

Julian Ly Davis

Associate Professor of Engineering

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Experience

2016-Present	Associate Professor of Engineering, University of Southern Indiana (USI), Evansville, IN <ul style="list-style-type: none">• ME395 Introduction to the Finite Element Method• ME366 Dynamics of Machinery• ME365 Modeling Dynamic Systems• ME363 Vibrations• ENGR355 Strength of Materials• ENGR291 Experimental Design and Technical Writing• ENGR275 Dynamics• ENGR237 Survey of Computational Methods in Engineering• ENGR235 Statics• ENGR108 Systems Engineering and Freshman Design• ENGR107 Introduction to Engineering• UNIV101 Freshman Seminar
2010-2016	Assistant Professor of Engineering, University of Southern Indiana (USI), Evansville, IN (Teaching experience - same as above)
2008-2010	Post Doctoral Research Associate, University of Massachusetts, Amherst, MA
2008-2009	Instructor, University of Massachusetts, Amherst, MA <ul style="list-style-type: none">• MIE397B System Dynamics
2008	Adjunct Professor of Engineering, New River Valley Community College, Christiansburg, VA <ul style="list-style-type: none">• EGR245 Engineering Mechanics - Dynamics
2008	Post Doctoral Research Associate, Virginia Polytechnic Institute and State University (Virginia Tech), Blacksburg, VA
2007	Ph.D. Engineering Mechanics, Virginia Tech, Blacksburg, VA, Dissertation: <i>A Computational Study into the Effect of Geometry and Orientation of the Utricle of a Red Ear Slider Turtle on Hair Bundle Stimulus</i> , Advisor: J. Wally Grant
2000-2007	Graduate Research Assistant, Virginia Tech, Blacksburg, VA
1999	B.S. Engineering Science and Mechanics (ESM), Minor: Mathematics, Virginia Tech, Blacksburg, VA, Thesis: <i>Design of a Smart Fluid Rankine Cycle</i> , Advisor: Mark S. Cramer

Research

Peer-Reviewed Publications

- 2019 | **Davis, J.L.,** McDonald T.N. & Kicklighter, B.L., *It's not a matter of time! (A work in progress)*, American Society of Engineering Education, Tampa Bay, FL.

- 2019 **Davis, J.L.**, McDonald T.N. & Kloosterman, J.L., *Students - Ask them to eat their Steaks!*, American Society of Engineering Education, Tampa Bay, FL.
- 2019 Cost, I.N. , Middleton, K.M., Sellers, K.C., Echols, M.S., Witmer, L.M., **Davis, J.L.** & Holliday, C.M., *Palatal biomechanics and its significance for cranial kinesis in Tyrannosaurus Rex* , Anatomical Record.
- 2018 McDonald T.N. & **Davis, J.L.**, *Students - Ask them to eat their vegetables!*, American Society of Engineering Education, Salt Lake City, UT.
- 2017 Smith, N. & **Davis, J.L.** *Collaborating with Industry Partner within an Undergraduate Finite Element Course*, American Society for Engineering Education, Columbus, OH.
- 2017 **Davis, J.L.** & Chlebowski, A.C. *Work in Progress: Oh The Irony: A Six-Section Rube Goldberg Machine for Freshman Engineering Design*, American Society for Engineering Education, Columbus, OH.
- 2017 Sellers, K.C., Middleton, K.M., **Davis, J.L.** & Holliday, C.M. *Ontogeny of Bite Force in a Validated Biomechanical Model of the American Alligator*, Journal of Experimental Biology.
- 2016 Arena, S.L., **Davis, J.L.**, Grant, J.W., Madigan, M.L. *Tripping elicits earlier and larger deviations in linear head acceleration compared to slipping*, PLoS One.
- 2016 McDonald T.N., **Davis, J.L.** & Goodman, K.D., *Look Ahead problem*, American Journal of Engineering Education.
- 2016 McDonald T.N. & **Davis, J.L.**, *Can enforcing an organized solution lead to better grades?*, American Society of Engineering Education, New Orleans, LA.
- 2016 **Davis, J.L.** & McDonald, T.N., *Online, Handwritten or Hybrid Homework: Whats best for our students in the long run?*, Journal of Online Engineering Education, 7(1).
- 2016 Smith, N.L. & **Davis, J.L.**, *Connecting Theory and Software: Experience with an Undergraduate Finite Element Course*, Computers in Engineering Education Journal, 7(2).
- 2015 Chlebowski, A.C., **Davis, J.L.** & Mitchell, Z.W. *Team Grouping Strategies in Freshman Engineering Design Courses.*, First Year Engineering Experience Conference, Roanoke/Blacksburg, VA.
- 2015 Arena, S.L., **Davis, J.L.**, Grant, J.W., Madigan, M.L. *Head Accelerations After Slipping and Tripping Exceed Those During Walking.* American Society of Biomechanics, Columbus, OH.
- 2015 Smith, N.L. & **Davis, J.L.** *Connecting Theory and Software: Experience with an Undergraduate Finite Element Course.* American Society of Engineering Education, Seattle, WA.
- 2015 Field, B.S., **Davis, J.L.**, Taylor, E.M., Volz, L.J., & McCloud, E.S. *A device for measuring the flexural stiffness of insect wings, or How to make a wing-bar gizmo.* Indiana Academy of Sciences.
- 2014 **Davis, J.L.** & Smith, N.L. *Connecting Finite Element Modeling With Strengths of Materials and Vibrations Using Beam Experiments.* ASME 2014 International Mechanical Engineering Congress and Exposition.
- 2014 **Davis, J.L.** & Grant, J.W. *Turtle utricle dynamic behavior using a combined anatomically accurate model and experimentally measured hair bundle stiffness.* Hearing Research.

