

**Raj K. Prabhu, Ph.D.**

Associate Director (Computational Engineering Mechanics)

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E-mail: [rprabhu@abe.msstate.edu](mailto:rprabhu@abe.msstate.edu)**PROFESSIONAL SUMMARY**

- I. Research: Multiscale Modeling, finite element analysis, biomechanics, biomedical engineering, computational solid mechanics, design optimization, dynamic strain rate experimental mechanics
  - 32 peer-reviewed publications, 31 conference proceedings, 56 professional presentations, 13 invited talks
  - Managed extramural funding of \$931k as PI, and \$2,727k as co-PI (11 research collaborators, 1 post-doc, 7 graduate and 8 undergraduate students)
  - 2 international academic appointments
- II. Teaching and Mentoring:
  - Teach the undergraduate course transport phenomena for bioengineering in fall and spring semesters (Average Student Evaluation: 4.3/5.0; College Average: 4.1/5.0<sup>1</sup>)
  - Taught the graduate course on computational modeling and applications for engineers at Pyongyang University of Science and Technology, Pyongyang, DPR Korea, 2013
  - Graduated 1 Ph.D. and 3 M.S. students as major advisor
  - Mentored and guided 7 graduate and 17 undergraduate students through directed individual studies
  - Advise 31 undergraduate and 5 – 10 graduate students per semester
- III. Service:
  - Serving as member of the University Course Curriculum Committee, Fall 2015 – Present
  - Review department's Institutional Effectiveness reports, Fall 2013 – Present
  - Served as ABET coordinator for the BE<sup>2</sup> undergraduate program, Fall 2015 – Summer 2017
  - Served as graduate coordinator for the BE graduate programs, Spring 2013 – Fall 2015
  - Review manuscripts for several BE, biomechanics and computational mechanics journals
- IV. Entrepreneurial:
  - Started 2 tech start-up companies
  - Co-owner or consultant for 2 companies
  - 2 US patents
- V. Education:
  - Ph.D., Mechanical Engineering, MSU, August 2011.
  - M.S., Computational Engineering, MSU, August 2005.
  - B.Tech., Chemical Engineering, Indian Institute of Technology-Madras, Chennai, India, August 2000.

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<sup>1</sup> Mississippi State University (MSU) Bagley College of Engineering (BCoE) data from AY 2015–2016

<sup>2</sup> BE: Biological Engineering

## **PROFESSIONAL EXPERIENCE**

### **Associate Director (CEM<sup>3</sup>)**

CAVS<sup>4</sup>, MSU, March 2018 – present.

- Manage the CEM thrust research activities at CAVS
- Provide guidance and support for the CEM researchers

### **Assistant Professor**

Department of ABE<sup>5</sup>, MSU, August 2015 – present.

- Multiscale mechanical characterization and multiscale modeling of biomaterials
- Bio-inspired design and biomimetics
- Develop and conduct experimental (*in vitro* and *in vivo*) protocols for testing the performance of designed biomedical devices
- Uncertainty analysis for local weather-based irrigation modeling
- Manuscript publications of scientific studies, and professional presentations of the results thereof
- Lead mentor of graduate students at MSU in computational biomechanics and dynamic experimentation of biomaterials and biomedical devices
- Served as graduate coordinator for the BE programs, Spring 2013 – Fall 2015
- Served as ABET coordinator for the BE undergraduate program, Fall 2015 – Summer 2017
- Serving as member of the University Course Curriculum Committee (UCCC), Fall 2015 – present
- Review department's Institutional Effectiveness (IE) reports, Fall 2013 – present

### **Honorary Research Fellow**

School of Engineering, CU<sup>6</sup>, Wales, CF10 3AT, UK, Jun 2015 – present.

- Conduct collaborative research with CU in injury biomechanics – co-lead joint projects in infant head trauma, pedestrian highway safety, soft tissue biomechanics, and dynamic experimentation
- Advise CU graduate and undergraduate students in computational biomechanics
- Co-author publications and draft joint proposals

### **Adjunct Professor**

College of Computer Science and Electrical Engineering, PUST<sup>7</sup>, Pyongyang, DPR Korea (North Korea), June 2013 – present

- Taught graduate-level computational modeling and applications for engineers
- Mentored PUST graduate students of PUST for graduate research

### **Assistant Research Professor**

Department of ABE, and CAVS, MSU, August 2011 – 2015.

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<sup>3</sup> CEM: Computational Engineering Mechanics

<sup>4</sup> CAVS: Center for Advanced Vehicular Systems

<sup>5</sup> ABE: Agricultural and Biological Engineering

<sup>6</sup> CU: Cardiff University

<sup>7</sup> PUST: Pyongyang University of Science and Technology

- Theoretical, computational and experimental studies of the large deformation of biomaterials (brain, muscle, tendon, etc.) under diverse mechanical loading conditions (blast and blunt) and development of Finite Element Analysis (FEA) protocols for the mechanics of biomaterials
- Biomedical engineering product development and multi objective-based design optimization of biomedical devices
- Develop and conduct experimental (*in vitro* and *in vivo*) protocols for testing the performance of designed biomedical devices
- Proposal writing in the areas of hierarchical modeling and FE simulations of soft biological materials
- Manuscript publications of scientific studies, and professional presentations of the results thereof
- Served as graduate coordinator for the BE programs, Spring 2013 – Summer 2013

### **Graduate Research Assistant**

CAVS, MSU, August 2005 – June 2011.

- Theoretical studies of the dynamic deformation of soft biological materials (brain, liver) under traumatic or ballistic conditions using Finite Element (FE) Simulations
- Experimentally developed and implemented a testing procedure for soft biological material (Brain, Liver, and tendon) using a Split-Hopkinson Pressure Bar (SHPB) setup.
- Implemented and executed coupled experimental/FE simulations setup in multiscale framework
- Lectured and taught graduate level class on continuum mechanics

### **Research Engineer (coop)**

Fluid Physics International, August 2004 – May 2005.

- Worked on multiple projects in computational fluid dynamics (CFD)
- Involved in understanding the physics of Cavitation in propellers using CFD

### **Graduate Research Assistant**

CAVS, Mississippi State University, January 2003 – July 2004.

- Modeled and studied the effects of various components in a Fuel Cell, to quantify solid-liquid interactions.

### **Operations Officer I**

Indian Oil Corporation Limited (Marketing Division), August 2000 – December 2001.

- Managed over 20 employees in manufacturing industrial grade lubricants
- Successfully set up a benchmark for manufacturing and set record production in consecutive months
- Involved in implementing ISO 9000 and 14001.

### **Graduate Student Summer Internship**

Summer internship at San Diego under the guidance of Dr. J. Baumgardner (former Technical Lead in Los Alamos National Lab), May-July, 2006.

- Involved in developing a framework to study ocean current trends

### **Technical Skills**

- Multiscale mechanics of materials
- High strain rate experimental mechanics
- Finite element analysis
- Multiscale material modeling
- Computational solid mechanics
- Bio-Inspired Design
- Uncertainty analysis

### **Computing Skills**

- Programming: C, C++, Fortran, Python, Perl, Visual Basic scripting
- Platforms: Windows, LINUX, UNIX (Solaris)
- Packages: ABAQUS 6.11-14, LS-DYNA, LAMMPS, Solid Mesh, Tecplot, Mathcad, MATLAB, MS Office 2010

### **Honors and Associations**

- Mississippi State University (College of Engineering) Graduate Student Researcher of the Academic Year 2010-2011.
- National Talent Scholarship (National Talent Search Examination) Awardee, 1992-1993, India.
- The Biophysical Society (BPS)
- American Society of Mechanical Engineers (ASME), Bioengineering Division (BED)
- Biomedical Engineering Society (BMES)
- United States Association for Computational Mechanics (USACM)
- The Minerals, Metals and Materials (TMS) Society

## **I. RESEARCH**

### **PUBLISHED JOURNAL ARTICLES (\*: Lead, or Corresponding Author)**

1. F. Ahmad, S. Soe, N. White, R. Johnston, I. Khan, J. Liao, M. Jones, R. Prabhu, I. Maconochie, And P. Theobald, (**Jul 2018**), "Region-Specific Microstructure in the Neonatal Ventricles of a Porcine Model." (*Accepted, Ann Biomed Eng*; <https://doi.org/10.1007/s10439-018-2089-4>)
2. R. Bertucci, **R. Prabhu**, M.F. Horstemeyer, Y. Mao, R. Gilbrech, J. Sheng, J. Liao, L. N. Williams, (**Jun 2018**), "An Anatomically-Accurate Computational Model for Primary Blast Effects on the Human Lower Extremity." (*Accepted, J Mech Med Bio*)
3. F. Ahmad, **R. Prabhu**, J. Liao, S. Soe, M. D Jones, J. Miller, P. Berthelson, D. Enge, K. M. Copeland, S. Shaabeth, R. Johnston, I. Maconochie, P. S. Theobald, (**Mar 2018**), "Biomechanical properties and microstructure of neonatal porcine ventricles." (*Accepted, J Mech Beha Biomed Matls*)
4. J. Chen, B. Brazile, R. Prabhu, S. S. Patnaik, R. Bertucci, H. Rhee, M. F. Horstemeyer, Y. Hong, L. N. Williams, J. Liao, (**Feb 2018**) "Quantitative Analysis of Tissue Damage Evolution in Porcine Liver with Interrupted Mechanical Testing under Tension, Compression, and Shear." (*Accepted, ASME J Biomech*)
5. M. A. Murphy, S. Mun, M. F. Horstemeyer, M. I. Baskes, A. Bakhtiary, M. LaPlaca, S. Gwaltney, L. N. Williams, **R. K. Prabhu\*** (**Feb 2018**) "Molecular dynamics simulations showing 1-palmitoyl-2-oleoyl-phosphatidylcholine (POPC) membrane mechanoporation damage under different strain paths."

