Alper Erturk, Ph.D.

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Education

- **2006-2009** **Ph.D. in Engineering Mechanics**
  Department of Engineering Science and Mechanics
  Virginia Polytechnic Institute and State University
  Blacksburg, VA, USA

- **2004-2006** **M.S. in Mechanical Engineering**
  Department of Mechanical Engineering
  Middle East Technical University (METU)
  Ankara, Turkey

- **2000-2004** **B.S. in Mechanical Engineering**[†]
  Department of Mechanical Engineering
  Middle East Technical University
  Ankara, Turkey

Academic Experience

- **2011-** **Assistant Professor**
  G. W. Woodruff School of Mechanical Engineering
  Georgia Institute of Technology
  (Fall 2011 Teaching: COE 3001 Mechanics of Deformable Bodies;
  Textbook: *Mechanics of Materials*, 7th Edition, Gere and Goodno;
  41 students from various Schools of COE at Georgia Tech;
  Instructor evaluation: 4.81/5.00; Course evaluation: 4.68/5.00)

- **2009-2011** **Research Scientist**
  Center for Intelligent Material Systems and Structures
  Department of Mechanical Engineering
  Virginia Polytechnic Institute and State University

  Description and Responsibilities: *Conducting theoretical and experimental research on various applications of piezoelectric materials: energy harvesting, structural actuation, vibration damping, linear and nonlinear electromechanical behavior, multifunctional applications using flexible piezoceramics, solar panels and thin-film batteries, energy harvesting combining vibrational, solar and thermal energy, bistable beams and plates with electromechanical coupling, linear and nonlinear aeroelastic vibrations with piezoelectric coupling for wind energy harvesting, energy harvesting for civil infrastructure systems, bio-inspired electromechanical hydro-structures, energy harvesting and morphing for aircraft*

[†] Graduated with High Honors and the 3rd rank out of 277 Mechanical Engineering students.

structures, etc. Formally and informally advising several graduate and undergraduate students on problems ranging from bio-inspired smart structures to combined energy harvesting – vibration control for aerospace structures.

- **2007-2009** **Graduate Research Assistant**
  Center for Intelligent Material Systems and Structures
  Department of Mechanical Engineering
  Virginia Polytechnic Institute and State University

  Description and Responsibilities: *Developed distributed-parameter electromechanical models (analytical and approximate analytical solutions) to predict and optimize the electrical and mechanical response characteristics of piezoelectric energy harvesters with applications to unmanned air vehicles (UAVs). Validated the mathematical models developed against several experimental cases with frequency-domain and time-domain measurements. Worked on novel concepts in vibration energy harvesting (such as the concept of self-charging structures) and introduced novel vibration energy harvester configurations (such as the piezomagnetoelastic broadband power generator). Worked on several other problems related to modeling and applications of piezoelectric materials, ranging from shunt damping to structural actuation, with applications to morphing-wing aircraft, machine tool structures and bridges.*

- **2007, 2009** **Instructor** (co-instructor with Prof. Daniel J. Inman)
  Department of Mechanical Engineering
  Virginia Polytechnic Institute and State University

  Description and Responsibilities: (ME 5514: Vibrations of Mechanical Systems) *Taught the material covered in "Engineering Vibration, 3rd Edition, D.J. Inman, Prentice Hall" to graduate students from ME, AOE and CEE departments, graded homework papers and organized the experiment-based final exam as a co-instructor of this three-credit graduate-level vibrations course.*

- **2006 (Fall)** **Graduate Teaching Assistant**
  Department of Engineering Science and Mechanics
  Virginia Polytechnic Institute and State University

  Description and Responsibilities: (ESM 3064: Mechanical Behavior of Materials Laboratory) *As an instructor of this one-credit junior-level course offered to ESM, ME, CEE and MSE students, taught 12 fundamental experiments on mechanics of materials (e.g. testing of composites polymers, reinforced concretes), supervised students during the experiments, graded lab reports, did overall letter grading, etc.*

- **2004-2006** **Graduate Teaching Assistant**
  Department of Mechanical Engineering
  Middle East Technical University, Ankara, Turkey

  Description and Responsibilities: *Prepared and graded homework and term projects, taught lab courses and graded lab reports, taught mathematical programming in software such as MATLAB, Mathcad, etc.* (Courses: ME 200: Mechanical Engineering Orientation, ME 307: Machine Elements I, ME 301: Theory of Machines II, ME 410: Mechanical Engineering Systems Laboratory, ME 429: Mechanical Vibrations)

Academic Interests

- Structural dynamics, mechanical vibrations, smart materials, electromechanical systems
- Interdisciplinary problems of sustainable energy and applied mechanics

- Modeling and applications of piezoelectric materials in structural dynamics (e.g., vibration-based energy harvesting, structural sensing, actuation, morphing, and shunt damping)
- Multifunctional self-charging structures using flexible solar panels, piezoceramic layers and thin-film batteries
- Piezoaeroelastic models for energy harvesting from airflow excitation and scalable wind energy harvesters exploiting aeroelastic phenomena
- Bio-inspired hydro-structures using flexible piezoelectric composites
- Strain-gradient and polarization-gradient effects in dielectrics
- Materials-based and mechanics-based optimization of piezoelectric energy harvesters
- Piezoelectric energy harvesting for civil infrastructure systems
- Nonlinear and random vibrations of electromechanical systems
- Utilization of chaotic vibrations and instabilities in energy harvesting through bistable beams and plates
- Experimental mechanics and modal analysis
- Frequency-domain structural coupling and modification techniques
- Implementation of substructure techniques for identification of contact dynamics
- Modeling of spindle-tool dynamics in machining centers for chatter stability

List of Publications

Book

Erturk, A. and Inman, D.J., 2011, *Piezoelectric Energy Harvesting*, John Wiley & Sons Ltd., Chichester, UK (ISBN: 978-0-470-68254-8, 412pp).‡

Book chapter

Erturk, A. and Inman, D.J., 2009, Electromechanical Modeling of Cantilevered Piezoelectric Energy Harvesters for Persistent Base Motions, *Energy Harvesting Technologies*, Chapter 2, pp. 41-77, Springer, New York (Eds: S. Priya and D.J. Inman).