- 2014 **Davis, J.L.** & McDonald, T.N. *Online Homework: Does it help or hurt in the long run?* American Society for Engineering Education, Indianapolis, IN.
- 2014 Grosse, I.R., Huang, L., **Davis, J.L.**, & Cullinane, D. *A Multi-Level Hierarchical Finite Element Model for Capillary Failure in Soft Tissue.* ASME Journal of Biomechanical Engineering.
- 2012 Rivera, A.R., **Davis, J.L.**, Grant, J.W., Blob, R.W., Peterson, E.H., Neiman, A.B., Rowe, M.H. *Quantifying Utricular Stimulation During Natural Behavior.* Journal of Experimental Zoology Part A: Ecological Genetics and Physiology.
- 2012 **Davis, J.L.** & Diersing, R.W. *Systems engineering and freshman design: Reinforcing systems engineering methods and technical communication through project based learning.* Conference on Higher Education and Pedagogy, Virginia Tech, Blacksburg, VA.
- 2011 **Davis, J.L.**, Dumont, E.R., Strait, D.S., & Grosse, I.R. *An efficient method of modeling material properties using thermal diffusion analogy: an example based on cranio-facial bone.* PLoSOne.
- 2010 Dumont, E.R., **Davis, J.L.**, Grosse, I.R. & Burrows, A. *Finite Element Analysis of Performance in the Skulls of Marmosets and Tamarins.* Journal of Anatomy.
- 2010 Santana, S.E., Dumont, E.R., **Davis, J.L.** *Mechanisms of bite force production and their relationship to diet in bats.* Journal of Functional Ecology.
- 2010 **Davis, J.L.**, Santana, S.E., Dumont, E.R., Grosse, I.R. *Predicting Bite Force in Mammals: 2D vs. 3D Lever Models.* Journal of Experimental Biology.
- 2007 **Davis, J.L.**, Xue, J., Peterson, E.H. & Grant, J.W. *Layer Thickness and Curvature Effects on Utricle Deflection in the Red Ear Slider Turtle: Static and Dynamic Analyses.* Journal of Vestibular Research, 17(4): 145162.

Abstracts & Presentations

- 2019 Land, Z.M., Jones, J., Curthoys, I.S., Grant, J.W. & **Davis, J.L.**, *Guniea Pig Sacculle Finite Element Model; Spanning the Dynamic Range of VEMP Testing*, Association for Research in Otolaryngology - 42nd Annual MidWinter Meeting, Baltimore, MD.
- 2018 Land, Z.M., **Davis, J.L.**, Curthoys, I.S., Grant, J.W. *Utricle Finite Element model; Implications at VEMPs Stimulation Frequencies*, Association for Research in Otolaryngology - 41st Annual MidWinter Meeting, San Diego, CA.
- 2017 Holliday, C.M., Hill, C.A., **Davis, J.L.**, Witmer, L.M. & Middleton K.M., *Inside Dinosaurs: A Broader Impacts Program for Research, Teaching and Public Education Through Dinosaur Biology, Physics and Evolution*, The FASEB Journal vol. 31 no. 1 Supplement 734.8
- 2017 Wilken, A.T., Middleton, K.M., Sellers, K.C., Cost, I.N., **Davis, J.L.** & Holliday, C.M., *Modeling Complex Cranial Joints in Varanus exanthematicus* The FASEB Journal vol. 31 no. 1 Supplement 579.1
- 2017 Sellers, K.C., Middleton, K.M., **Davis, J.L.** & Holliday, C.M., *Biomechanics and the Evolution of the Crocodyliform Skull* The FASEB Journal vol. 31 no. 1 Supplement 577.7
- 2017 **Davis, J.L.** *Structuring a Class Period: Reaching Different Learning Styles in the Classroom*, University of Southern Indiana – Celebration of Teaching and Learning Symposium, Evansville, IN.