- (Accepted, J Biomol Struct Dyn, <https://www.tandfonline.com/doi/full/10.1080/07391102.2018.1453376>)
6. G. A. Rush, **R. Prabhu\***, G. A. Rush III, L.N. Williams, M.F. Horstemeyer, (2017) "Modified Drop Tower Impact Tests for American Football Helmets." (*J Vis Exp* (120) e53929, [doi: 10.3791/53929](https://doi.org/10.3791/53929))
  7. Al-Graitti, A., Khalid, G., Berthelson, P., Mason-Jones, A., **Prabhu, R.**, Jones, M. (Nov 2017) "Auto Rickshaw Impacts with Pedestrians: A Computational Analysis of Post-Collision Kinematics and Injury Mechanics." (*Int J Biomed Bio Eng*, 11 11:568 – 587; [scholar.waset.org/1307-6892/10008192](http://scholar.waset.org/1307-6892/10008192))
  8. G. A. Khalid, **R. Prabhu**, J. Dickson, M. D. Jones, (Oct 2017) "Biomechanical engineering investigation of the risk of children wearing a bicycle helmet suffering an angular acceleration induced head injury." (*MOJ Sports Med* 1 5:00025; [DOI: 10.15406/mojm.2017.01.00025](https://doi.org/10.15406/mojm.2017.01.00025))
  9. D. Darwall, G. A. Khalid, P. S. Theobald, **R. Prabhu**, O. Arthurs, M. D. Jones, (Jul 2017) "Development and Validation of a Physical Model to Investigate the Biomechanics of Infant Head Impact." (*Forensic Sci Int*, 276:111-119, <http://doi.org/10.1016/j.forsciint.2017.03.025>)
  10. N. Lee, L. N. Williams, S. Mun, H. Rhee, **R. Prabhu**, K. Bhattarai, M. F. Horstemeyer, (Jun 2017) "Stress wave mitigation at suture interfaces." (*Biomed Phys Eng Express*, 3:035025, <https://doi.org/10.1088/2057-1976/aa777e>)
  11. J. Deang, P.G. Allison, **R. Prabhu**, L.N. Williams, H. Rhee, W.R. Whittington, E. Perkins, S.M. Bruce, M.F. Horstemeyer, (Jan 2017) "Constitutive behavior of paddlefish (*Polyodon spathula*) cartilage." (Published Jan 26, 2017, *Bioinspir Biomim Nanobio*, 1-18, <http://dx.doi.org/10.1680/jbibn.16.00046>)
  12. A. M. Kovach, V. L. Nguyen, J.M. Gambino, Z. F. Nelson, T. Szasz, Sandra Bulla, Jun Liao, Lakiesha Williams, **R. Prabhu\***, (2016) "Prospective preliminary *in vitro* investigation of a magnetic iron oxide nanoparticle conjugated with ligand CD80 and VEGF antibody as a targeted drug delivery system for the induction of cell death in rodent osteosarcoma cells." (*BioResrch Open* 5 1:299-307, <https://doi.org/10.1089/biores.2016.0020>)
  13. M. A. Murphy, M. F. Horstemeyer, S. Gwaltney, J. Liao, L. N. Williams, **R. Prabhu\*** (2016) "Nanomechanics of phospholipid bilayer failure under strip biaxial stretching using molecular dynamics." (*Model Simul Mater Sci Eng* 24 5:055008, <http://dx.doi.org/10.1088/0965-0393/24/5/055008>)
  14. K.L. Johnson, S. Chowdhury, W.B. Lawrimore, Mao, Y., Mehmani, A., **Prabhu, R.**, Rush, G.A., M.F. Horstemeyer, "Topology Optimization of a Football Helmet Facemask Based on Brain Response." (Dec 2016), (*J Mater & Des*, 111:108-118, <https://doi.org/10.1016/j.matdes.2016.08.064>)
  15. N. Lee, M. F. Horstemeyer, **R. Prabhu**, H. Rhee, Y. Hammi, R. Moser, L. N. Williams, (Oct 2016) "The geometric effects of a woodpecker's hyoid apparatus for stress wave mitigation." (*Bioinspir Biomim* 11:066004, <http://dx.doi.org/10.1088/1748-3190/11/6/066004>)
  16. G. A. Rush, G. A. Rush III, N. Sbravati, **R. Prabhu**, J. L. DuBien, L.N. Williams, M.F. Horstemeyer, (Sep 2016) "Comparison of Shell-Facemask Responses in American Football Helmets during NOCSAE Drop Tests." (*Sports Eng* 20:199, [doi:10.1007/s12283-017-0233-2](https://doi.org/10.1007/s12283-017-0233-2))
  17. S. Mun, G. F. Sassenrath, A. M. Schmidt, N. Lee, M. C. Wadsworth, B. Rice, J. Q. Corbitt; J. M. Schneider, M. L. M. Tagert, J. W. Pote, **R. Prabhu\***, (2015) "Uncertainty Analysis of an Irrigation Scheduling Model for Water Management in Crop Production." (*Ag Water Manag* 155:100-112, <http://dx.doi.org/10.1016/j.agwat.2015.03.009>)
  18. **R. Prabhu\***, W. R. Whittington, S. S. Patnaik, Y. Mao, J. Liao, L. N. Williams, M. T. Begonia, M. F. Horstemeyer, (2015) "A Coupled Experiment-Finite Element Modeling Methodology for Assessing High Strain Rate Mechanical Response of Soft Biomaterials." (*J Vis Exp* 99:e51545, [doi:10.3791/51545](https://doi.org/10.3791/51545))
  19. A. Pinheiro, A. Cooley, J. Liao, **R. Prabhu**, S. Elder, (Dec 2015) "Comparison of Natural Crosslinking Agents for the Stabilization of Xenogenic Articular Cartilage." (*J Orthop Res* 34 6:1037-1046, [DOI: 10.1002/jor.23121](https://doi.org/10.1002/jor.23121))

20. J. Clemmer, **R. Prabhu**, J. Chen, L. B. Priddy, E. E. Colebeck, M. L. McCollum, M. F. Horstemeyer, L. N. Williams, J. Liao, (**May 2015**) “Experimental Observation of High Strain Rate Responses of Porcine Brain, Liver, and Tendon.” (*J Mech Med Biol* **16**:1650032, <http://dx.doi.org/10.1142/S0219519416500329>)
21. F. Li, X. Li, J. Yang, J. Liao, S. Li, J. Liao, **R. Prabhu**, L. N. Williams, Y. Yang, J. Tang, N. Liu, (**Sep 2015**) “Direct Synthesis of Carbon-based Microtubes by Hydrothermal Carbonization of Microorganism Cells.” (*Chem Eng J* **276**:322-330, <http://dx.doi.org/10.1016/j.cej.2015.04.091>)
22. B. Weed, S. Patnaik, M. Browning, B. Brazile, J. Liao, **R. Prabhu**, L. Williams, (**May 2015**), “Experimental Evidence of Mechanical Isotropy in Porcine Lung Parenchyma.” (*MDPI Matls* **8** 5:2454-2466; [doi:10.3390/ma8052454](http://dx.doi.org/10.3390/ma8052454))
23. M.T. Begonia, **R. Prabhu**, J. Liao, W. R. Whittington, A. Claude, B. Willeford, J. Wardlaw, G. Sorrells, R. Wu, S. Zhang, L.N. Williams, (**Nov 2014**) “Quantitative Analysis of Rodent Brain Microstructure Following Mild Blunt and Blast Trauma.” (*J Biomech* **47**:3704–3711, [DOI: 10.1016/j.jbiomech.2014.09.026](http://dx.doi.org/10.1016/j.jbiomech.2014.09.026))
24. R. Pietsch, B. B. Wheatley, T. L. H. Donahue, R. Gilbrech, **R. Prabhu**, J. Liao, L. N. Williams, (**Nov 2014**) “Anisotropic Compressive Properties of Passive Porcine Muscle Tissue.” (*ASME J Biomech Eng*, **136** 11:111003-8, [doi: 10.1115/1.4028088](http://dx.doi.org/10.1115/1.4028088))
25. X. Deng, S. A. Chen, **R. Prabhu**, Y. Jiang, Y. Mao, M. F. Horstemeyer, (**Aug 2014**) “Finite Element Analysis of the Human Head under Side Car Crash Impacts at Different Speeds.” (*J Mech Med Bio* **14** 6:1440002; <https://doi.org/10.1142/S0219519414400028>).
26. B. C. Weed, T. L. Bova, S. S. Patnaik, B. Brazile, C. Mochal-King, B. Rude, **R. Prabhu**, L. N. Williams, J. Liao, (**Jun 2014**) “3D Printing Assisted Rapid Prototyping and Optimization: Development of a Novel Small Intestinal Cannula for Equine Research.” (*3D Print Addit Manuf*, **1** 2: 104-106, [doi:10.1089/3dp.2013.0008](http://dx.doi.org/10.1089/3dp.2013.0008))
27. B. Brazile, B. Wang, G. Wang, R. Bertucci, **R. Prabhu**, S. Patnaik, J. R. Butler, A. Claude, E. Brinkman-Ferguson, L. N. Williams, and J. Liao, (**2014**) “On the Bending Properties of Porcine Mitral, Tricuspid, Aortic, and Pulmonary Valve Leaflets.” (*J Long-Term Eff Med Implants* **25**:41-53, [DOI: 10.1615/JLongTermEffMedImplants.2015011741](http://dx.doi.org/10.1615/JLongTermEffMedImplants.2015011741))
28. K. L. Johnson, M. F. Horstemeyer, M. W. Trim, H. Rhee, L. N. Williams, J. Liao, **R. Prabhu**, (**Feb 2014**) “Geometric effects on elastic stress wave propagation.” (*ASME J Biomech Eng* **136** 2:021023, [http://doi: 10.1115/1.4026320](http://doi:10.1115/1.4026320))
29. G. F. Sassenrath, J. M. Schneider, A. M. Schmidt, J. Q. Corbitt, J. M. Halloran, **R. Prabhu**, (**Nov 2013**), “Testing gridded NWS 1-Day Observed Precipitation Analysis in a daily irrigation scheduler.” (*Agr Sci* **4** 12:621-627, <http://dx.doi.org/10.4236/as.2013.412083>)
30. B.C. Weed, A. Borazjani, S.S. Patnaik, **R. Prabhu**, M.F. Horstemeyer, P.L. Ryan, T. Franz, L.N. Williams, J. Liao, (**Oct 2012**) “Stress State and Strain Rate Dependence of the Human Placenta” *Annals of Biomedical Engineering*.” (*Ann Biomed Eng* **40** 10:2255-65, [doi: 10.1007/s10439-012-0588-2](http://dx.doi.org/10.1007/s10439-012-0588-2))
31. **R. Prabhu\***, M. F. Horstemeyer, J. Bouvard, J. Sherburn, E. B. Marin, J. Liao, L. N. Williams, ( **2011**), “Coupled Experiment/Finite Element Simulation On High Rate Mechanical Response Of Porcine Brain.” (*J Mech Behav Biomed Mater* **4** 7 :1067-80, [doi:10.1016/j.jmbbm.2011.03.015](http://dx.doi.org/10.1016/j.jmbbm.2011.03.015))
32. M. T. Begonia, **R. Prabhu**, J. Liao, M. F. Horstemeyer, L. N. Williams, (**Oct 2010**). The Influence of Strain Rate Dependency on the Structure–Property Relations of Porcine Brain.” (*Ann Biomed Eng* **38** 10:3043-3057, [doi:10.1007/s10439-010-0072-9](http://dx.doi.org/10.1007/s10439-010-0072-9))

#### **JOURNAL ARTICLES SUBMITTED OR UNDER REVIEW**

1. G. A. Khalid, **R. Prabhu**, O. Arthurs, M. D. Jones, (**Nov 2018**) “A coupled physical-computational methodology for the investigation of short fall related infant head impacts.” (*Under review, Forensic*

*Sci Int)*

2. X. Deng, **R. Prabhu**, Y. Mao, P.T. Wang, M.F. Horstemeyer, (2018) "The Mechanical Response of the Human Head under a Side Car Crash Impact Using Finite Element Analysis." (*Under review, Int J Crashworth*)
3. **R. Prabhu**, M. F. Horstemeyer, M. G. Begonia, Mao, Y., M. L. McCollum, D. J. Bammann L. N. Williams, J. Liao, (2018), "Compressive Mechanical Properties of Porcine Brain: Modeling Tissue Hydration Effects." (*Under review, Int Biomech*)
4. M. T. Begonia, **R. Prabhu**, J. Liao, A. Claude, J. Wardlaw, B. Willeford, G. Sorrells, R. Wu, S. Zhang, L. Williams, (2018) "Comparison of Blunt Force and Blast Induced Trauma in the Rodent Brain." (*Under internal review*)
5. **R. Prabhu**, M. F. Horstemeyer, Y. Mao, J. Bouvard, E. B. Marin, L. N. Williams, J. Liao, (2018) "Simulation Based Analysis of an Experimentally Quantified Traumatic Brain Injury from an In-Theater Blast Explosion." (*Under internal review*)
6. **R. Prabhu**, E. E. Colebeck, S. Ryland, M. F. Horstemeyer, G. Steele, L. N. Williams, J. Liao, (2018) "Uncertainty Analysis of the Split-Hopkinson Pressure Bar Apparatus for Testing Soft Biological Materials." (*Under internal review*)

#### **JOURNAL ARTICLES IN PREPARATION**

1. G. A. Khalid, **R. Prabhu**, O. Arthurs, P. S. Theobald, M. D. Jones, (Oct 2018) "A computational model for the investigation of infant fall related head impacts." (*Under internal review*)
2. Brazile, B. Wang, G. Wang, R. Bertucci, **R. Prabhu**, S. Patnaik, J. R. Butler, A. Claude, E. Brinkman-Ferguson, L. N. Williams, and J. Liao, (2019) "Biomechanical Characterizations of Scar ECM during The Acute to Chronic Stages of Myocardial Infarction."
3. G. A. Rush, W.T. Thoms, G. A. Rush III, **R. Prabhu**, L.N. Williams, M.F. Horstemeyer, (2019) "Parametric Analysis of a Highly Dissipative Helmet Liner Foam using Design of Experiments to Optimize a Design." *Journal of Biomechanical Engineering*
4. R. Bertucci, **R. Prabhu**, S. Clark, M. Horstemeyer, J. Liao, L. Williams, (2019) "A Computational Method for Analyzing Military Boot Designs at Blast Conditions."
5. J. Bentley, K. Pope, W. R. Whittington, S. Turnage, M. F. Horstemeyer, A. Oppedal, **R. Prabhu**, (2019) "Structure-Property Quantification of the Walrus Bacula "Oosiks."
6. Y. Mao, **R. Prabhu**, R. Singh, A. Oje, S. Ryland, L. Williams, J. Liao, M.F. Horstemeyer, (2019) "On the Experimental and Finite Element Analysis of the Dynamic Response of the Porcine Adipose Tissue."
7. S. Clark, R. Bertucci, J. Liao, L. N. Williams, **R. Prabhu**, (2019) "The Effect of Acoustic Pollution on Marine Mammals."
8. **R. Prabhu**, M. F. Horstemeyer, Y. Mao, L. N. Williams, J. Liao, (2019) "A Novel Head Impact Criterion for Blast Related Traumatic Brain Injury."