Journal articles§

1. **Erturk, A.**, 2012, Assumed-modes Modeling of Piezoelectric Energy Harvesters: Euler-Bernoulli, Rayleigh, and Timoshenko Models with Axial Deformations, *Computers and Structures* (under review).

2. De Marqui, Jr., C. and **Erturk, A.**, 2012, Electroaeroelastic Analysis of Airfoil-based Wind Energy Harvesting Using Piezoelectric Transduction and Electromagnetic Induction, *Journal of Intelligent Material Systems and Structures* (under review).

3. Anton, S.R., **Erturk, A.**, and Inman, D.J., 2012, Bending Strength of Piezoelectric Ceramics and Single Crystals for Multifunctional Load-Bearing Applications, *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control* (under review).

4. Stanton, S.C., **Erturk, A.**, Mann, B.P., Dowell, E.H., and Inman, D.J., 2012, Nonlinear Nonconservative Behavior and Modeling of Piezoelectric Energy Harvesters Including Proof Mass Effects, *Journal of Intelligent Material Systems and Structures* (at press).

‡ This volume is a combination of Dr. Erturk's dissertation and side work during 2007-2010.
§ Number of external citations in refereed journals and books (since 2007) > **300** (h-index>**10**).

5. Anton, S.R., **Erturk, A.**, and Inman, D.J., 2012, Multifunctional Unmanned Aerial Vehicle Wing Spar for Low-Power Generation and Storage, *AIAA Journal of Aircraft*, doi: 10.2514/1.C031542 (at press).

6. Gambier, P., Anton, S.R., Kong, N., **Erturk, A.**, and Inman, D.J., 2012, Piezoelectric, Solar and Thermal Energy Harvesting for Hybrid Low-Power Generator Systems with Thin-Film Batteries, *Measurement Science and Technology*, **23**, 015101 (11pp).

7. **Erturk, A.** and Delporte, G., 2011, Underwater Thrust and Power Generation Using Flexible Piezoelectric Composites: An Experimental Investigation Toward Self-Powered Swimmer-Sensor Platforms, *Smart Materials and Structures*, **20**, 125013 (11pp).

8. **Erturk, A.**, 2011, Piezoelectric Energy Harvesting for Civil Infrastructure System Applications: Moving Loads and Surface Strain Fluctuations, *Journal of Intelligent Material Systems and Structures*, **22**, pp. 1958-1972.

9. Sousa, V.C., Anicézio, M., De Marqui, Jr., C., and **Erturk, A.**, 2011, Enhanced Aeroelastic Energy Harvesting by Exploiting Combined Nonlinearities: Theory and Experiment, *Smart Materials and Structures*, **20**, 094007 (8pp).

10. **Erturk, A.** and Inman, D.J., 2011, Broadband Piezoelectric Power Generation on High-Energy Orbits of the Bistable Duffing Oscillator with Electromechanical Coupling, *Journal of Sound and Vibration*, **330**, pp. 2339-2353.

11. De Marqui, Jr., C., Vieira, W.G.R., **Erturk, A.**, and Inman, D.J., 2011, Modeling and Analysis of Piezoelectric Energy Harvesting from Aeroelastic Vibrations Using the Doublet-Lattice Method, *ASME Journal of Vibration and Acoustics*, **133**, 011003 (9pp).

12. **Erturk, A.** and Inman, D.J., 2011, Parameter Identification and Optimization in Piezoelectric Energy Harvesting: Analytical Relations, Asymptotic Analyses and Experimental Validations, *IMechE Journal of Systems and Control Engineering*, **225**, pp. 485-496.

13. Stanton, S.C., **Erturk, A.**, Mann, B.P., and Inman, D.J., 2010, Resonant Manifestation of Intrinsic Nonlinearity within Electroelastic Micropower Generators, *Applied Physics Letters*, **97**, 254101 (3pp).

14. Anton, S.R., **Erturk, A.**, and Inman, D.J., 2010, Multifunctional Self-Charging Structures Using Piezoceramics and Thin-Film Batteries, *Smart Materials and Structures*, **19**, 115021 (15pp).

15. Stanton, S.C., **Erturk, A.**, Mann, B.P., and Inman, D.J., 2010, Nonlinear Piezoelectricity in Electroelastic Energy Harvesters: Modeling and Experimental Identification, *Journal of Applied Physics*, **108**, 074903 (9pp).

16. Kong, N., Ha, D.S., **Erturk, A.**, and Inman, D.J., 2010, Resistive Impedance Matching Circuit for Piezoelectric Energy Harvesting, *Journal of Intelligent Material Systems and Structures,* **21**, pp. 1293-1302.

17. Arrieta, A.F., Hagedorn, P., **Erturk, A.**, and Inman, D.J., 2010, A Piezoelectric Bistable Plate for Nonlinear Broadband Energy Harvesting, *Applied Physics Letters*, **97**, 104102 (3pp).

18. Bilgen, O., **Erturk, A.**, and Inman, D.J., 2010, Analytical and Experimental Characterization of Macro-Fiber Composite Actuated Thin Clamped-Free Unimorph Benders, *ASME Journal of Vibration and Acoustics*, **132**, 051005 (6pp).

