14. Tampa, Florida, USA. November 3–9, 2017. V014T11A049. ASME. <https://doi.org/10.1115/IMECE2017-72103>
- C7 Lane, K. V., Yasuda, N. K., Lo, M. E., Mather, E. R., & Shih, F. J.* (2016) Experimental characterization of low velocity impact energy dissipation in sandwich composites with porous cores with tailored structure and morphology. *Proceedings of the ASME 2016 International Mechanical Engineering Congress and Exposition*. 14. Phoenix, Arizona, USA. November 11–17, 2016. V014T11A044. ASME. <https://doi.org/10.1115/IMECE2016-67901>
- C6 Bever, A. M., Brown, P. J., Lane, K. V., Levy-Wendt, B. L., Yasuda, N. K., Han, Y.-L., & Shih, F. J.* (2015) Characterization of a fast responding composite thermal bimorph film actuator based on carbon nanotube sheets. *Proceedings of the ASME 2015 International Mechanical Engineering Congress and Exposition*. 14. Houston, Texas, USA. November 13–19, 2015. V014T11A040. ASME. <https://doi.org/10.1115/IMECE2015-52576>
- C5 Levy-Wendt, B. L., Bever, A. M., Wright, N. C., Venable, T. J., Dally, J. P., & Shih, F. J.* (2014) Interlaminar tensile strength of CFRP composites reinforced with interleaved carbon nanotube sheets. *Proceedings of the ASME 2014 International Mechanical Engineering Congress and Exposition*. 14. Montreal, Quebec, Canada. November 14–20, 2014. V014T11A039. ASME. <https://doi.org/10.1115/IMECE2014-38876>
- C4 Bever, A. M., Levy-Wendt, B. L., del Rosario, V., Pentz, J. A., Han, Y.-L., & Shih, F. J.* (2014) In-plane thermal conductivities of CFRP composites interleaved with dissimilar conductive media. *Proceedings of the ASME 2014 International Mechanical Engineering Congress and Exposition*. 14. Montreal, Quebec, Canada. November 14–20, 2014. V014T11A047. ASME. <https://doi.org/10.1115/IMECE2014-38923>
- C3 Mal, A. K.* , Shih, F. J., Ricci, F., & Banerjee, S. (2005). Impact damage detection in composite structures using lamb waves [5768-34]. *Proceedings - SPIE the International Society for Optical Engineering*, 5768, 295–303. <https://doi.org/10.1117/12.600566>
- C2 Shih, F. J.* , Banerjee, S., & Mal, A. K. (2004) Impact damage monitoring in composite plates. *Proceedings of the ASME 2004 International Mechanical Engineering Congress and Exposition. Applied Mechanics*. Anaheim, California, USA. November 13–19, 2004. pp. 321-327. ASME. <https://doi.org/10.1115/IMECE2004-61868>

- C1 Mal, A.*, **Shih, F.**, & Banerjee, S. (2003). Acoustic emission waveforms in composite laminates under low velocity impact. *Proceedings - SPIE the International Society for Optical Engineering*, 5047(1), 1-12. <https://doi.org/10.1117/12.484448> (Best Paper Award)

Non-Refereed Conference Publications

- N3 Mal, A.*, Banerjee, S., **Shih, F.**, Ricci, F., & Gibson, S. (2003) Damage detection in structural components from vibration and wave propagation data. In Chang, F. K., (Eds.), *Proc. of the 4th International Workshop on Structural Health Monitoring*. (pp. 675-85)
- N2 **Shih, F. J.***, Pouet, B. F., Klein, M. B., & McKie, A. D. W. (2001) Determination of glass thickness using laser based ultrasound. In Thompson D. O. and D. E. Chimenti, D. E. (Eds.) *Rev. of Progress in QNDE*, Vol. 20A. (pp. 287-92) <https://doi.org/10.1063/1.1373771>
- N1 **Shih J.-H.** & Mal, A. K.* (1999) Acoustic emission from impact damage in crossply composites. In Chang, F. K., (Eds.), *Proc. of the 2nd International Workshop on Structural Health Monitoring*, (pp. 209-17)

Conference Presentations (*presenting author, undergraduate students underlined)

- P10 Beach, A. E., Bratzel, G. H., Jahner, B. A., & **Shih, F. J.***, "In-situ damage monitoring of GLARE 5 under tensile loading using Lamb waves," American Institute of Aeronautics and Astronautics (AIAA) Technical Symposium 2008, Seattle, WA (October 25, 2008)
- P9 **Shih, F. J.***, Bratzel, G. H., & Enke, A. D., "Interlaminar shear strength of GLARE 5 under different temperature and strain rate conditions," IMECE2007-43880, 2007, ASME International Mechanical Engineering Congress and Exposition (IMECE) Seattle, WA (Nov. 13, 2007)
- P8 **Shih, F. J.***, Bratzel, G. H., Enke, A. D., & Pang, C., "Test method improvement for out-of-plane tensile strength in composites," IMECE2007-42658, 2007 ASME International Mechanical Engineering Congress and Exposition (IMECE), Seattle, WA (Nov. 12, 2007)
- P7 Mal, A.*, & **Shih, F.**, "Health monitoring of composite structures for impact damage," ASME International Mechanical Engineering Congress and Exposition (IMECE), New Orleans, LA, November 17–22, 2002
- P6 **Shih, J.-H.***, & Guo, D., "Characterization of impact damage in composite plates using waveform-based acoustic emission," ASME International Mechanical Engineering Congress and Exposition (IMECE), Nashville, TN, November 14-19, 1999
- P5 **Shih, J.-H.***, Mal, A. K., & McKie, A. D. W., "Characterization of impact damage using laser-based ultrasound," ASME Applied Mechanics and Materials Conference, Blacksburg, VA, June 27–30, 1999
- P4 **Shih, J.-H.*** & Mal, A. K., "Characterization of impact damage in crossply composites using acoustic emission," ASME Applied Mechanics and Materials Conference, Blacksburg, VA, June 27–30, 1999
- P3 Ju, J.*, Weng, L., **Shih, J.**, & Mal, A., "Ultrasonic NDE of the degradation of concrete subject to environmental attacks," ASNT Conference, Anaheim, CA, March 23 – 7, 1998