#### **PEER-REVIEWED CONFERENCE PROCEEDINGS**

1. Al-Graitti, A., J., Khalid, G., A., Berthelson, **Prabhu, R.**, Jones, M., D., (Jul 2019) "A Comparative Study of the Kinematic Response and Injury Metrics Associated with Adults and Children Impacted by an Auto Rickshaw," Computing Conference 2019, London, United Kingdom, Jul 16 – Jul, 2019.
2. Al-Graitti, A., J., Khalid, G., A., Berthelson, P., Mason-Jones, A., **Prabhu, R.**, Jones, M., D., (Nov 2018) "Investigation of the Influence of Auto Rickshaw Frontal Geometry on Pedestrian Impact Response – An Analysis of Post-Kinematic Mechanics and Injury Risk," 62<sup>nd</sup> Stapp Car Crash Conference® (November 2018), San Diego, CA, Oct, 2 – Nov, 2, 2018.

3. Crawford, F., AbuOmar, O., Jones, M., King, R., and **Prabhu, R., (Jul 2017)** “Data mining the effects of testing conditions on brain biomechanical properties,” Proceedings of the 2017 International Conference on Data Mining, Las Vegas, NV, July 17-20, 2017.
4. G. A. Khalid, M. D. Jones, **R. Prabhu**, A. Mason-Jones, W. Whittington, P. Theobald, H. Bakhtarydavijani. **(Mar 2017)** “Development of Paediatric Head Model for the Computational Analysis of Head Impact Interactions,” Proceedings of the 19th International Conference on Computational Modeling, Analysis and Simulation (ICCMAS), 14 – 15, March 2017, London, UK.
5. Lamont, A., Nguyen, V., Bertucci, R., Hammi, Y., Horstemeyer, M. F., Liao, J., Rhee, H., Williams, L., **Prabhu, R., (Jun 2016)** “Damage Modeling of a Human Tibia and Fibula Fracture Caused by a Mixed Martial Arts Kick,” SB3C 2016, National Harbor, Maryland, USA, Jun 28 – Jul 2, 2016.
6. Berthelson, P. R., Liao, G., Liao, J., Williams, L. N., Rhee, H., Deng, ., Horstemeyer, M. F., **R. Prabhu, (Jun 2016)** “A Study on the Mechanical Response of the Human Head during Single-Collision Car Crashes using Finite Element Analysis,” SB3C 2016, National Harbor, Maryland, USA, Jun 28 – Jul 2, 2016.
7. G. A. Khalid, **R. Prabhu**, A. Mason-Jones, P. S. Theobald, S. P. Soe, M. D. Jones, **(Mar 2016)** “Preliminary Numerical Simulations to Investigate the Kinematics of Infant Head Impact,” Proceedings of the 24<sup>th</sup> UK Conference of the Association for Computational Mechanics in Engineering 31 March – 01 April 2016, Cardiff University, Cardiff, UK.
8. R Prabhu\*, W. R. Whittington, M. D. Jones, D. Darwall, J. Liao, L. N. Williams, **(Feb 2016)** “Dynamic compressive mechanical properties of the porcine immature brain,” Brain Injury, 30, 5-6, pp. 674. [10.3109/02699052.2016.1162060](https://doi.org/10.3109/02699052.2016.1162060)
9. B. Brazile, **R. Prabhu**, L. Williams, J. Liao, **(Jun 2015)** “Biomechanical Characterization of Porcine Skeletal Muscle Extracellular Matrix,” Summer Biomechanics, Bioengineering, and Biotransport Conference, June 17-20, 2015, Snowbird, Utah, USA.
10. B. Brazile, **R. Prabhu**, L. Williams, J. Liao, **(Jun 2015)** “Biomechanical Characterizations of Scar ECM during the Acute to Chronic Stages of Myocardial Infarction,” Summer Biomechanics, Bioengineering, and Biotransport Conference, June 17-20, 2015, Snowbird, Utah, USA.
11. J. W. Wood, H. Rhee, **R. Prabhu, (Jun 2015)** “Using Finite Element Analysis to Study the Mechanical Advantages of a Turtle’s Shell,” Summer Biomechanics, Bioengineering, and Biotransport Conference, June 17-20, 2015, Snowbird, Utah, USA.
12. A. Bakhtarydavijani, J. Liao, L. Williams, M. LaPlaca, **R. Prabhu, (Jun 2015)** “Strain Rate Dependency of the Intracellular Calcium Ion Concentration during Neuronal Membrane Mechanoporation,” Summer Biomechanics, Bioengineering, and Biotransport Conference, June 17-20, 2015, Snowbird, Utah, USA.
13. A. C. Lamont, R. Bertucci, J. Liao, L. Williams, H. Rhee, **R. Prabhu, (Jun 2015)** “Biomechanics of Human Tibia and Fibula Fracture Caused by a Mixed Martial Arts Kick,” Summer Biomechanics, Bioengineering, and Biotransport Conference, June 17-20, 2015, Snowbird, Utah, USA.
14. M. A. Murphy, S. Mun, J. Liao, L. Williams, M. LaPlaca, **R. Prabhu, (Jun 2015)** “Constructing Rudimentary Limit Curves For Neuronal Phospholipid Bilayer Failure And Theoretical Calcium Penetration,” Summer Biomechanics, Bioengineering, and Biotransport Conference, June 17-20, 2015, Snowbird, Utah, USA.
15. M. A. Murphy, S. Mun, J. Liao, L. Williams, M. LaPlaca, **R. Prabhu, (Jun 2015)** “The Effects Of Stress State On The Mechanical Response And Failure Of The Neuronal Phospholipid Bilayer: A Molecular Dynamics Study,” Summer Biomechanics, Bioengineering, and Biotransport Conference, June 17-20, 2015, Snowbird, Utah, USA.
16. M. A. Murphy, S. Mun, J. Liao, L. Williams, M. LaPlaca, **R. Prabhu, (Jun 2015)** “Validation Of High Rate Strip Biaxial Tension Deformations Of The Neuronal Phospholipid Bilayer Using Empirical Data,” Summer Biomechanics, Bioengineering, and Biotransport Conference, June 17-20, 2015, Snowbird,



Utah, USA.

17. R. Bertucci, J. Liao, **R. Prabhu**, L. Williams, (**Jun 2015**) "Finite Element Analysis of Lower Extremity Military Boot Protection at Blast Conditions," Summer Biomechanics, Bioengineering, and Biotransport Conference, June 17-20, 2015, Snowbird, Utah, USA.
18. A. Kovach, T. Szasz, Z. Nelson, M. Cavalcanti, J. Gambino, L. Williams, J. Liao, **R. Prabhu**, (**Apr 2015**), "Targeted Drug Delivery via Nanoparticles: Novel Treatment for Canine Osteosarcoma," Society for Biomaterials 2015 Annual Meeting and Exposition, Charlotte, NC 2015.
19. S. Patnaik, T. Szasz, J. Liao, **R. Prabhu**, L. Williams, (**Jun 2015**) "Viscoelastic Properties of Porcine Patellar Tendon Tissue: A Study of Regional Variation and Frequency Dependent Behavior," Summer Biomechanics, Bioengineering, and Biotransport Conference, June 17-20, 2015, Snowbird, Utah, USA.
20. B. Brazile, B. Wang, G. Wang, R. Bertucci, **R. Prabhu**, S. Patnaik, X. Shi, R. Butler, A. Claude, E. Brinkman-Ferguson, L. Williams, J. Liao, (**Jul 2014**), "A Comparative Study of the Bending Properties of Porcine Mitral, Tricuspid, Aortic, and Pulmonary Valve Leaflets," Proceedings of the 7<sup>th</sup> World Congress of Biomechanics 2014, Boston, MA 2014.
21. L. N. Williams, S. Patnaik, **R. Prabhu**, J. Liao, (**Jul 2014**), "Effect of Frequency on the Dynamic Viscoelastic Properties of Porcine Patellar Tendon," Proceedings of the 7<sup>th</sup> World Congress of Biomechanics 2014, Boston, MA 2014.
22. B. Weed, S. Patnaik, B. Brazile, **R. Prabhu**, J. Liao, L. Williams, (**Jul 2014**), "Experimental Evidence of Mechanical Isotropy in Porcine Lung Parenchyma," Proceedings of the 7<sup>th</sup> World Congress of Biomechanics 2014, Boston, MA 2014.
23. R. Bertucci, **R. Prabhu**, M. F. Horstemeyer, J. Sheng, J. Liao, L. N. Williams, (**Jul 2014**), "Finite Element Analysis of Human Lower Extremity Subjected to Underbelly Blast Loading," Proceedings of the 7<sup>th</sup> World Congress of Biomechanics 2014, Boston, MA 2014.
24. I. S. Ladner, K. Johnson, M.F. Horstemeyer, L. N. Williams, J. Liao, **R. Prabhu**, (**Jun 2013**) "Simulation Based Design and Analysis of Helmet-to-Helmet Collision," *Proc. ASME. 55614*; Volume 1B, V01BT47A006, June 26, 2013, SBC2013-14544, Sunriver, OR, USA, doi: 10.1115/SBC2013-14649.
25. K. Johnson, W. Trim, M. F. Horstemeyer, **R. Prabhu**, (**Jun 2013**) "Examination of the Geometric Effects on Stress Wave Propagation and Applications in Football Helmet Design," *Proc. ASME. 55614*; Volume 1B, V01BT59A008, June 26, 2013, SBC2013-14649, Sunriver, OR, USA, doi: 10.1115/SBC2013-14544.
26. R. Bertucci, **R. Prabhu**, M.F. Horstemeyer, J. Sheng, J. Liao, L. Williams (**Jun 2013**), "Validation of Finite Element Lower Extremity Model Using Drop Tower Testing," *Proc. ASME. 55614*; Volume 1B, V01BT55A023, June 26, 2013, SBC2013-14650, Sunriver, OR, USA, doi: 10.1115/SBC2013-14650.
27. B. Wang, R. Bertucci, Z. Li, **R. Prabhu**, L. Williams, J. Guan, J. Liao, (**Jun 2013**) "Effect of Thermosensitive Hydrogel Injection on Mechanical Behavior of Porcine Myocardium," *Proc. ASME. 55607*; Volume 1A, V01AT11A002, June 26, 2013, SBC2013-14551, Sunriver, OR, USA, doi: 10.1115/SBC2013-14551.
28. Bertucci, R., **Prabhu. R.**, Liao, J., Williams, L.N. (**Jun 2011**) "Development of a Lower Extremity Model for Finite Element Analysis at Blast Condition" ASME Summer Bioengineering Conference, Farmington, PA 2011.
29. Ryland, S., Patnaik, S, **Prabhu, R.**, Horstemeyer, M.F., Liao, J, Williams, L.N., (**Jun 2011**) "Development of a Finite Element Model for Porcine Scalp" *Proc. ASME. 54587*; ASME 2011 Summer Bioengineering Conference, Parts A and B: 1043 -1044. June 22, 2011, SBC2011-53815, doi: 10.1115/SBC2011-53815.
30. **Prabhu, R.**, Steele, W. Glenn, Ryland, S., Colebeck, E.E., Whittington, W.R., Horstemeyer, M.F., Liao, J., Williams, L.N., (**Jun 2011**) "Uncertainty Analysis of the Mechanical Response of Porcine Brain at High Strain Rate Compression" *Proc. ASME. 54587*; ASME 2011 Summer Bioengineering Conference, Parts A and B: 1309 - 1310. June 22, 2011, SBC2011-53738, doi: 10.1115/SBC2011-53738.
31. Weed, B., Franz, T., Borazjani, A., Horstemeyer, M.F., Patnaik, S., **Prabhu, R.**, Williams, L. N., Jun Liao, (**Jun 2011**) "Stress State Dependence of Human Placenta Mechanical Behavior" *Proc. ASME. 54587*;

- ASME 2011 Summer Bioengineering Conference, Parts A and B: 1313 - 1314. June 22, 2011, SBC2011-53775, *doi: 10.1115/SBC2011-53775*.
32. **R. Prabhu**, M. F. Horstemeyer, M. L. McCollum, W. R. Whittington, J. Bouvard, J. Sherburn, L. N. Williams, E. B. Marin, J. Liao, (**Jun 2010**), "Traumatic Brain Injury: Coupled Experiment/Finite Element Simulation On High Rate Mechanical Response Of Porcine Brain." *Proc. ASME*. 44038; ASME 2010 Summer Bioengineering Conference, Parts A, and B:21-22, June 16, 2010, SBC2010-19513, Grande Beach Resort, Naples Florida, USA, *doi: 10.1115/SBC2010-19513*.
  33. **R. Prabhu**, M. F. Horstemeyer, E. B. Marin, J. Liao, M. Tucker, L. N. Williams, (**Jun 2009**), "Traumatic Brain Injury: Mechanical Response of Porcine Brain under High Strain Rate Tests," *Proc. ASME*. 48913; ASME 2009 Summer Bioengineering Conference, Parts A and B: 605-606, SBC2009-206814, June 17, 2009, Resort at Squaw Creek, Lake Tahoe, CA, USA, *doi: 10.1115/SBC2009-206814*.
  34. J. Chen, L. B. Priddy, **R. Prabhu**, E. B. Marin, M. F. Horstemeyer, L. N. Williams and J. Liao, (**Jun 2009**), "Traumatic Injury: Mechanical Response of Porcine Liver Tissue under High Strain Rate Compression Testing," *Proc. ASME*. 48913; ASME 2009 Summer Bioengineering Conference, Parts A and B: 601-602, SBC2009-206532, June 17, 2009, Resort at Squaw Creek, Lake Tahoe, CA, USA, *doi: 10.1115/SBC2009-206532*.