19. **Erturk, A.**, Vieira, W.G.R., De Marqui, Jr., C., and Inman, D.J., 2010, On the Energy Harvesting Potential of Piezoaeroelastic Systems, *Applied Physics Letters*, **96**, 184103 (3pp).

20. De Marqui, Jr., C., **Erturk, A.**, and Inman, D.J., 2010, Piezoaeroelastic Modeling and Analysis of a Generator Wing with Continuous and Segmented Electrodes, *Journal of Intelligent Material Systems and Structures*, **21**, pp. 983-993.

21. **Erturk, A.**, Hoffmann, J., and Inman, D.J., 2009, A Piezomagnetoelastic Structure for Broadband Vibration Energy Harvesting, *Applied Physics Letters*, **94**, 254102 (3pp).**

22. **Erturk, A.** and Inman, D.J., 2009, An Experimentally Validated Bimorph Cantilever Model for Piezoelectric Energy Harvesting from Base Excitations, *Smart Materials and Structures*, **18**, 025009 (18pp).††

23. **Erturk, A.**, Renno, J.M., and Inman, D.J., 2009, Modeling of Piezoelectric Energy Harvesting from an L-Shaped Beam-Mass Structure with an Application to UAVs, *Journal of Intelligent Material Systems and Structures*, **20**, pp. 529-544.

24. **Erturk, A.**, Tarazaga, P.A., Farmer, J.R., and Inman, D.J., 2009, Effect of Strain Nodes and Electrode Configuration on Piezoelectric Energy Harvesting from Cantilevered Beams, *ASME Journal of Vibration and Acoustics*, **131**, 011010 (11pp).

25. De Marqui, Jr., C., **Erturk, A.**, and Inman, D.J., 2009, An Electromechanical Finite Element Model for Piezoelectric Energy Harvester Plates, *Journal of Sound and Vibration*, **327**, pp. 9-25.

26. Ozsahin, O., **Erturk, A.**, Ozguven H.N., and Budak, E., 2009, A Closed-Form Approach for Identification of Dynamical Contact Parameters in Spindle-Holder-Tool Assemblies, *International Journal of Machine Tools and Manufacture*, **49**, pp. 25-35.

27. **Erturk, A.**, Bilgen, O., and Inman, D.J., 2008, Power Generation and Shunt Damping Performance of a Single Crystal Lead Magnesium Niobate – Lead Zirconate Titanate Unimorph: Analysis and Experiment, *Applied Physics Letters*, **93**, 224102 (3pp).

28. **Erturk, A.** and Inman, D.J., 2008, Issues in Mathematical Modeling of Piezoelectric Energy Harvesters, *Smart Materials and Structures*, **17**, 065016 (14pp).‡‡

29. **Erturk, A.** and Inman, D.J., 2008, A Distributed Parameter Electromechanical Model for Cantilevered Piezoelectric Energy Harvesters, *ASME Journal of Vibration and Acoustics*, **130**, 041002 (15pp).§§

** Featured article (and the most downloaded article) of the Applied Physics Letters (Research Highlights - July 2009). Related news articles have appeared in the *Inside Science News Service* (American Institute of Physics) and in the *MRS Bulletin* (Materials Research Society).

†† This article was downloaded more than 500 times (and was among the top 3 % of the Institute of Physics downloaded articles) and listed in the *Highlights of 2009* of the journal (the most cited article of the journal in 2009-2010).

‡‡ This article was downloaded more than 500 times and was among the top 3 % of the Institute of Physics downloaded articles (the second most cited article of the journal in 2009-2010).

30. **Erturk, A.** and Inman, D.J., 2008, On Mechanical Modeling of Cantilevered Piezoelectric Vibration Energy Harvesters, *Journal of Intelligent Material Systems and Structures*, **19**, pp. 1311-1325.***

31. **Erturk, A.** and Inman, D.J., 2007, On the Fundamental Transverse Vibration Frequency of a Free-Free Thin Beam with Identical End Masses, *ASME Journal of Vibration and Acoustics,* **129**, pp. 656-662.

32. **Erturk, A.**, Budak, E., and Ozguven H.N., 2007, Selection of Design and Operational Parameters in Spindle-Holder-Tool Assemblies for Maximum Chatter Stability by Using a New Analytical Model, *International Journal of Machine Tools and Manufacture*, **47**, pp. 1401-1409.†††

33. **Erturk, A.**, Ozguven, H.N., and Budak, E., 2007, Effect Analysis of Bearing and Interface Dynamics on Tool Point FRF for Chatter Stability in Machine Tools by using a New Analytical Model for Spindle-Tool Assemblies, *International Journal of Machine Tools and Manufacture*, **47**, pp. 23-32.

34. **Erturk, A.**, Ozguven, H.N., and Budak, E., 2006, Analytical Modeling of Spindle-Tool Dynamics on Machine Tools using Timoshenko Beam Model and Receptance Coupling for the Prediction of Tool Point FRF, *International Journal of Machine Tools and Manufacture*, 46, pp. 1901-1912.‡‡‡

35. Budak, E., **Erturk, A.,** and Ozguven, H.N., 2006, A Modeling Approach for Analysis and Improvement of Spindle-Holder-Tool Assembly Dynamics, *CIRP Annals – Manufacturing Technology*, **55**, pp. 369-372.§§§

Articles in conference proceedings

1. **Erturk, A.** and Delporte, G., 2011, Hydroelastic Power and Thrust Generation Using Macro-Fiber Composite Piezoelectrics, *Proceedings of the 4th ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems*, Scottsdale, AZ, 18-21 September 2011.