- P2 **Shih, J.-H.*** & Mal, A. K., "Damage evaluation in structural composites using ultrasonics," ASME ASCE-SES Joint Summer Meeting, McNU '97, Evanston, IL, June 28 – July 2, 1997
- P1 **Shih, J.-H.**, Mal, A. K., & Gorman, M., "Plate wave characterization of stiffness degradation in composites during fatigue," Poster Presentation, Progress in QNDE, Brunswick, ME, July 28 – August 2, 1996

Fundings

External

National Science Foundation – Major Research Instrumentation Grant (\$266k), Co-PI 2012

Internal

PACCAR Professor (~\$50k) 2020-22

Thomas Bannan Chair of Engineering & Computer Science, (~\$10k) 2019-21

Summer Faculty Fellowship (~\$6-7k) 2005, 2012

Services

University

Academic Assembly (AcA) member, President (2017-21) 2010, 2015 – 20

Strategic Planning Council / Provost Council 2017 – 20

Presidential Task Force on Reopening 2020

Budget Advisory Group (BAG) member 2019 – 20

Bias Prevention Working Group 2017 – 19

Ad-Hoc Academic Assembly Committee on Bullying 2016

Academic Policy Committee 2014 – 20

Commencement Committee 2019 – 20

Faculty Pay Committee 2019 – 20

University Workload Committee 2017

University Leadership Council 2017 – 19

Budget Advisory Committee (BAC) 2017 – 19

Dean's Evaluation Committee 2017 – 19

Academic Affairs Operations Review (AAOR)

Analysis and Recommendation Committee (ARC) 2016 – 17

Student Development Integrity Formation Review Board 2019 – 20

College

Bannan Scholars Program Director 2011 – 19

CSE Faculty Senate Planning Group member 2008 – 20

College Personnel Committee 2016 – 19

Bannan Scholars Selection Committee 2011 – 19

Ad-Hoc Annual Evaluation Revision Committee (Co-Chair) 2014 – 15

Seattle Science EXPO Committee (Co-Chair)	2012 – 13
College Curriculum Committee	2004 – 10
Community College Visits (Edmunds, Everett, Green River, Bellevue)	2004 – 07, 16

Department

Tenure Review Committee	2018, 19
MSME Program Development Support	2017 – 18
ABET Review Support	2011, 2017 – 18
RED Grant Support	2017 – 20
Faculty Hiring Committee	2004, 14, 15, 19
Kogakuin University Japanese Exchange Program Mentor	2008, 09, 10
Machine Shop Supervisor Search Committee	2005

Search

University Presidential Search Committee	2019 – 20
CFO Search Committee	2019
Associate Provost for Global Engagement	2009 – 10
VP of Enrollment Search Committee	2019 – 20
CSE Dean Search Committee	2006 – 07
Academic Affairs Program Manager (AAPM) Search Committee	2019 – 20
Naef Scholar Director Search Committee	2019
OMA Director Search Committee	2014

Professional

ASME Technical Committee on Heterogeneous Materials Vice Chair	2019
ASME Technical Committee on Soft Materials Vice Chair, Chair (2016-17)	2015 – 17
ASME Western Washington, PSEC Rep, Secretary, Vice Chair (2009-10)	2006 – 10
ASME IMECE Technical Track Session Chair	2004, 07, 14 – 19
ASME IMECE Topic Organizer	2016 – 17
Reviewers for <i>Journal of Alloys and Compounds</i> , <i>Journal of Composite Materials</i> , <i>Mechanics of Materials</i> , <i>Review of Scientific Instruments</i> , <i>Structural Health</i> <i>Monitoring</i> , <i>ASME Conference Paper</i>	2003-09, 14

Diversity & Inclusion

STEM Afterschool Program at Bailey Gatzert Elementary, Seattle, WA	2011 – 18
Campus Climate Study - SU as a Workplace Subcommittee	2015
Campus Climate Study Working Group	2014 – 15
Campus Climate Assessment Ambassador	2014
Faculty and Staff of Color Retreat	2012 – 15
UCLA CEED Instructor (SMARTS, BREES, K-12 Teacher Training)	1996 – 2003

Community

STEM Afterschool Program at Bailey Gatzert Elementary, Seattle, WA	2011 – 18
Impactathon Planning	2018 – 19
CCE/CSE Work Group Member	2018 – 19
First Robotics Volunteer Judge	2008 – 10
PSEC Engineering Fair	2005 – 09
Weekly Tutor, Prairie Vista Middle School, Hawthorne, CA	2003
Volunteer, Camp Footprint, Yucaipa, CA	1997 – 99

Mission

SU Delegate to Nicaragua	2012
SU Delegate to Western Conversations	2009
Colleagues Speaker (4/25/2019)	2019
Endowed Mission Fund Committee	2018 – 20

Student Developments

Taiwanese Student Association Faculty Advisor	2004 – 17
ASME Student Section Faculty Advisor	2003 – 10
ASCE Steel-Bridge Team Faculty Co-Advisor	2012 – 13
SWE Faculty Advisor	2008, 13
Tau Beta Pi Faculty Advisor (Co-Advisor)	2010 – 20
Sullivan Day Faculty Speaker	2013
Advisory Board to Student Development Division	2012 – 15