#### **NON PEER-REVIEWED CONFERENCE PROCEEDINGS**

1. **R. Prabhu**, G.F. Sassenrath, A.M. Schmidt, J. Crumpton, B. Rice, H. van Riessen, R. Thornton, J. Pote, C. Wax, J. Schneider (**Jul 2013**) "Uncertainty, calibration, and validation of the Mississippi Irrigation Scheduling Tool model," Conference Proceedings of the 2013 ASABE Annual Meeting, Jul. 21-24, 2013, Kansas City, MO, USA.
2. **R. Prabhu**, G.F. Sassenrath, A.M. Schmidt, J. Crumpton, B. Rice, H. van Riessen, R. Thornton, J. Pote, C. Wax, J. Schneider (**Apr 2013**) "Uncertainty, calibration, and validation of the Mississippi Irrigation Scheduling Tool model," 2013 MWRC Proceedings, Apr. 2-3, 2013, Jackson, MS, USA.
3. G.F. Sassenrath, A.M. Schmidt, J. Crumpton, B. Rice, **R. Prabhu**, H. van Riessen, R. Thornton, J. Pote, C. Wax, J. Schneider (**Apr 2013**) "Development of the Mississippi Irrigation Scheduling Tool – MIST," Proceedings of the 2013 MWRC Proceedings, Apr. 2-3, 2013, Jackson, MS, USA.

#### **PROFESSIONAL PRESENTATIONS**

1. Al-Graitti, A., J., Khalid, G., A., Berthelson, P., Mason-Jones, A., **Prabhu, R.**, Jones, M., D., (**Nov 2017**) "Auto Rickshaw Impacts with Pedestrians: A Computational Analysis of Post-Collision Kinematics and Injury Mechanics," ICMCBE 2017 : 19th International Conference on Mathematical and Computational Biomedical Engineering, Venice, Italy, Nov, 13-14, 2017.
2. Crawford, F., AbuOmar, O., Jones M, King, R., and **Prabhu, R.**, (Jul 2017). Data mining the effects of testing conditions on brain biomechanical properties. Paper presented at the 2017 International Conference on Data Mining (DMIN), Las Vegas, NV, July 17-20, 2017.
3. Bakhtiary, A., Dobbins, A., Johnson, K., Jones, M., Horstemeyer, M., **Prabhu, R.**, (**Oct 2017**) "A Multiscale Modeling Approach to Quantifying the Effects of Brain Geometry Effects in Chronic Traumatic Encephalopathy," 2017 BMES Annual Meeting, Phoenix, Arizona, USA, Oct 11 – Oct 14, 2017.
4. Yenusah, C. O., Stone, T., W., Hammi, Y., **Prabhu, R.**, (**Oct 2017**) "Influence of bone-implant interface condition on the femoral fracture after cementless total hip replacement: A finite element study," 2017 BMES Annual Meeting, Phoenix, Arizona, USA, Oct 11 – Oct 14, 2017.

5. Courtney J. White, J. Liao, M. J. Beasley, Michael Jones, **R. Prabhu**, Lakiesha N. Williams, (**Jun 2017**) The Influence of Compressive Strain Rate Dependency on the Structure-Property Relations of Fetal Porcine Brain, SB3C 2017, Tucson, AZ, USA, Jun 21 – Jun 24, 2017.
6. Haden A. Johnson, Wilburn R. Whittington, Jonathon Miller, Alicia K. Olivier, Michael D. Jones, **R. Prabhu**, Lakiesha N. Williams, (**Jun 2017**) Interrupted High-Rate Compression of Porcine Brain Tissue Utilizing the Split-Hopkinson Pressure Bar Method, SB3C 2017, Tucson, AZ, USA, Jun 21 – Jun 24, 2017.
7. Murphy, M. A., **Prabhu, R.**, Horstemeyer, M. F., Williams, L. N., Mun, S., & Baskes, M. I. (**Nov 2016**). Molecular Dynamics Simulations of Neuronal Membrane Mechanoporation Damage. Paper presented at the 2016 ASME International Mechanical Engineering Congress & Exposition (IMECE), Phoenix, AZ, November 11-17, 2016.
8. S. Lin, K. Copeland, B. Brazile, H. Baskin, **R. Prabhu**, L. Williams, G. Zhang, J. Liao, (**Oct 2016**) “Investigating The Viscoelastic Properties of Tricuspid Valve Leaflets and Chordae Tendineae,” BMES 2016 Annual Meeting, Oct 5 - 8, 2016, Minneapolis, Minnesota, USA.
9. V. Nguyen, A. Kovach, J. Gambino, L. Williams, J. Liao, **R. Prabhu**, (**Oct 2016**) “Drug Delivery Treatment for Canine Osteosarcoma,” BMES 2016 Annual Meeting, Oct 5 - 8, 2016, Minneapolis, Minnesota, USA.
10. Lamont, A., Nguyen, V., Bertucci, R., Hammi, Y., Horstemeyer, M. F., Liao, J., Rhee, H., Williams, L., **Prabhu, R.**, (**Jun 2016**) “Damage Modeling of a Human Tibia and Fibula Fracture Caused by a Mixed Martial Arts Kick,” SB3C 2016, National Harbor, Maryland, USA, Jun 28 – Jul 2, 2016.
11. Berthelson, P. R., Liao, G., Liao, J., Williams, L. N., Rhee, H., Deng, ., Horstemeyer, M. F., **R. Prabhu**, (**Jun 2016**) “A Study on the Mechanical Response of the Human Head during Single-Collision Car Crashes using Finite Element Analysis,” SB3C 2016, National Harbor, Maryland, USA, Jun 28 – Jul 2, 2016.
12. Mun, S., Sassenrath, G. F., Lee, N., Murphy, M. A., Schmidt, A. M., Corbitt, J. Q., & **Prabhu, R.** (**Jul 2016**). Development of Crop Coefficients for Scheduling Irrigation of Crops in Humid Environments. Paper presented at the ASABE Annual International Meeting, Orlando, FL, July 17-20, 2016.
13. R. Prabhu, W. R. Whittington, M. D. Jones, D. Darwall, J. Liao, L. N. Williams, (Mar 2016) “Dynamic Compressive Mechanical Properties of The Porcine Immature Brain,” 11<sup>th</sup> World Congress on Brain Injury, The Hague, Netherlands, March 2 -5, 2016.
14. S.L. Naugler, J.M. Gambino, J.L. Townsend, J.M. Perkins, J.L. Algarín, M. Jackson, H. Rhee, **R. Prabhu**, A. Kovach, S. Rush, C. Ayers, B. Nabors, (**Oct 2015**), “Interactive Multidetector Computed Tomographic (MDCT) Atlas Of The Endangered Kemp’s Ridley (*Lepidochelys Kempii*) Sea Turtle,” 2015 American College of Veterinary Radiology (ACVR) Annual Scientific Conference, Minneapolis, MN.
15. K. A. Brown, A. Desai, Y. Mao, M. F. Horstemeyer, J. Liao, L. Williams, H. Rhee, **R. Prabhu**, (**Oct 2015**) “An In-Silico Investigation of Soccer-Related Traumatic Brain Injury,” BMES 2015 Annual Meeting, Oct 7-10, 2015, Tampa, Florida.
16. M. A. Murphy, M. F. Horstemeyer, S. Gwaltney, T. Stone, M. LaPlaca, J. Liao, L. Williams and **R. Prabhu**, (**Oct 2015**) “Phospholipid Deformation Size Effects during Tensile Molecular Dynamics Simulations,” BMES 2015 Annual Meeting, Oct 7-10, 2015, Tampa, Florida.
17. B. Brazile, S. Patnaik, S. Lin, X. Shi, S. Liao, **R. Prabhu**, H. Rhee, L. Williams, J. Liao, (**Oct 2015**) “Biomechanical Characterization of Porcine Skeletal Muscle Extracellular Matrix,” BMES 2015 Annual Meeting, Oct 7-10, 2015, Tampa, Florida.
18. X. Shi, D. Lee, B. Brazile, S. Patnaik, J. Cooley, **R. Prabhu**, H. Rhee, L. Williams, S. Zhang and J. Liao, (**Oct 2015**) “Elastin Fiber Network in Porcine Epicardium: 3D Visualization and Quantification,” BMES 2015 Annual Meeting, Oct 7-10, 2015, Tampa, Florida.
19. J.M. Perkins, J.M. Gambino, M. Jackson, **R. Prabhu**, H. Rhee, A. Kovach, S. Rush, C. Ayers, B. Nabors, S.L. Naugler, (**Sep 2015**), “The Art of Medicine Meets the Wave of the Future Purpose Built Software for Veterinary Medicine,” 2015 South Eastern Conference (SEC) Symposium, Atlanta, GA.
20. B. Brazile, **R. Prabhu**, L. Williams, J. Liao, (**Jun 2015**) “Biomechanical Characterization of Porcine