2. Anicézio, M., **Erturk, A.**, De Marqui, Jr., C., and Inman, D.J., 2011, Linear and Nonlinear Aeroelastic Energy Harvesting Using Electromagnetic Induction, *Proceedings of the 4th ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems*, Scottsdale, AZ, 18-21 September 2011.

3. **Erturk, A.** and Inman, D.J., 2011, Energy Harvesting for Wireless Applications, *Proceedings of the 14th International Symposium on Dynamic Problems of Mechanics*, Sao Sebastiao, SP, Brazil, 13-18 March 2011 (**keynote address**).

4. Anicézio, M., De Marqui, Jr., C., **Erturk, A.**, and Inman, D.J., 2011, Nonlinear Modeling and Analysis of a Piezoaeroelastic Energy Harvester, *Proceedings of the 14th International Symposium on Dynamic Problems of Mechanics*, Sao Sebastiao, SP, Brazil, 13-18 March 2011.

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§§ Ranked 1st among the monthly Top 10 most downloaded articles of the journal (June-August 2008).
*** Most cited article of the Journal of Intelligent Material Systems and Structures in 2009.
††† Selected for this special issue of the journal from the 2006 CIRP HPC Conference.
‡‡‡ Ranked 5th among the quarterly Top 25 most downloaded articles of the journal (October-December 2006).
§§§ Also presented in the 56th CIRP General Assembly, Kobe, Japan, 20-26 August 2006.

5. **Erturk, A.** and Inman, D.J., 2011, Piezoelectric Power Generation for Civil Infrastructure Systems, *Proceedings of the 18th SPIE Annual International Symposium on Smart Structures and Materials & Nondestructive Evaluation and Health Monitoring*, San Diego, CA, 6-10 March 2011.

6. Gambier, P., Anton, S.R., Kong, N., **Erturk, A.**, and Inman, D.J., 2010, Combined Piezoelectric, Solar and Thermal Energy Harvesting for Multifunctional Structures with Thin-film Batteries, *Proceedings of the 21st International Conference on Adaptive Structures and Technologies,* State College, PA, 4-6 October 2010.

7. Arrieta, A.F., Hagedorn, P., **Erturk, A.**, and Inman, D.J., 2010, Dynamics and Morphing of a Bistable Plate, *Proceedings of the 21st International Conference on Adaptive Structures and Technologies,* State College, PA, 4-6 October 2010.

8. **Erturk, A.**, Lee, H.Y., and Inman, D.J., 2010, Investigation of Soft and Hard Ceramics and Single Crystals for Resonant and Off-resonant Piezoelectric Energy Harvesting, *Proceedings of the 3rd ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems,* Philadelphia, PA, 28 September - 1 October 2010.

9. Arrieta, A.F., **Erturk, A.**, Hagedorn, P., and Inman, D.J., 2010, Electromechanical Modeling and Experiments of a Bistable Plate for Nonlinear Energy Harvesting, *Proceedings of the 3rd ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems,* Philadelphia, PA, 28 September - 1 October 2010.

10. Stanton, S.C., **Erturk, A.**, Mann, B.P., and Inman, D.J., 2010, On the Manifestation and Influence of Material Nonlinearity in Electroelastic Power Generators, *Proceedings of the 3rd ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems,* Philadelphia, PA, 28 September - 1 October 2010.[****]

11. **Erturk, A.** and Inman, D.J., 2010, Assumed-modes Formulation of Piezoelectric Energy Harvesters: Euler-Bernoulli, Rayleigh and Timoshenko Models with Axial Deformations, *Proceedings of the ASME 2010 ESDA 10th Biennial Conference on Engineering Systems, Design and Analysis,* Istanbul, Turkey, 12-14 July 2010.

12. Vieira, W.G.R., De Marqui, Jr., C., **Erturk, A.**, and Inman, D.J., 2010, Frequency Domain Piezoaeroelastic Analysis and Optimization of an Energy Harvester Wing, *Proceedings of the 51th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, Orlando, FL, 12-15 April 2010.[††††]

13. **Erturk, A.**, Vieira, W.G.R., De Marqui, Jr., C., and Inman, D.J., 2010, Piezoelectric Energy Harvesting from Flow Excitation: Modeling and Experiment, *Proceedings of the 17th SPIE Annual International Symposium on Smart Structures and Materials & Nondestructive Evaluation and Health Monitoring*, San Diego, CA, 7-11 March 2010.

14. Anton, S.R., **Erturk, A.**, and Inman, D.J., 2010, Strength Analysis of Piezoceramic Materials for Structural Considerations in Energy Harvesting for UAVs, *Proceedings of the 17th SPIE Annual International Symposium on Smart Structures and Materials & Nondestructive Evaluation and Health Monitoring*, San Diego, CA, 7-11 March 2010.

[****] Received the *Best Student Paper* award in ASME SMASIS 2010.
[††††] Ranked 4th out of 89 papers in the AIAA SDM Best Student Paper Competition.

15. **Erturk, A.**, Hoffmann, J., and Inman, D.J., 2010, Limit Cycle Oscillations of a Nonlinear Piezomagnetoelastic Structure for Broadband Vibration Energy Harvesting, *Proceedings of the 28th International Modal Analysis Conference,* Jacksonville, FL, 1-4 February 2010.

16. De Marqui, Jr., C., Vieira, W.G.R., **Erturk, A.**, and Inman, D.J, 2010, Frequency Domain Solution of a Piezoaeroelastic Wing for Energy Harvesting, *Proceedings of the 28th International Modal Analysis Conference,* Jacksonville, FL, 1-4 February 2010.