- 2016 Cost, I.N., Spates, A., Sellers, K.C., **Davis, J.L.**, Middleton, K.M., Witmer, L.M. and Holliday, C.M. *Relative kinetic competency in the palatal complexes of birds and other diapsids*. Program & Abstracts of the 11th International Congress of Vertebrate Morphology, Washington, D.C. Anatomical Record, Volume 299, Special Feature: 208209.
- 2016 Cost, I.N., Sellers, K.C., **Davis, J.L.**, Middleton, K.M., Witmer, L.M., & Holliday, C.M. *Postural changes and kinetic competency in the palates of birds and other diapsids*. 76th Annual Meeting of the Society of Vertebrate Paleontology, Salt Lake City, UT. Journal of Vertebrate Paleontology Supplement Meeting Program and Abstracts: 120121.
- 2016 Craig, R., **Davis, J.L.**, Wong, C., Curthoys, I.S., Grant, J.W. *FEA Model for High Frequency Stimulus of Utricle Receptors*, Association for Research in Otolaryngology Midwinter Meeting, San Diego, CA.
- 2016 Ninad, N., **Davis, J.L.**, Field, B.S. & McCloud, E.S. *Contributions of wing condition and wing veins to flexural stiffness in three species of Lycaenid butterflies*, Annual Meeting of the Society for Integrative and Comparative Biology, Portland, OR.
- 2015 **Davis, J.L.**, McCloud, E.S. & Field, B.S. *Non-uniform Material Properties observed in Lycaenidae Wing Veins*, Annual Meeting of the Society for Integrative and Comparative Biology, West Palm Beach, FL.
- 2015 Sellers, K.C., **Davis, J.L.**, Middleton, K.M. & Holliday, C.M., *Ontogeny and Biomechanics of the American Alligator Skull*, Society of Vertebrate Paleontology, Dallas, TX.
- 2015 Cost, I.N., Spates, A., Sellers, K.C., **Davis, J.L.**, Middleton, K.M. Witmer, L.M. & Holliday, C.M., *Biomechanics of the Avian Feeding Apparatus*, Society of Vertebrate Paleontology, Dallas, TX.
- 2015 **Davis, J.L.**, McCloud, E.S. & Field, B.S. *Non-uniform Material Properties observed in Lycaenidae Wing Veins*, Annual Meeting of the Society for Integrative and Comparative Biology, West Palm Beach, FL.
- 2015 Holliday, C.M., Sellers, K.C., Vickaryous, M. K., Ross C.F., Porro, L. B., Witmer, L. M., and **Davis, J.L.** The functional and evolutionary significance of the crocodyliform pterygomandibular joint. Annual Meeting of the Society of Integrative and Comparative Biology, West Palm Beach, FL.
- 2015 Sellers, K.C., **Davis, J.L.**, Mongalo, M., Jacoby, M.J. & Holliday, C.M. *Estimates of Three-Dimensional Cranial Joint Forces in the American Alligator*, Annual Meeting of the Society for Integrative and Comparative Biology, West Palm Beach, FL.
- 2014 Ninad, N., Field, B.S., McCloud, E.S. & **Davis, J.L.** *Stiffness Components of Wings in Three Species of Lycaenid Butterflies*, American Society of Mechanical Engineers, Montreal, Canada.
- 2014 Holliday, C.M., Sellers, K.C., **Davis, J.L.**, Middleton, K.M., Witmer, L.M. *Modeling Cranial Biomechanics in Archosaurus Using 3D Computational Methods*, Society of Vertebrate Paleontology, Berlin, Germany.
- 2014 Holliday, C.M., Sellers, K.C., **Davis, J.L.**, Tea, J. C. ,Miller-Phillips, C. & Witmer, L. M. *Modeling cranial biomechanics in archosaurs using 3D computational methods*. 126th Annual Meeting of the American Association of Anatomists, Experimental Biology Conference, San Diego, CA.