- Skeletal Muscle Extracellular Matrix,” Summer Biomechanics, Bioengineering, and Biotransport Conference, June 17-20, 2015, Snowbird, Utah, USA.
21. B. Brazile, **R. Prabhu**, L. Williams, J. Liao, (**Jun 2015**) “Biomechanical Characterizations of Scar ECM during the Acute to Chronic Stages of Myocardial Infarction,” Summer Biomechanics, Bioengineering, and Biotransport Conference, June 17-20, 2015, Snowbird, Utah, USA.
  22. J. W. Wood, H. Rhee, **R. Prabhu**, (**Jun 2015**) “Using Finite Element Analysis to Study the Mechanical Advantages of a Turtle’s Shell,” Summer Biomechanics, Bioengineering, and Biotransport Conference, June 17-20, 2015, Snowbird, Utah, USA.
  23. A. Bakhtarydavijani, J. Liao, L. Williams, M. LaPlaca, **R. Prabhu**, (**Jun 2015**) “Strain Rate Dependency of the Intracellular Calcium Ion Concentration during Neuronal Membrane Mechanoporation,” Summer Biomechanics, Bioengineering, and Biotransport Conference, June 17-20, 2015, Snowbird, Utah, USA.
  24. A. C. Lamont, R. Bertucci, J. Liao, L. Williams, H. Rhee, **R. Prabhu**, (**Jun 2015**) “Biomechanics of Human Tibia and Fibula Fracture Caused by a Mixed Martial Arts Kick,” Summer Biomechanics, Bioengineering, and Biotransport Conference, June 17-20, 2015, Snowbird, Utah, USA.
  25. M. A. Murphy, S. Mun, J. Liao, L. Williams, M. LaPlaca, **R. Prabhu**, (**Jun 2015**) “Constructing Rudimentary Limit Curves for Neuronal Phospholipid Bilayer Failure And Theoretical Calcium Penetration,” Summer Biomechanics, Bioengineering, and Biotransport Conference, June 17-20, 2015, Snowbird, Utah, USA.
  26. M. A. Murphy, S. Mun, J. Liao, L. Williams, M. LaPlaca, **R. Prabhu**, (**Jun 2015**) “The Effects Of Stress State On The Mechanical Response And Failure Of The Neuronal Phospholipid Bilayer: A Molecular Dynamics Study,” Summer Biomechanics, Bioengineering, and Biotransport Conference, June 17-20, 2015, Snowbird, Utah, USA.
  27. M. A. Murphy, S. Mun, J. Liao, L. Williams, M. LaPlaca, **R. Prabhu**, (**Jun 2015**) “Validation Of High Rate Strip Biaxial Tension Deformations Of The Neuronal Phospholipid Bilayer Using Empirical Data,” Summer Biomechanics, Bioengineering, and Biotransport Conference, June 17-20, 2015, Snowbird, Utah, USA.
  28. R. Bertucci, J. Liao, **R. Prabhu**, L. Williams, (**Jun 2015**) “Finite Element Analysis of Lower Extremity Military Boot Protection at Blast Conditions,” Summer Biomechanics, Bioengineering, and Biotransport Conference, June 17-20, 2015, Snowbird, Utah, USA.
  29. A. Kovach, T. Szasz, Z. Nelson, M. Cavalcanti, J. Gambino, L. Williams, J. Liao, **R. Prabhu**, (**Apr 2015**), “Targeted Drug Delivery via Nanoparticles: Novel Treatment for Canine Osteosarcoma,” Society for Biomaterials 2015 Annual Meeting and Exposition, Charlotte, NC 2015.
  30. S. Patnaik, T. Szasz, J. Liao, **R. Prabhu**, L. Williams, (**Jun 2015**) “Viscoelastic Properties of Porcine Patellar Tendon Tissue: A Study of Regional Variation and Frequency Dependent Behavior,” Summer Biomechanics, Bioengineering, and Biotransport Conference, June 17-20, 2015, Snowbird, Utah, USA.
  31. P. Parajuli, S. Patnaik, B. Brazile, **R. Prabhu**, H. Rhee, L. Williams, J. Liao, (**Oct 2014**) “Characterization of the Viscoelastic Property of Mitral Valve Leaflets,” BMES 2014 Annual Meeting, Oct 7-10, San Antonio, USA.
  32. T. Szasz, A. Kovach, S. Bulla, J. Liao, L. Williams, C. Bulla, **R. Prabhu**, (**Oct 2014**) “Drug Delivery via Magnetic Nanoparticles: Pioneering Treatment of Osteosarcoma,” BMES 2014 Annual Meeting, Oct 7-10, San Antonio, USA.
  33. C. Mahaffey, B. Weed, S. Patnaik, J. Liao, **R. Prabhu**, L. Williams, (**Oct 2014**) “Stress State and Strain Rate Dependency in Porcine Lung Parenchyma,” BMES 2014 Annual Meeting, Oct 7-10, San Antonio, USA.
  34. M. A. Murphy, M. F. Horstemeyer, S. Gwaltney, J. Liao, L. N. Williams, **R. Prabhu** (**Oct 2014**) “POPC Phospholipid Bilayer Failure Under Strip Biaxial Stretching Using Molecular Dynamics,” BMES 2014 Annual Meeting, Oct 7-10, San Antonio, USA.

35. S. Clark, R. Bertucci, J. Liao, L. N. Williams, **R. Prabhu**, (Oct 2014) "The Effect of Acoustic Pollution on Marine Mammals," BMES 2014 Annual Meeting, Oct 7-10, San Antonio, USA.
36. R. Bertucci, **R. Prabhu**, S. Clark, M. Horstemeyer, J. Liao, L. Williams, (Oct 2014) "A Computational Method for Analyzing Military Boot Designs at Blast Conditions," BMES 2014 Annual Meeting, Oct 7-10, San Antonio, USA.
37. B. Brazile, B. Wang, G. Wang, R. Bertucci, **R. Prabhu**, S. Patnaik, J. R. Butler, A. Claude, E. Brinkman-Ferguson, L. N. Williams, and J. Liao, (Oct 2014) "Biomechanical Characterizations of Scar ECM During The Acute to Chronic Stages Of Myocardial Infarction," BMES 2014 Annual Meeting, Oct 7-10, San Antonio, USA.
38. B. Brazile, B. Wang, G. Wang, R. Bertucci, **R. Prabhu**, S. Patnaik, J. R. Butler, A. Claude, E. Brinkman-Ferguson, L. N. Williams, and J. Liao, (Oct 2014) "Bending Properties Of Porcine Mitral, Tricuspid, Aortic, And Pulmonary Valve Leaflets," BMES 2014 Annual Meeting, Oct 7-10, San Antonio, USA.
39. N. Lee, **R. Prabhu**, L. N. Williams, M. F. Horstemeyer, (Apr 2014), "The Role of the Hyoid Bone of Woodpeckers for Energy Absorption," 30<sup>th</sup> Southern Biomedical Engineering Conference, Gulfport, MS, Apr 11-12, 2014.
40. A. Kovach, T. Szasz, J. Liao, L. Williams, C. Bulla, S. Bulla, **R. Prabhu**, (Apr 2014), "Targeted Drug Delivery via Nanoparticles: Pioneering Treatment for Osteosarcoma," Mississippi State University Bagley College of Engineering Undergraduate Research Poster Competition Spring 2014, Mississippi State, MS 2014.
41. S. S. Patnaik, J. Chen, **R. Prabhu**, M. F. Horstemeyer, L. N. Williams, J. Liao, (Sept 2013) Multiscale Computational Modeling of the Dynamic Compressive Behavior of Porcine Liver Tissue, Multiscale Modeling Session:1467 Accepted-Oral, BMES 2013 Annual Meeting, Sept 25-28, Seattle, USA.
42. R. Bertucci, **R. Prabhu**, M. F. Horstemeyer, J. Sheng, J. Liao, L. N. Williams, (Sept 2013) Finite Element Analysis of the Lower Extremity Due to Anti-Vehicle Blasts, Computer-Aided Biomechanical Analysis Session: 1422 Accepted-Oral, BMES 2013 Annual Meeting, Sept 25-28, Seattle, USA.
43. **R. Prabhu**, G.F. Sassenrath, A.M. Schmidt, J. Crumpton, B. Rice, H. van Riessen, R. Thornton, J. Pote, C. Wax, J. Schneider (Jul 2013) "Uncertainty, calibration, and validation of the Mississippi Irrigation Scheduling Tool model," 2013 ASABE Annual Meeting, Jul. 21-24, 2013, Kansas City, MO, USA.
44. **R. Prabhu**, Y. Mao, E. Marin, L. Williams, J. Liao, M. Horstemeyer, (Oct 2012), "Novel Simulation-Based Analysis of the Biomechanics of Blast-Related Traumatic Brain Injury (bTBI)," BMES 2012 Annual Meeting Proceedings, Oct. 24 – 27, 2012. Atlanta, Georgia, USA.
45. **R. Prabhu**, M. F. Horstemeyer, J. Bouvard, E. B. Marin, D. J. Bammann, L. N. Williams, J. Liao, (Dec 2011) "A Novel ISV-based Constitutive Model for Porcine Brain under Large Deformations," 4<sup>th</sup> International Conference on the Mechanics of Biomaterials and Tissues, Dec 11-15, 2011, Kona, Hawaii.
46. Rougeau M., Patnaik S., Gilbrech R., Young C., **Prabhu R.**, Liao J., Williams L., (Oct 2011) "Influence of Water Content on Quasistatic Compressive Properties of Porcine Lungs Tissue." BMES Annual Meeting 2011, October 12-15, Hartford, Connecticut, 2011.
47. Begonia M. T., **Prabhu R.**, Horstemeyer M. F., Liao J., Williams L., (Oct 2011) "University Quantitative Analysis of Porcine Brain Microstructure via Interruption Testing." BMES ANNUAL MEETING 2011, October 12-15, Hartford Convention Centre, Hartford, Connecticut, 2011.
48. Williams, L.N., Bertucci, R., Mao, M., **Prabhu, R.**, Liao, J., (Aug 2011) "Development of a Lower Extremity Model for Finite Element Analysis at Blast Condition," NATO: A survey of blast injury across the full landscape of military science, Halifax, Canada. 2011
49. **R. Prabhu**, J. Chen, L. B. Priddy, M. Tucker, J. Bouvard, E. B. Marin, M. F. Horstemeyer, J. Liao, L. N. Williams, (Oct 2009), "Traumatic Injury: Mechanical Response of Porcine Brain and Liver Tissue under High Strain Rate Tests," 2009 BMES Annual Fall Meeting, Oct. 7-10, Pittsburgh, PA, USA.

50. **R. Prabhu**, M. F. Horstemeyer, J. Bouvard, M. G. Begonia, E. B. Marin, L. N. Williams, J. Liao, D. Bammann, (**Jan 2009**), "Traumatic Brain Injury: Constitutive Modeling of the Porcine Brain under Large Deformation," TMS 2009, San Francisco, CA, February 15-19, 2009.
51. **R. Prabhu**, M. F. Horstemeyer, W. H. Brewer, (**Dec 2008**) "Ocean Patterns in Ancient Epicontinental Seas," American Geophysical Union 2008 Fall Meeting, San Francisco, CA, December 15-19, 2008.
52. **R. Prabhu**, M. T. Tucker, E. B. Marin, M. F. Horstemeyer, L. N. Williams, Liao, J. (**Nov 2008**), "Traumatic Brain Injury: Mechanical Response of Porcine Brain Tissue under High Strain Rate Tests." *Modeling & Simulation, Testing & Validation Conference*, Sterling Heights, MI.
53. M. G. Begonia, **R. Prabhu**, J. Liao, M. F. Horstemeyer, E. B. Marin, L. N. Williams, (**Aug 2008**), "Structure-Property Relationships of Porcine Brain Tissue in Compression," Bio Inspired Design Conference, Starkville, MS, August 19-22, 2008.
54. **R. Prabhu**, D. Adams, W. Whittington, M. Tucker, M. G. Begonia, L. N. Williams, J. Liao, E. B. Marin, M. F. Horstemeyer, (**Aug 2008**) "Traumatic Brain Injury: Mechanical Response of Porcine Brain Tissue under High Strain Rate Tests," 2008 Bio Inspired Design Conference, Starkville, MS, August 19-22, 2008.
55. **R. Prabhu**, W.H. Brewer, D.S. Thompson, S. Bhushan, (**May 2005**), "Computational Study of Vortex-vortex Interactions," 6<sup>th</sup> Mississippi State & UAB Conference on Differential Equations and Computational Simulations, Starkville, MS, May 13-14, 2005.
56. Q. Yan, J. Wu, W. Gao, **R. Prabhu**, B.S.Y. Choe, (**2003**) "Particle Level Modelling of Catalyst Layer for PEM Fuel Cell," 204<sup>th</sup> Meeting of The Electrochemical Society, Orlando, FL, Oct 12 – 16, 2003.

#### **NON PEER-REVIEWED PROFESSIONAL PRESENTATIONS**

1. Mun, S., Sassenrath, G. F., Lee, N., Murphy, M. A., Schmidt, A. M., Corbitt, J. Q., **Prabhu, R.** (**Jul 2016**). Development of Crop Coefficients for Scheduling Irrigation of Crops in Humid Environments. Paper presented at the ASABE Annual International Meeting, Orlando, FL, July 17-20, 2016.
2. N. Ulmer, M. A. Murphy, **R. Prabhu**, "Molecular Dynamics of Phospholipid Bilayer," (**Apr 2015**) MSMS Research Symposium, May 7, 2015, Hogarth Auditorium, Mississippi University Women, 1100 College Street, Columbus, MS, USA.
3. **R. Prabhu**, G.F. Sassenrath, A.M. Schmidt, J. Crumpton, B. Rice, H. van Riessen, R. Thornton, J. Pote, C. Wax, J. Schneider (**Apr 2013**) "Uncertainty, calibration, and validation of the Mississippi Irrigation Scheduling Tool model," 2013 MWRC, Apr. 2-3, 2013, Jackson, MS, USA.
4. G.F. Sassenrath, A.M. Schmidt, J. Crumpton, B. Rice, **R. Prabhu**, H. van Riessen, R. Thornton, J. Pote, C. Wax, J. Schneider (**Apr 2013**) "Development of the Mississippi Irrigation Scheduling Tool – MIST," 2013 MWRC, Apr. 2-3, 2013, Jackson, MS, USA.
5. R. Thornton, G.F. Sassenrath, A.M. Schmidt, J. Crumpton, B. Rice, H. van Riessen, **R. Prabhu**, J. Pote, C. Wax, J. Schneider (**Apr 2013**) "Can National Weather Service Spatially Gridded Radar Precipitation Estimates be used to Overcome Spatial Variability in Mississippi Precipitation Measurements?" 2013 MWRC, Apr. 2-3, 2013, Jackson, MS, USA.