17. Anton, S.R., **Erturk, A.**, Kong, N., Ha, D.S., and Inman, D.J., 2009, Self-Charging Structures Using Piezoceramics and Thin-Film Batteries, *Proceedings of the ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems,* Oxnard, CA, 20-24 September 2009.‡‡‡‡

18. De Marqui, Jr., C., **Erturk, A.**, and Inman, D.J., 2009, Effect of Segmented Electrodes on Piezoelastic and Piezoaeroelastic Responses of Generator Plates, *Proceedings of the ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems,* Oxnard, CA, 20-24 September 2009.

19. **Erturk, A.**, Anton, S.R., Bilgen, O., and Inman, D.J., 2009, Effect of Material Constants and Mechanical Damping on Piezoelectric Power Generation, *Proceedings of the ASME 2009 IDETC 22nd Biennial Conference on Mechanical Vibration and Noise*, San Diego, CA, 30 August - 2 September 2009.

20. De Marqui, Jr., C., **Erturk, A.**, and Inman, D.J., 2009, Piezoaeroelastically Coupled Modeling and Analysis of Electrical Power Generation and Shunt Damping for a Cantilever Plate, *Proceedings of the 17th International Conference on Composite Materials*, Edinburgh, UK, 27-31 July 2009.

21. Anton, S.R., **Erturk, A.**, and Inman, D.J., 2009, An Investigation on Multifunctional Piezoelectric Composite Spars for Energy Harvesting in Unmanned Aerial Vehicles, *Proceedings of the 17th International Conference on Composite Materials*, Edinburgh, UK, 27-31 July 2009.

22. De Marqui, Jr., C., **Erturk, A.**, and Inman, D.J., 2009, Finite Element Analysis of a UAV Wing Spar with Piezoceramics for Vibration Energy Harvesting, *Proceedings of the 50th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, Palm Springs, CA, 4-7 May 2009.

23. **Erturk, A.**, Anton, S.R., and Inman, D.J., 2009, Piezoelectric Energy Harvesting from Multifunctional Wing Spars for UAVs – Part 1: Coupled Modeling and Preliminary Analysis, *Proceedings of the 16th SPIE Annual International Symposium on Smart Structures and Materials & Nondestructive Evaluation and Health Monitoring*, San Diego, CA, 8-12 March 2009.

24. Anton, S.R., **Erturk, A.**, and Inman, D.J., 2009, Piezoelectric Energy Harvesting from Multifunctional Wing Spars for UAVs – Part 2: Experiments and Storage Applications, *Proceedings of the 16th SPIE Annual International Symposium on Smart Structures and Materials & Nondestructive Evaluation and Health Monitoring*, San Diego, CA, 8-12 March 2009.

25. **Erturk, A.** and Inman, D.J., 2009, Parameter Identification and Optimization for Cantilevered Piezoelectric Energy Harvesters Based on the Coupled Distributed Parameter

‡‡‡‡ Received the *Best Student Paper* award in ASME SMASIS 2009.

Solution, *Proceedings of the 27th International Modal Analysis Conference,* Orlando, FL, 9-12 February 2009.

26. Inman, D.J., **Erturk, A.**, and Bilgen, O., 2008, Morphing, Monitoring and Harvesting Using Smart Materials, *Proceedings of the 12th International Conference on Mechanical Engineering,* Bratislava, Slovakia, 13-14 November 2008 (**keynote address**).

27. **Erturk, A.**, Bilgen, O., Fontenille, M., and Inman, D.J., 2008, Piezoelectric Energy Harvesting from Macro-Fiber Composites with an Application to Morphing Wing Aircraft, *Proceedings on the 19th International Conference of Adaptive Structures and Technologies,* Monte Verità, Ascona, Switzerland, 6-9 October 2008.

28. Bilgen, O., **Erturk, A.**, Inman, D.J., and Kochersberger K.B., 2008, Macro-Fiber Composite Actuated Thin Clamped-Free Benders and Thin Simply-Supported Morphing Airfoils, *Proceedings of the 19th International Conference on Adaptive Structures and Technologies,* Monte Verità, Ascona, Switzerland, 6-9 October 2008.

29. **Erturk, A.** and Inman, D.J., 2008, Piezoelectric Shunt Damping for Chatter Suppression in Machining Processes, *Proceedings of the ISMA2008 International Conference on Noise and Vibration Engineering*, Leuven, Belgium, 15-17 September 2008.

30. **Erturk, A.** and Inman, D.J., 2008, Analytical Modeling of Cantilevered Piezoelectric Energy Harvesters for Transverse and Longitudinal Base Motions, *Proceedings of the 49th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, Schaumburg, IL, 7-10 April 2008*.

31. **Erturk, A.**, Renno, J.M., and Inman, D.J., 2008, Energy Harvesting from a Piezoelectric Bender through Rigid Body Motion of a Two-Link Manipulator, *Proceedings of the 49th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, Schaumburg, IL, 7-10 April 2008*.

32. **Erturk, A.**, Renno, J.M., and Inman, D.J., 2008, Piezoelectric Energy Harvesting from an L-Shaped Beam-Mass Structure, *Proceedings of the 15th SPIE Annual International Symposium on Smart Structures and Materials & Nondestructive Evaluation and Health Monitoring*, San Diego, CA, 9-13 March 2008.

33. Anton, S.R., **Erturk, A.**, and Inman, D.J., 2008, Energy Harvesting from Small Unmanned Air Vehicles, *Proceedings of the 17th International Symposium on Application of Ferroelectrics,* Santa Fe, NM, 24-27 February 2008.

34. **Erturk, A.**, Anton, S.R., and Inman, D.J., 2007, Energy Harvesting from Rigid Body Motions, *Proceedings of the 18th International Conference on Adaptive Structures and Technologies,* Ottawa, Ontario, Canada, 3-5 October 2007.

35. **Erturk, A.** and Inman, D.J., 2007, Mechanical Considerations for Modeling of Vibration-Based Energy Harvesters, *Proceedings of the ASME 2007 IDETC 21st Biennial Conference on Mechanical Vibration and Noise*, Las Vegas, NV, 4-7 September 2007.

36. Inman, D.J. and **Erturk, A.,** 2007, Energy Harvesting Using Smart Materials, *Proceedings of the 3rd ECCOMAS Thematic Conference on Smart Structures and Materials,* Gdansk, Poland, 9-11 July 2007 (**keynote address**).

37. **Erturk, A.**, Budak, E., and Ozguven, H.N., 2006, Selection of Design and Operational Parameters in Spindle-Holder-Tool Assemblies for Maximum Chatter Stability by Using a

New Analytical Model, *Proceedings of the 2nd CIRP Conference on High Performance Cutting*, Vancouver, BC Canada, 12-13 June 2006.

Abstract-based presentations / Seminars / Invited lectures / Short courses

1. **Erturk, A.**, Energy Harvesting, Morphing, and Locomotion Using Flexible Piezoelectric Materials, *Lecture for the Acoustical Society of America Georgia Tech Student Chapter*, Atlanta, GA, 24 October 2011.

2. **Erturk, A.**, and Inman, D.J., Broadband Vibration Energy Harvesting Using Bistable Beams and Plates, *ACerS Electronic Materials and Applications*, Orlando, FL, 19-21 January 2011 (invited).

3. **Erturk, A.**, Modeling and Applications of Piezoelectric Energy Harvesting, Department of Mechanical Engineering, Middle East Technical University, Ankara, Turkey, July 22, 2010 (seminar).

4. **Erturk, A.**, Electromechanical Modeling of Piezoelectric Energy Harvesters, Short Course in the 5th Annual Energy Harvesting Workshop, Roanoke, VA, March 2, 2010 (short course).

5. **Erturk, A.**, Modeling and Applications of Piezoelectric Energy Harvesting, Department of Mechanical Engineering, Carnegie Mellon University, Pittsburgh, PA, February 23, 2010 (seminar).

6. Varoto, P., **Erturk, A.**, and Inman, D.J., Experimental Analysis of Piezoelectric Energy Harvesters Subjected to Random Vibration Environments, *5th Annual Energy Harvesting Workshop*, Roanoke, VA, 3-4 March 2010.

7. **Erturk, A.**, Anton, S.R., Tarazaga, P.A., and Inman, D.J., 2009, Analytical Modeling and Experimental Verification of a Broadband Piezoelectric Energy Harvester, *The Joint ASCE-ASME-SES Conference on Mechanics and Materials*, Blacksburg, VA, 24-27 June 2009.

8. **Erturk, A.**, Anton, S.R., Kong, N., and Inman, D.J., 2009, Self-powered Border Security Systems, *3rd National Security Innovation Competition* (presentations of the finalist universities), Colorado Springs, CO, 1 May 2009.

9. De Marqui, Jr., C., **Erturk, A.**, and Inman, D.J., 2009, Piezoaeroelastic Analysis of a Unimorph Cantilever for Vibration Energy Harvesting, *4th Annual Energy Harvesting Workshop*, Blacksburg, VA, 28-29 January 2009.

10. **Erturk, A.** and Inman, D.J., 2009, Issues in Mathematical Modeling of Piezoelectric Energy Harvesters and Some Practical Considerations, *4th Annual Energy Harvesting Workshop*, Blacksburg, VA, 28-29 January 2009.

11. **Erturk, A.**, Modeling and Applications of Vibration Energy Harvesting Using Piezoelectric Transduction, The George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, GA, November 30, 2009 (seminar).

12. **Erturk, A.**, Vibration Energy Harvesting Using Piezoelectric Transduction, Department of Mechanical Engineering, The University of British Columbia, Vancouver, BC, Canada, November 16, 2009 (seminar).

13. **Erturk, A.**, Applications of Smart Materials in Aerospace Engineering, Invited Lecture in the 6th Aeronautical Engineering Week, Department of Aeronautical Engineering, Engineering School of Sao Carlos, University of Sao Paulo, SP, Brazil, August 21, 2009 (invited).

14. **Erturk, A.**, Piezoelectric Energy Harvesting: Modeling and Applications, Invited Lecture, Department of Aeronautical Engineering, Engineering School of Sao Carlos, University of Sao Paulo, SP, Brazil, August 20, 2009 (invited).

15. **Erturk, A.**, *Smart Materials and Structures: Fundamentals and Applications*, Short Course in the 6th Aeronautical Engineering Week, Department of Aeronautical Engineering, Engineering School of Sao Carlos, University of Sao Paulo, SP, Brazil, August 18, 2009 (short course).

16. **Erturk, A.**, *Piezoelectric Energy Harvesting: Analytical Modeling and Experimental Validations*, Liviu Librescu Memorial Scholarship Seminar, Department of Engineering Science and Mechanics, Virginia Polytechnic Institute and State University, Blacksburg, VA, November 12, 2008 (seminar).

17. **Erturk, A.** and Inman, D.J., Electromechanical Modeling of Piezoelectric Energy Harvesters for Persistent Ambient Vibrations, *The Mechanics Conference to Celebrate the 100th Anniversary of the Department of Engineering Science and Mechanics,* Blacksburg, VA, 29-30 May 2008.