#### **INVITED SEMINAR TALKS**

1. Invited seminar talk at the KU-Leuven, (**Oct 2018**) "Minding the Brain: A Multiscale Modeling Approach to Study Brain Injuries," 17 Oct 2018, KU-Leuven, Belgium.
2. Invited seminar talk at Mines ParisTech, (**Oct 2018**) "A Lower Length Scale Multiscale Modeling Approach to Study Brain Injury," 15 Oct 2018, CEMEF, Mines ParisTech, Sophia-Antipolis, France.
3. Invited seminar talk at Medtronic, (**Sep 2018**) "Minding the Brain: A Multiscale Modeling Approach to Study Brain Injuries," 11 Sep 2018, Minneapolis, Minnesota, USA.

4. Invited seminar talk at the New Jersey Institute of Technology, (**Jan 2018**) "Multiscale Modeling of the Mechanical Behavior of the Human Brain under Impact Scenarios and Safety Design Aspects," 19 Jan 2018, Newark, New Jersey, USA.
5. Invited seminar talk at the Army Research Laboratory (ARL), (**Apr 2017**) "Multiscale Material Modeling of the Human Brain to Study Traumatic Brain Injury," 14 Apr 2017, Aberdeen Proving Ground, Maryland, USA.
6. Invited seminar talk at KITECH, Incheon, (**Jun 2016**) "Multiscale Modeling Paradigm for Human-Centric Design and Biomimicry," 24 Jun 2016, Incheon, Gyeonggi, Rep. Korea.
7. Invited seminar talk at KITECH, Gangneung, (**Jun 2016**) "Multiscale Modeling Paradigm for Human-Centric Design and Biomimicry," 22 Jun 2016, Gangneung, Gangwon, Rep. Korea.
8. Invited seminar talk at the GW4 Seminar in Cardiff University, (**Feb 2015**) "Constitutive Tissue Models: The dynamic deformation of brain biomaterials," 24-25 Feb 2015, Cardiff, South Wales, UK.
9. Invited seminar talk at Virginia Tech, (**Sep 2014**) "Multiscale Modeling of the Mechanical Behavior of Human under Impact Scenarios and Safety Design Aspects," 30 Sep 2014, Virginia Tech, VA, USA.
10. Invited seminar talk at LeTourneau University, (**May 2014**) "Modeling of the Human Brain Trauma under Injury Scenarios," 5 May 2014, Longview, TX, USA.
11. Invited seminar talk at Georgia Institute of Technology, Atlanta, GA, USA, (**Mar 2013**) "Multiscale Modeling of the Mechanical Behavior of Human Body under Impact Scenarios and Safety Design Aspects," 12 Mar 2013, Atlanta, GA, USA.
12. Invited seminar talk at Baylor University, Waco, TX, USA, (**Feb 2013**) "Multiscale Modeling of the Mechanical Behavior of Human under Impact Scenarios and Safety Design Aspects," 26 Feb 2013, Waco, TX, USA.
13. Williams, L.N., Bertucci, R., Mao, M., **Prabhu, R.**, Liao, J., (**Aug 2011**) "Development of a Lower Extremity Model for Finite Element Analysis at Blast Condition" NATO: A Survey of Blast Injury across the Full Landscape of Military Science, Halifax, Canada.

#### **EXTERNAL REPORTS**

1. Arterburn, D., Ewing, M., Francis, D., **Prabhu, R.**, Zhu, F., "Final Report for the FAA UAS Center of Excellence Task A4: UAS Ground Collision Severity Evaluation Revision 2", prepared for the FAA under Grant # 15-C-UAS-UAH-01, 03, 28 April 2017.

#### **INTERNAL REPORTS**

1. L. Simmons, **R. Prabhu**, M. Doude, A. Hartzog, (**Jan 2009**) "Failure Analysis of Automotive Main Bearing Cap for Alabama Motors," *CAVS Extension Technical Reports*.
2. L. Simmons, **R. Prabhu**, M. Doude, (**Jan 2009**) "Failure Analysis of AM2 Airfield Matting for Engineer Research and Development Center", *CAVS Extension Technical Reports*.

#### **FUNDED RESEARCH as PRINCIPAL INVESTIGATOR (PI)**

Cumulative Extramural Funding as PI: \$ 931,429

1. **“Ground Collision Severity Study 2017-2018 (A14\_A11L.UAS.7),”** DoT<sup>8</sup> FAA<sup>9</sup>, USA, Sponsor Award # 15-UAS-MSU-028, Project Duration: 8/1/17 – 1/31/19, \$268k, Co-PIs: W. R. Whittington, Y. Liu, H. El Kadiri, J. Pote. Performing non-linear finite element simulations of lightweight UAS-human head collisions.
2. **“Virtual Soldier Model for Occupant Centric Design (Phase II),”** DoD<sup>10</sup> ERDC<sup>11</sup>, Vicksburg, MS, USA, Sponsor Award # W912HZ-18-C-0021, Project Duration: 4/28/18 – 4/27/19, \$221k, Co-PI: L. B. Priddy. Performing non-linear finite element simulations and experiments for quantifying vehicular human body vibrations.
3. **“Virtual Soldier Model for Occupant Centric Design (Phase V),”** CREATE-GV, US DoD ERDC, Vicksburg, MS, USA, Sponsor Award # W912HZ-13-C-0004, Project Duration: 10/1/14 – 9/30/18, \$187k, Co-PI: L. Williams. Conductive multiscale modeling, experimentation and finite element analysis for human centric vehicular design.
4. **“Analysis of Quantitative Diagnostic Criteria for Traumatic Brain Injury,”** BCoE<sup>12</sup> and CAVS, MSU, MS, USA, Project Duration: 8/16/15 – 8/15/19, \$128k. Conducting mild TBI rat model tests for early biomarker diagnosis.
5. **“Multiscale Modeling and Experimentation for Infant Head Trauma Biomechanics,”** CAVS, MSU, MS, USA, Project Duration: 7/1/15 – 6/30/19, \$96k, Co-PIs: W. R. Whittington, M. D. Jones (Cardiff University, Cardiff, Wales, UK). Performing structure-property quantification of immature brain tissue at intermediate and high strain rates.
6. **“Biomechanics and Bio-Inspired Design Working Group,”** BCoE, MSU, MS, USA, Project Duration: 7/1/18 – 6/30/19, \$2.5k. Coordinating translational research in biomechanics and bio-inspired design.
7. **“Virtual Soldier Model for Occupant Centric Design (Phase I),”** Proving Ground and Dismounted Troops, Topic Area 4: Computational Prototyping and Proving Ground Environment, DoD ERDC, Vicksburg, MS, USA, Sponsor Award # W912HZ-18-C-0021, Project Duration: 4/28/17 – 4/27/18, \$221k, Co-PIs: W. R. Whittington, L. B. Priddy. Performing non-linear finite element simulations of vehicular human body vibrations.
8. **“Biomedical assessment of Combined Electromagnetic Field Device: Phase I,”** Zavation LLC, Brandon, MS, USA, Project Duration: 4/30/13 – 3/31/17, \$79k. Conducted mild TBI rat model tests for early biomarker diagnosis.
9. **“A4: Ground Collision Severity Study,”** DoT FAA, USA, Project Duration: 8/1/15 – 3/31/17, \$268k, Co-PIs: R. Jha, J. Liao, L. Williams. Performed non-linear finite element simulations of lightweight UAS-human head collisions.
10. **“Development of Thermodynamic Framework for Biomimicry,”** BCoE, MSU, MS, USA, Project Duration: 8/1/15 – 6/30/17, \$5k. Co-PIs: W. R. Whittington, H. Rhee, L. Williams, Coordinated translational research in bio-inspired design of bombardier beetle.
11. **“Targeted Drug Delivery via Magnetic Nanoparticles for Canine Osteosarcoma,”** ORED<sup>13</sup>, MSU, MS, USA, Project Duration: 1/1/15 – 12/31/16, \$2.2k. Conducted proof-of-concept targeted drug delivery method for treating osteosarcoma.
12. **“Multiscale Mechanophysiological Constitutive Modeling of the Brain,”** NSF<sup>14</sup> EPSCoR, VA USA, Project Duration: 8/16/14 – 8/15/15, \$36k, Co-PIs: L. Williams, J. Liao. Developed a strain rate and

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<sup>8</sup> DoT: United States Department of Transportation

<sup>9</sup> FAA: Federation Aviation Administration

<sup>10</sup> DoD: United States Department of Defense

<sup>11</sup> ERDC: Engineering Research and Development Center

<sup>12</sup> BCoE: Bagley College of Engineering

<sup>13</sup> ORED: Office of Research and Economic Development

<sup>14</sup> NSF: National Science Foundation



stress state dependent thermodynamic framework for modeling the mechanical response of the brain.

13. **“Uncertainty and Sensitivity Analysis of MIST Irrigation Model,”** MAFES<sup>15</sup>, MSU, MS, USA, Project Duration: 1/1/13 – 6/30/15, \$5k, Co-PIs: J. Sassenrath. Developed of an uncertainty based computational code for a Mississippi irrigation model.

#### **FUNDED RESEARCH as Co-PRINCIPAL INVESTIGATOR (Co-PI)**

**Cumulative Extramural Funding as Co-PI: \$1,977,535**

1. **“From the Ground Up: Using Soft Robotic Sensors to Create a Foot and Ankle Wearable that Accurately Captures Real-time, Kinematic and Kinetic Data During Athletic Training,”** NSF<sup>16</sup> PFI:RP, VA USA, Project Duration: 9/15/18 – 8/31/21, \$750k, PI: R. F. Burch; Co-PIs: , M. Ronay, J. E. Ball, H. Chander, R. Prabhu. Develop a real-time wearable sensor technology for athletic training.  
*Contribution in developing the proposal: ~12.5%*  
*Contribution in conducting the subsequent research: ~12.5%*
2. **“Virtual Soldier Model for Occupant Centric Design (Phase I, II, III, and IV),”** CREATE-GV, DoD ERDC, Vicksburg, MS, USA, Sponsor Award # W912HZ-13-C-0037, Project Duration: 10/1/14 – 9/30/18, \$748k, PI: L. Williams; co-PI: R. Prabhu, J. Liao. Conductive multiscale modeling, experimentation and finite element analysis for human centric vehicular design.  
*Contribution in developing the proposal: ~50%*  
*Contribution in conducting the subsequent research: ~50%*
3. **“Bio-Inspired for IVPED (Phase II, and III),”** IVPED, DoD ERDC, Vicksburg, MS, USA, Sponsor Award # W912HZ-13-C-0037, Project Duration: 10/1/15 – 3/31/17, \$390k, PI: H. Rhee, Co-PI: L. Williams. Conductive multiscale modeling, experimentation and finite element analysis for bio-inspired design of impact resistant structures.  
*Contribution in developing the proposal: ~50%*  
*Contribution in conducting the subsequent research: ~50%*
4. **“Cardiac Multiscale Modeling and Simulation: A Novel Approach to Capture Heart Muscle-Heart Extracellular Matrix Interaction,”** NSF EPSCoR, VA USA, Project Duration: 8/16/14 – 8/15/15, \$36k, Co-PI: R. Prabhu, J. Liao. Developed a computational tool for represent hear muscle-heart extracellular matrix interaction.  
*Contribution in developing the proposal: ~25%*  
*Contribution in conducting the subsequent research: ~15%*
5. **“Analyses of the Mechanisms of Cardiac Function and Rhythm Problems during Spaceflight,”** NSF EPSCoR, VA USA, Project Duration: 10/1/13 – 9/30/14, \$36k, PI: J. Liao, Co-PI: R. Prabhu, L. Williams. Performed finite element of the human heart in microgravity conditions.  
*Contribution in developing the proposal: ~15%*  
*Contribution in conducting the subsequent research: ~25%*
6. **“Virtual Soldier Model for Occupant Centric Design (Phase 1),”** CRESS-GV, DoD ERDC, Vicksburg, MS, USA, Sponsor Award # W912HZ-13-C-0004, \$187k Project Duration: 10/1/13 – 9/30/14, \$187k, Co-PI: L. Williams. Conductive multiscale modeling, experimentation and finite element analysis for human centric vehicular design.  
*Contribution in developing the proposal: ~50%*  
*Contribution in conducting the subsequent research: ~50%*

<sup>15</sup> MAFES: Mississippi Agricultural and Forestry Experiment Station

<sup>16</sup> NSF: National Science Foundation

7. **“Bio-Inspired for ERS (Phase I),”** CEED ERS, DoD ERDC, Vicksburg, MS, USA, Sponsor Award # W912HZ-13-C-0037, Project Duration: 10/1/13 – 9/30/14, \$390k, PI: H. Rhee, Co-PI: R. Prabhu, L. Williams, M. F. Horstemeyer. Conductive multiscale modeling, experimentation and finite element analysis for bio-inspired design of ERS.  
*Contribution in developing the proposal: ~50%*  
*Contribution in conducting the subsequent research: ~50%*

## **II. TEACHING AND MENTORING**

### **TEACHING**

MSU BCoE Classes Course Evaluation Average: 4.1/5.0<sup>1</sup>

- Taught undergraduate-level “ABE 3303 Transport in BE,” spring 2018 (Course Evaluation: 3.8/5.0)
- Taught undergraduate-level “ABE 3303 Transport in BE,” fall 2017 (Course Evaluation: 4.6/5.0)
- Taught undergraduate-level “ABE 3303 Transport in BE,” fall 2016 (Course Evaluation: 4.8/5.0)
- Taught undergraduate-level “ABE 3303 Transport in BE,” fall 2015 (Course Evaluation: 4.7/5.0)
- Taught undergraduate-level “ABE 3303 Transport in BE,” fall 2014 (Course Evaluation: 4.2/5.0)
- Taught undergraduate-level “ABE 3303 Transport in BE,” fall 2013 (Course Evaluation: 3.7/5.0)
- Taught undergraduate-level “Principles of Engineering Design,” fall 2012 (Course Evaluation: 4.3/5.0)
- Taught undergraduate-level “Introduction to Biomedical Engineering Design,” spring 2012 (Course Evaluation: 4.1/5.0)
- Co-Taught Graduate-level course on “Cellular and Tissue Biomechanics,” spring 2012
- Co-Taught Graduate-level continuum mechanics course, fall 2011
- Teaching Assistant for Graduate-level continuum mechanics course, spring 2009

### **Undergraduate Directed Individual Study (DIS) Guidance**

- Guided undergraduate-level “ABE 4000 06 DIS,” spring 2018 (Student: Jennifer Fisher)
- Guided undergraduate-level “ABE 4000 12 DIS,” spring 2018 (Student: Allison Oversen)
- Guided undergraduate-level “ABE 4000 13 DIS,” spring 2018 (Student: Daniel Thomas)
- Guided undergraduate-level “ABE 4000 20 DIS,” spring 2018 (Student: Dustin Montecillo)
- Guided undergraduate-level “ABE 4000 17 DIS,” spring 2017 (Student: Jesse Smith)
- Guided undergraduate-level “ABE 4000 18 DIS,” spring 2017 (Student: Phong Phan)
- Guided undergraduate-level “ABE 4000 01 DIS,” fall 2016 (Student: Alyssa Sanders)
- Guided undergraduate-level “ABE 4000 01 DIS,” spring 2016 (Student: Folly Crawford)
- Guided undergraduate-level “ABE 4000 09 DIS,” spring 2016 (Student: Alex Smith)
- Guided undergraduate-level “ABE 4000 10 DIS,” spring 2016 (Student: Nicholas Renfro)
- Guided undergraduate-level “HON 4903 H04 Honors Thesis,” fall 2015 (Student: Folly Crawford)
- Guided undergraduate-level “HON 4003 H06 Oxbridge Tutorial,” Spring 2015 (Student: Folly Crawford)
- Guided undergraduate-level “ABE 4000 14 DIS,” spring 2015 (Student: Brayden Whitmon)
- Guided undergraduate-level “ABE 4000 13 DIS,” fall 2014 (Student: Anna Florence)
- Guided undergraduate-level “ABE 4000 16 DIS,” spring 2015 (Student: Binod Shilpakar)
- Guided undergraduate-level “ABE 4000 07 DIS,” spring 2013 (Student: John Wood)
- Guided undergraduate-level “ABE 4000 10 DIS,” spring 2013 (Student: Andrew Lamont)

- Guided undergraduate-level “ABE 4000 07 DIS,” fall 2013 (Student: Christopher Miceli)
- Guided undergraduate-level “ABE 4000 09 DIS,” fall 2013 (Student: Eshan Newaz)

### **Graduate Directed Individual Study (DIS) Guidance**

- Guided graduate-level “ABE 7000 04 DIS,” spring 2018 (Student: Folly Crawford)
- Guided graduate-level “ABE 7000 05 DIS,” spring 2018 (Student: Shelby Baird)
- Guided graduate-level “ABE 7000 02 DIS,” fall 2017 (Student: Parker Berthelson)
- Guided graduate-level “ABE 7000 01 DIS,” spring 2016 (Student: Vina Nguyen)
- Guided graduate-level “ABE 7000 03 DIS,” spring 2016 (Student: Sonja Jensen)
- Guided graduate-level “ABE 7000 05 DIS,” spring 2016 (Student: Michael Murphy)
- Guided graduate-level “ABE 7000 02 DIS,” fall 2014 (Student: John Wood)

### **MENTORING**

- Mentoring 1 post-doctoral research associate and 6 Ph.D. and 1 M.S. students in the areas of biological materials structure-property characterization, computational biomechanics, dynamic experimentation, multiscale modeling, finite element modeling and molecular dynamics simulations
- Mentoring 8 undergraduate students in the area of biomedical engineering and computational biomechanics
- Mentored undergraduate and graduate student researchers in the academic years since 2009
- Mentored summer REU student researchers in the academic years 2015-2016 and 2016-2017
- Mentored Mississippi School of Math and Science’s high school student researchers in the academic years 2015-2016 and 2016-2017
- Mentored Starkville high school students through Project PASS 2009-2010

### **SECONDARY SCHOOL STUDENT RESEARCH ADVISING**

- |    |  |   |
|----|--|---|
| 1. | <b>Name/Univ.:</b> McKenzie Jones, Mississippi School of Math and Science (MSMS)                     | <b>Funding Source:</b> MSU/MSMS<br><b>Semester:</b> Spring 2017 |
|    | <b>Project:</b> Investigation of chemosensory-based non-invasive diagnostic tool for mild TBI        |   |
| 2. | <b>Name/ Univ.:</b> Noah Ulmer, MSMS   | <b>Funding Source:</b> MSU/MSMS<br><b>Semester:</b> Spring 2016 |
|    | <b>Project:</b> MD simulations on a neuronal membrane lipid bilayer for a traumatic injury scenarios |   |
| 3. | <b>Name/ Univ.:</b> Aalaap Desai, Madison High School, Madison, MS                                   | <b>Funding Source:</b> MSU BCoE<br><b>Semester:</b> Summer 2013 |
|    | <b>Project:</b> Finite element analysis of soccer-related traumatic brain injury                     |   |
| 4. | <b>Name/ Univ.:</b> Keyshawn Pope, Starkville High School, Starkville, MS                            | <b>Funding Source:</b> MSU CAVS<br><b>Semester:</b> Summer 2012 |
|    | <b>Project:</b> Structure-property relationships mineralize bio-inspiration materials                |   |
| 5. | <b>Name/ Univ.:</b> Jackson Bentley, Wetumpka High School, Wetumpka, AL                              | <b>Funding Source:</b> MSU CAVS<br><b>Semester:</b> Summer 2012 |
|    | <b>Project:</b> Structure-property relationships mineralize bio-inspiration materials                |   |

**UNDERGRADUATE STUDENT RESEARCH ADVISING**

1. **Name/Univ.:** Jesse Smith, MSU **Funding Source:** DoT FAA  
**Semester:** Summer 2017 – present  
**Project:** Finite element analysis of human head-drone impacts
2. **Name/ Univ.:** Jared Hopper, MSU **Funding Source:** DoT FAA  
**Semester:** Summer 2018 - Present  
**Project:** Patient-specific human body finite element modeling
3. **Name/ Univ.:** Daniel Thomas, MSU **Funding Source:** DoT FAA  
**Semester:** Summer 2018 - Present  
**Project:** Patient-specific human body finite element modeling
4. **Name/ Univ.:** Lincoln Whittington, MSU **Funding Source:** DoD US Army  
**Semester:** Summer 2018 - Present  
**Project:** High speed digital image correlation of material dynamic deformations
5. **Name/ Univ.:** Andy Li, MSU **Funding Source:** DoD US Army  
**Semester:** Summer 2018 - Present  
**Project:** Large deformation finite element modeling of vehicular crashes
6. **Name/ Univ.:** Allison Oversen, MSU **Funding Source:** MSU  
**Semester:** Summer 2018  
**Project:** Mild TBI rate model testing
7. **Name/ Univ.:** Phong Phan, MSU **Funding Source:** DoT FAA  
**Semester:** Spring 2017 - 2018  
**Project:** Patient-specific human body finite element modeling
8. **Name/ Univ.:** Jen Fisher, MSU **Funding Source:** DoT FAA  
**Semester:** Spring 2018 - Present  
**Project:** Patient-specific human body finite element modeling
9. **Name/ Univ.:** Martin McCandless, MSU **Funding Source:** DoT FAA  
**Semester:** Fall 2017 – Spring 2018  
**Project:** Development of human body finite element mesh
10. **Name/ Univ.:** Alex Smith, MSU **Funding Source:** ABE, MSU  
**Semester:** Fall 2016 – Spring 2017  
**Project:** Biophysics of lipid bilayer mechanoporation dynamics
11. **Name/ Univ.:** Parker Berthelson, MSU **Funding Source:** DoD US Army  
**Semester:** Summer 2016 – 2017  
**Project:** Biaxial mechanical properties of immature porcine heart
12. **Name/ Univ.:** Danny Enge, University of the **Funding Source:** NSF REU  
Cumberlands, Williamsburg, KY **Semester:** Summer 2016  
**Project:** Biaxial mechanical properties of immature porcine heart
13. **Name/ Univ.:** Alyssa Sander, MSU **Funding Source:** MSU  
**Semester:** Fall 2016 - Spring 2017  
**Project:** Development of a wearable electric muscle stimulator
14. **Name/ Univ.:** Hannah Stealey, MSU **Funding Source:** MSU  
**Semester:** Fall 2015 - Spring 2016  
**Project:** Development of a blunt impactor for rat-model tests

15. **Name/ Univ.:** Darrell Robinson, Huston-Tillotson University, Austin, TX **Funding Source:** NSF REU  
**Semester:** Summer 2015 – Spring 2016  
**Project:** Finite element analysis of the microgravity effects of the human heart
16. **Name/ Univ.:** Zach Nelson, MSU **Funding Source:** MSU  
**Semester:** Summer 2015 – Fall 2015  
**Project:** Multiscale modeling of tumor
17. **Name/ Univ.:** Caleb Foster, MSU **Funding Source:** MSU CAVS  
**Semester:** Summer 2015  
**Project:** Statistical analysis of the geological data
18. **Name/ Univ.:** Binod Shipakar, MSU **Funding Source:** MSU  
**Semester:** Summer 2015  
**Project:** Finite element analysis of bone fracture
19. **Name/ Univ.:** Kimberly Brown, MSU **Funding Source:** MSU  
**Semester:** Summer 2014 – Spring 2016  
**Project:** Finite element modeling soccer-related traumatic brain injury
20. **Name/ Univ.:** Andrew Lamont, MSU **Funding Source:** DoD US Army  
**Semester:** Summer 2014 – Spring 2016  
**Project:** Finite element modeling for bio-inspired designs
21. **Name/ Univ.:** George Liao, MSU **Funding Source:** DoD US Army  
**Semester:** Fall 2014 – Spring 2015  
**Project:** Finite element modeling of car crash scenarios
22. **Name/ Univ.:** Brayden Whitmon, MSU **Funding Source:** DoD US Army  
**Semester:** Fall 2014 – Fall 2015  
**Project:** Finite element modeling of cell vibrations
23. **Name/ Univ.:** AnneMarie Kovach, MSU **Funding Sources:** MSU; DOD ERDC  
**Semester:** Spring 2014 – Spring 2017  
**Project:** Targeted drug delivery therapy for osteosarcoma
24. **Name/ Univ.:** Jennifer Bateman, MSU **Funding Source:** DoD US Army  
**Semester:** Spring 2014 – Fall 2015  
**Project:** Finite element modeling of the heart's microgravity conditions
25. **Name/ Univ.:** Me'Lanae Garrett, MSU **Funding Source:** DoD US Army  
**Semester:** Fall 2013 – Summer 2016  
**Project:** Mechanical testing of bio-inspiration materials
26. **Name/ Univ.:** Taylor Szasz, MSU **Funding Source:** MSU  
**Semester:** Summer 2014 – 2015  
**Project:** Targeted drug system for treating osteosarcoma
27. **Name/ Univ.:** Ravinderjit Singh, MSU **Funding Source:** DoD US Army  
**Semester:** Summer 2013  
**Project:** Finite element modeling of the human scalp traumatic injury
28. **Name/ Univ.:** Marlee Wadsworth, MSU **Funding Source:** MSU MAFES  
**Semester:** Spring 2013 – Spring 2014  
**Project:** Uncertainty quantification of the Mississippi irrigation scheduling tool
29. **Name/ Univ.:** Desola Oje, MSU **Funding Source:** MSU