Ph.D. Dissertation

Erturk, A., 2009, *Electromechanical Modeling of Piezoelectric Energy Harvesters*, Ph.D. Dissertation, (xxviii+291 pages), Department of Engineering Science and Mechanics, Virginia Polytechnic Institute and State University, Blacksburg, VA, November 2009.

M.S. Thesis

Erturk, A., 2006, *Dynamic Modeling of Spindle-Tool Assemblies in Machining Centers*, M.S. Thesis, (xxii+202 pages), Department of Mechanical Engineering, Middle East Technical University, Ankara, Turkey, May 2006.§§§§

Related Projects

- *Ph.D. research:* U.S. Air Force Office of Scientific Research (AFOSR) MURI, Grant No. F 9550-06-1-0326: "*Energy Harvesting and Storage Systems for Future Air Force Vehicles,*" AFOSR Grant No. F 9550-09-1-0625: "*Simultaneous Vibration Suppression and Energy Harvesting*," and U.S. Department of Commerce, National Institute of Standards and Technology, Technology Innovation Program, Cooperative Agreement Number 70NANB9H9007: "*Self-Powered Wireless Sensor Network for Structural Health Prognosis*."

- *M.S. research:* The Scientific and Technological Research Council of Turkey, Project No. 104M430: "*Improvement of Process Efficiency in High Speed Machining by Modeling of Machine Tool and Workpiece Dynamics Using Advanced Structural Dynamics Techniques*."

§§§§ Received the *Thesis of the Year Award* of the METU Parlar Foundation in December 2006.

Recent Patents and Intellectual Property

- *Piezomagnetoelastic Power Generator for Broadband Vibration Energy Harvesting* (Erturk, A. and Inman, D.J.), U.S. Patent Application No. 61/269,662, VTIP No. 09-172 (date filed: June 26, 2009) WO 2010/151738 – PCT/US2010/039938

Current Graduate and Undergraduate Students

- Mr. M. Cacan, PhD student, Georgia Tech, Fall 2011 –
- Mr. L. Cen, PhD student, Georgia Tech, Fall 2011 –
- Ms. S. Zhao, PhD student, Georgia Tech, Fall 2011 –
- Mr. A. Samur, MS student, Georgia Tech, Fall 2011 –

Other Students and Visiting Scholars

- Mr. T. Deplace, Senior student, Institut Catholique d'Arts et Métiers, Lille, France, February – May 2011 (*stochastic excitation of monostable and bistable vibration-based energy harvesters*)

- Mr. H. Westermann, Graduate student, Leibniz Universität Hannover, Hanover, Germany, March – May 2011 (*optimization of magnet arrangement in multi-stable piezomagnetoelastic energy harvesters*)

- Ms. M. Anicézio, Senior student, University of Sao Paulo, SP, Brazil, January – March 2011 (*linear and nonlinear aeroelastic energy harvesting using electromagnetic induction*)

- Mr. G. Delporte, Senior student, Institut Catholique d'Arts et Métiers, Lille, France, August – December 2010 (*experimental investigation of thrust generation in carangiform swimming using macro-fiber composite piezoceramics*)

- Mr. P. Gambier, Senior student, Institut Catholique d'Arts et Métiers, Toulouse, France, February – June 2010 (*fabrication and experiments of a multifunctional energy harvester*)

- Mr. J. Hoffmann, Senior student, Institut Catholique d'Arts et Métiers, Lille, France, February – June 2009 (*completed experiments with the piezomagnetoelastic structure*)

- Mr. M. Fontenille, Senior student, Université de Technologie de Compiègne, Compiègne, France, February – July 2008 (*completed experiments with macro-fiber composite piezoceramics, the L-shaped energy harvester and piezoelectric-electromagnetic energy harvester*)

- Mr. G. Kleinhans, Senior student, Institut Catholique d'Arts et Métiers, Lille, France, August – December 2007 (*completed experiments for energy harvesting from acoustic excitation of PVDF membranes*)

Service on Graduate Student Committees

- Mr. B. Beck, Ph.D. candidate in Mechanical Engineering at Georgia Tech
- Mr. C. Faria, Ph.D. candidate in Mechanical Engineering at Virginia Tech
- Mr. W. Kim, Ph.D. candidate in Mechanical Engineering at Virginia Tech

Society Membership

- American Society of Mechanical Engineers (ASME)
- American Institute of Aeronautics and Astronautics (AIAA)
- Institute of Electrical and Electronics Engineers (IEEE)
- Society for Experimental Mechanics (SEM)
- International Society for Optical Engineering (SPIE)

Technical/Organizing/Advisory Committee Membership

- ASME Design Engineering Division, Technical Committee on Vibration and Sound, Elected Member, 2011-2014
- ASME Aerospace Division, Technical Committee on Modeling, Simulation and Control, Chair, 2012
- ASME Aerospace Division, Adaptive Structures and Material Systems Branch, Elected Member, 2011-
- ASME SMASIS Symposium 3 (Modeling, Simulation and Control) Organizing Committee Member (2011-) and Co-chair (2012)
- International Workshop on Piezoelectric Materials and Applications in Actuators Advisory Committee

Service to the Profession

Manuscript reviewer

- Journal of Applied Physics
- Applied Physics Letters
- AIP Advances
- Sensors and Actuators A: Physical
- Journal of Micromechanics and Microengineering
- Journal of Mechanics of Materials and Structures
- Measurement Science and Technology
- Smart Materials and Structures
- Journal of Intelligent Material Systems and Structures
- Journal of Smart Structures and Systems
- Smart Materials Research
- International Journal of Mechanical Sciences
- International Journal of Nonlinear Mechanics
- International Journal of Modeling and Simulation
- Nonlinear Dynamics
- Physica D: Nonlinear Phenomena
- Journal of Sound and Vibration
- ASME Journal of Applied Mechanics
- ASME Journal of Vibration and Acoustics
- ASCE Journal of Energy Engineering
- IEEE/ASME Transactions on Mechatronics
- IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control
- Finite Elements in Analysis and Design
- IMechE Journal of Mechanical Engineering Science
- Chinese Journal of Aeronautics
- Strojarstvo: Journal for Theory and Application in Mechanical Engineering
- European Journal of Mechanics A: Solids
- Machining Science and Technology
- Advances in Structural Engineering