- Semester:** Fall 2012 – Spring 2013
- Project:** Modeling the mechanical response of the human scalp under traumatic injury
30. **Name/ Univ.:** Ian Ladner, MSU **Funding Source:** MSU CAVS
- Semester:** Fall 2012 – Spring 2013
- Project:** Simulation based development and analysis of helmet-to-helmet collision
31. **Name/ Univ.:** Cole Young, MSU **Funding Source:** DoD US Army
- Semester:** Spring 2011 – Spring 2012
- Project:** Mechanical testing of soft biomaterials

### GRADUATE STUDENT ADVISING

#### Service as Ph.D. Major/Co-Major Professor (1 completed)

1. "Using Molecular Dynamics to Quantify Biaxial Membrane Damage in a Multiscale Modeling Framework for Traumatic Brain Injury," (**Defended on 9 May 2017**) by Michael A. Murphy, Department of Biomedical Engineering, MSU, MS 39762.

#### Service as M.S. Major/Co-Major Professor (5 completed)

1. "POPC Phospholipid Bilayer Failure under Biaxial Deformations using Molecular Dynamics," (**Defended on 28 May 2014**) by Michael A. Murphy, Department of Agricultural and Biological Engineering, MSU, MS 39762.
2. "Structure-property relations of the exoskeleton of the ironclad beetle (*Zopherus nodulosus haldemani*)," (**Defended on 18 July 2017**) by Vina L. Nguyen, Department of Biological Engineering, MSU, MS 39762.
3. "Using Thermography to Monitor Inflammation as a Non-Invasive Supplementary Diagnostic Tool for Mild Traumatic Brain Injury in a Sprague Dawley Rat Model," (**Defended on 16 October 2017**) by Sonja A. Jensen, Department of Biomedical Engineering, MSU, MS 39762.
4. "Structure-Property Relationships and Morphometric Effects of Different Shark Teeth on Shearing Performance," (**Defended on 1 Nov 2017**) by John W. Wood, Department of Biological Engineering, MSU, MS 39762.
5. "Data mining the effects of testing conditions and sample properties on brain biomechanical properties," (**Defended on 20 June 2018**) by Folly D. Crawford, Department of Biomedical Engineering, MSU, MS 39762.

#### Service as Ph.D. Major/Co-Major Professor (6 in progress)

1. "Mechano-physiological Damage Modeling of the Brain Due to Traumatic Brain Injury," (**Defense planned in summer 2019**) by Amirhamed "Hamed" Bakhtiarydavijani, Department of Biomedical Engineering, MSU, MS 39762.
2. "Quantifying Vibrational Injuries Using a Sprague Dawley Rat Model," (**In Progress**) by Folly D. Crawford, Department of Biomedical Engineering, MSU, MS 39762.
3. "Analysis of Quantitative Diagnostic Criteria for Sub-Concussive Repeated Blunt Impacts Using a Sprague Dawley Rat Model," (**In Progress**) by Anna Marie Dulaney, Department of Biomedical Engineering, MSU, MS 39762.
4. "Modeling Microscale Cellular Vibrational Injuries Using Coarse-Grain Molecular Dynamics," (**In Progress**) by Folly D. Crawford, Department of Biomedical Engineering, MSU, MS 39762.

5. "Quantification of the Structure-Process-Property Relations of Ti-64 for Biomedical Implants," (**In Progress**) by Shelby L. Baird, Department of Biomedical Engineering, MSU, MS 39762.
6. "Electro-Chemo-Mechanical Molecular Dynamics Modeling of Biaxial Membrane Damage Due to Traumatic Brain Injury," (**In Progress**) by Alex N. Smith, Department of Biomedical Engineering, MSU, MS 39762.

#### **Service as M.S. Major/Co-Major Professor (3 in progress)**

6. "A Comprehensive Injury Metric Analysis for the Central Nervous System during Vehicular Impact Scenarios," (**Defense planned in summer 2019**) by Parker R. Berthelson, Department of Biomedical Engineering, MSU, MS 39762.
7. "Quantification of traumatic brain injury metrics due to head impacts with unmanned aircraft systems," (**Defense planned in fall 2018**) by Anna Marie Dulaney, Department of Biomedical Engineering, MSU, MS 39762.
8. "Dynamic Mechanical Response of Porcine Heart Tissue," (**Defense planned in fall 2018**) by Shelby L. Baird, Department of Biomedical Engineering, MSU, MS 39762.

#### **Service as Ph.D. Committee Member (1 in progress; 8 completed)**

1. "Creation of a Computational Simulation of Maternal Trauma in Motor Vehicle Accident," (**Defended on 20 March 2013**) by Benjamin C. Weed, Department of Agricultural and Biological Engineering, MSU, MS 39762.
2. "Differentiating the Characteristic Response of the Brain after Exposure to Blunt and Blast Trauma," (**Defended on 17 October 2013**) by Mark G. T. Begonia, Department of Agricultural and Biological Engineering, MSU, MS 39762.
3. "Investigation of sheep reproductive tract as an animal model for pelvic organ prolapse and urogynecological research," (**Defended on 18 March 2015**) by Sourav S. Patnaik, Department of Agricultural and Biological Engineering, MSU, MS 39762.
4. "Cardiac extracellular matrix: structure, biomechanics in myocardial infarction, and heart regeneration," (**Defended on 10 March 2016**) by Bryn Brazile, Department of Agricultural and Biological Engineering, MSU, MS 39762.
5. "The application of uncertainty quantification and sensitivity analysis methodologies to engineering models and mechanical experiments," (**Defended on 18 October 2016**) by Justin Hughes, Department of Mechanical Engineering, MSU, MS 39762.
6. "Experimental-computational analysis of woodpeckers' beaks/hyoid apparatus for damping of elastic waves," (**Defended on 11 March 2016**) by NaYeon Lee, Department of Agricultural and Biological Engineering, MSU, MS 39762.
7. "Design of an American football helmet liner for concussion mitigation," (**Defended on 13 April 2016**) by Alston Rush, Department of Agricultural and Biological Engineering, MSU, MS 39762.
8. "From Horns to Helmets: Multi-objective Design Optimization Considerations to Protect the Brain," (**Defended on 28 April 2016**) by Kyle Johnson, Department of Mechanical Engineering, MSU, MS 39762.
9. "Structure Property Relationship of Porcine Dura Mater," (**In Progress**) by Ashma Sharma, Department of Mechanical Engineering, MSU, MS 39762.

#### **Service as M.S. Committee Member (1 in progress; 5 completed)**

1. "Efficacy of a Novel Through-Thickness Perfusion Bioreactor to Create Scaffold-Free Tissue Engineered Cartilage," (**19 July 2013**) by Eric A. Gilbert, Department of Agricultural and Biological Engineering, MSU, MS 39762.
2. "Hierarchical Multiscale Structure-Property relationships of the Red-Bellied Woodpecker (*Melanerpes carolinus*) Beak," (**Defended on 6 February 2014**) by NaYeon Lee, Department of Mechanical Engineering, MSU, MS 39762.
3. "Structure Property Relationship of Porcine Adipose Tissue," (**Defended on 23 June 2016**) by Ashma Sharma, Department of Agricultural and Biological Engineering, MSU, MS 39762.
4. "Interrupted high-rate compression of porcine brain tissue utilizing the split Hopkinson pressure bar method," (**Defended on 8 June 2017**) by Haden A. Johnson, Department of B Engineering, MSU, MS 39762.
5. "Finite Element Study on the Influence of bone-implant interface condition on femoral fracture after total hip replacement," (**Defended on 19 October 2017**) by Caleb O. Yenusah, Department of Mechanical Engineering, MSU, MS 39762.
6. "The Influence of Compressive and Tensile Strain Rate Dependency on the Structure Property Relations of Fetal Porcine Brain," (**17 November 2017**) by Courtney J. White, Department of Biomedical Engineering, MSU, MS 39762.

#### **Service as Ph.D. Student International Advisor (3 in progress; - completed)**

1. "Development of a Paediatric Head Surrogate for the Investigation of Infant Head Trauma," (**In Progress**) by Ghaidaa Khalid, Department of Medical Engineering, Cardiff University (CU), Wales, CF10 3AT, UK.
2. "Biomechanical properties and microstructure of neonatal porcine ventricles," (**In Progress**) by Faizan Ahmad, Department of Medical Engineering, CU, Wales, CF10 3AT, UK.
3. "Auto Rickshaw Impacts with Pedestrians - A Computational Analysis of Post-Collision Kinematics and Injury Mechanics," (**In Progress**) by Ahmed Al-Graitti, Department of Medical Engineering, CU, Wales, CF10 3AT, UK.

#### **POST-DOCTORAL RESEARCH ADVISING**

1. **Name/Univ.:** Michael Murphy **Funding Source:** DoD US Army  
**Semester:** May, 2017 – present  
**Project:** Vibrational Analyses of Soldier Models for Occupant Centric Design
2. **Name/ Univ.:** Benjamin Weed **Funding Sources:** MSU; DoD US Army  
**Semester:** January – May, 2014  
**Project:** Patient-specific human body finite element modeling
3. **Name/ Univ.:** Sungkwang Mun **Funding Source:** MSU MAFES  
**Semester:** January – June, 2014  
**Project:** Uncertainty Analysis of an Irrigation Scheduling Model for Water Management in Crop Production

### **III. SERVICE**

#### **Service Activities at MSU**



- Served as graduate coordinator for the Biological Engineering (BE) programs, Spring 2013 – Fall 2015
- Served as ABET coordinator for the BE undergraduate program, Fall 2015 – Summer 2017
- Serving as member of the University Course Curriculum Committee (UCCC), Fall 2015 – present
- Review department's Institutional Effectiveness (IE) reports, Fall 2013 – present

#### **Technical Reviewer for Professional Biomedical and Computational Mechanics Journals**

- Acta Biomaterialia
- Agricultural Science
- Annals of Biomedical Engineering
- Clinical Biomechanics
- Computer and Electronics in Agriculture
- International Biomechanics
- Journal of the Mechanical Behavior of Biomedical Materials
- Journal of Biomechanical Engineering
- MDPI Materials
- Materials and Design
- PLOS1

#### **Technical Reviewer for Conference Abstracts**

- Biomedical Engineering Society (BMES) Annual Meetings
- Summer Biomechanics, Bioengineering, and Biotransport Conference (SB<sup>3</sup>C)

### **IV. ENTREPRENEURIAL**

#### **Tech Start-Ups**

- Co-owner of Predictive design technologies (PDT) LLC, Starkville, MS:  
PDT is a local leader is a global leader in Integrated Computational Materials Engineering (ICME), with applications in high-fidelity physics-based material modeling, design and finite element analysis and material manufacturing processes
- Co-founder and co-owner of Rush Predictive Protection Systems (RPPS), which is a joint venture between PDT and Rush Sport Medical Inc., Meridian MS:  
RPPS specializes in the design, development, and testing of human safety and protective gears such as football helmet, body armor, etc.
- Co-founder and advisory board member of the Mstate Technologies LLC, Starkville, MS:  
Mstate Technologies LLC specializes in the design and development of novel sensors for enhancing human protection and safety during arms related outdoor activities that could lead accidental friendly fire.

#### **Patents**

- “Shock wave mitigating helmets,” US Patent (9,820,522 B2), published: Nov 21, 2017.
- “Friendly fire hunting safety sensor,” US Patent (# 13/705,333), filed: 12/5/2013.