- Mechanics of Advanced Materials and Structures
- Shock and Vibration
- Meccanica
- Strain
- Micromachines
- AIAA/ASME/AHS Adaptive Structures Conference
- ASME Design Engineering Technical Conferences
- ASME International Mechanical Engineering Congress and Exposition
- ASME Engineering Systems Design and Analysis Conference
- ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems
- IEEE Conference on Automation Science and Engineering
- IEEE International Symposium on Information, Communication and Automation Technologies
- AIP IEEE Conference on Magnetism and Magnetic Materials

Symposium co-chair
- ASME SMASIS 2012: Symposium#3 – Modeling, Simulation and Control

Session chair
- ASME SMASIS 2011: *Energy Harvesting Sessions*
- SPIE 2011: *Energy Harvesting and Scavenging*
- ASME SMASIS 2010: *Energy Harvesting Sessions*
- ASME ESDA 2010: *Vibrations Sessions*
- SPIE 2010: *Energy Harvesting and Scavenging*
- IMAC 2010: *Electromagnetic, Magnetostrictive and Piezoelectric Energy Harvesting Sessions*
- ASME-ASCE-SES 2009 Joint Conference on Mechanics and Materials: *Dynamics Session*
- ASME SMASIS 2009: *Bio-Inspired Hydro-Structures*
- SPIE 2009: *PZT Energy Harvesting Session*

Symposium and session organizer
- ASME IDETC 2012: *Symposium on Vibration Control, Energy Harvesting, Smart Structures, and Damping*
- ASME SMASIS 2012: *Symposium on Modeling, Simulation and Control*
- ASME SMASIS 2012: *Energy Harvesting Sessions*
- ASME SMASIS 2011: *Energy Harvesting Sessions (Nonlinear Energy Harvesting, Flow Energy Harvesting, Energy Harvesting Circuits, Modeling and Applications of Energy Harvesting)*
- ASME SMASIS 2010: *Energy Harvesting Sessions*
- IMAC 2010: *Electromagnetic, Magnetostrictive and Piezoelectric Energy Harvesting Sessions*

Industrial Experience

- **July 2003** **Project Intern**
  Product Development Department
  Arcelik Refrigerator Plant, Inc., Eskisehir, Turkey

  Description: *Completed an industrial design project (which was later patented by the company): "A sliding wine bottle rack for cooling of 1 to 3 bottles". Designed the product and administered the manufacturing process of the prototype. The simple design is today used in various domestic (Arcelik) and international (BEKO) refrigerator models of the company.*

- **July 2002** **Production Intern**
  Engineering Management
  TEI (TUSAS Engine Industries, Inc.), Eskisehir, Turkey

Description: *Investigated the manufacturing processes of various jet engine components at this joint company of the Turkish Aerospace Industries, Turkish Air Force, and General Electric.*

Awards/Scholarships/Honors/Notable News

- *Guest Editor*, Journal of Intelligent Material Systems and Structures (2011-2012)
- Most cited articles in Smart Materials and Structures, Journal of Intelligent Material Systems and Structures, and Journal of Vibration and Acoustics (2009-2010)
- Co-authored the *Best Student Papers* of the ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems (2009 and 2010)
- Featured article (and the most downloaded article) in Applied Physics Letters (American Institute of Physics): *"A Piezomagnetoelastic Structure for Broadband Vibration Energy Harvesting"* (July 2009) – Related news articles: (1) "*Piezomagnetoelastic Device Harvests Vibrational Energy*" by A. Hatt, *Research/Researchers* in the *MRS Bulletin* of the Materials Research Society (September 2009) (2) "*Good Vibrations Generate Electricity*" by P.F. Schewe, *Inside Science News Service* of the American Institute of Physics (August 2009)
- Featured articles in the 2009 and 2010 Highlights of Smart Materials and Structures (Institute of Physics).
- *ASME & AIAA Adaptive Structures & Material Systems Newsletter, Student Spotlight* (2009)
- *Liviu Librescu Memorial Scholarship* of the Department of Engineering Science and Mechanics at Virginia Tech – rewarded based on the criteria of "*having the potential for scholarly achievement in teaching and research, and a demonstrated dedication to the welfare and well-being of others*" (the first recipient - 2008)
- Biography listed in *Marquis Who's Who in America* and *Marquis Who's Who in Science and Engineering*
- *Publication Encouragement Prize* of the Scientific and Technological Research Council of Turkey for the journal papers in SCI from the M.S. thesis (4 times in 2007)
- *Thesis of the Year Award* of the METU Parlar Foundation for the M.S. Thesis (2006)
- *Project Encouragement Prize* of the Scientific and Technological Research Council of Turkey for Project No. 104M430 (2006)
- *National M.S. Scholarship* of the Scientific and Technological Research Council of Turkey (2005-2006)
- Ranked 1st in the oral *Graduate Teaching Assistant Examination* of the Department of Mechanical Engineering at METU (2004)
- *High Honor certificates* of the President and graduation with High Honors and the 3rd rank out of 277 ME students at METU (undergraduate)
- *Plaques and certificates* for the ranking (top 3) in the Department of Mechanical Engineering at METU (undergraduate)