- 2014 Holliday, C.M., Tea, J.C., Sellers, K.C., Witmer, L.M., & **Davis, J.L.** *Estimating bite force in fossil vertebrate using 3D computational methods*, Annual Meeting of the Society for Integrative and Comparative Biology, Austin, TX.
- 2014 Sellers, K.C., Miller-Phillips, C.M., Schmiegelow, A.B., **Davis, J.L.** & Holliday, C.M. *A Three Dimensional model of bite force in alligator Mississippiensis*, Annual Meeting of the Society for Integrative and Comparative Biology, Austin, TX.
- 2013 Volz, L.J., Taylor, E.M., Simpson, K.B., Field, B.S., McCloud, E.S., & **Davis, J.L.** *Flexural Stiffness & False Head Behavior in Lycaenidae Hind Wings*, Annual Meeting of the Society for Integrative and Comparative Biology, San Francisco, CA.
- 2012 Volz, L.J., Tepool, E.S., McCloud, E.S., Field, B.S., **Davis, J.L.**, *False head behavior and mechanics of a temperate butterfly: Experiment and modeling*, ASME Student Professional Development Conference, University of Missouri, Columbia, MO.
- 2009 **Davis, J.L.**, Santana, S.E., Dumont, E.R., Grosse, I.R. *Techniques for Predicting Bite Force in Bats*. Northeast Regional Division of Vertebrate Morphology & Division of Comparative Biomechanics meeting, Brown University, Providence, RI.
- 2009 Rivera, A., **Davis, J.L.**, Grant, J.W., Blob, R.W., Peterson, E.H., Neimann, A.B., Rowe, M.H. *Characterizing utricular stimulation during natural behaviors of the turtle, Trachemys Scripta*. Association for the Research in Otolaryngology, Baltimore, MD.
- 2007 **Davis, J.L.** & Grant, J.W. *Contribution of Hair Bundles to Shear Stiffness of the Column Filament Layer in the Turtle Utricle*. Association of Research in Otolaryngology, Denver, CO.
- 2006 **Davis, J.L.** & Grant, J.W. *Computational Modeling of the Turtle Utricle*. Virginia Academy of Science, Virginia Tech, Blacksburg, VA.
- 2004 **Davis, J.L.** & Grant, J.W. *Effects of Otoconia Thickness and Overall Curvature on Utricular Otolith Dynamics*. Association of Research in Otolaryngology, Daytona, FL; Virginia TechWake Forest Student Symposium, Wake Forest, NC.

Invited Seminars & Workshops

- 2009–2011 **Instructor** *Finite Element Analysis in Biology Workshop*, University of Massachusetts, Amherst, MA
- 2008 **Davis, J.L.** *A Computational Study into the Effect of Structure and Orientation of the Red Ear Slider Turtle Utricle on Hair Bundle Stimulus*. New Mexico State University, Las Cruces, NM. & Washington State University Institute for Shock Physics, Pullman, WA.

Research Projects

(My role indicated in parenthesis)

- 2015-2017 NSF (Co-PI) *Dinosaur Jaw Muscle Evolution and the Origins of Avian Cranial Evolution*, University of Southern Indiana, Evansville, IN.
- 2011-Present USI-Internal (Co-PI) *Functional Morphology & Biomechanics of Temperate Lycaenidae Butterflies*, University of Southern Indiana, Evansville, IN.
- 2008-2010 NSF (Post-Doc) *Finite Element Analysis & Bite Mechanics of the Skull*, University of Massachusetts, Amherst, MA.
- 2003-2008 NIH (PhD) *Finite Element (static & dynamic) Analysis of the Turtle Utricle*, Virginia Tech, Blacksburg, VA.

Awards & Honors

2017	Marching Virginians Alumni Service Award (\$ 1000)
2017	Pott College Excellence in Scholarship Award (\$ 1000)
2012	Excellence in Civil Engineering Education (ExCEED) Fellowship (\$ 2075)
2010	Science and Engineering Research Grant Award (\$ 2000) Functional Morphology of Butterfly Wings Associated with False-Head Behavior
2004	Pratt Fellowship (\$ 2000) Engineering Science and Mechanics Academic Fellowship
2002	James R. Sochinski Spirit of Tech Award (\$ 1000–Inaugural Recipient) Given to a marching band member who exemplifies the true Spirit of Tech by demonstrating outstanding citizenship and dedication during their career as a member of The Marching Virginians.
2002	Director’s Award Given to a member of the Marching Virginians in recognition of extraordinary service to the Virginia Tech marching band.
1999	James H. Sword Award Best Computational Engineering Science and Mechanics (Virginia Tech) Senior Design Project

Academic Service

Professional

2016–Present	American Society for Engineering Education - Board of Directors & Membership Committee
2015–Present	Journal of Biomedical Engineering and Informatics - Editorial Board Member
2013–2016	American Society of Civil Engineers ExCEED Teaching Workshop - Assistant Mentor

University

2018–Present	Marching Virginians Alumni Association - Board Member (Member at Large 2000-2004)
2017- 2018	Signature Initiative (University Wide Initiative) to provide “synergy for research and professional development” - Member
2016	Pott College Dean Search - Member
2014–2017	Pott College Strategic Plan Outcome II - Excellence In Learning (Chair)
2013-2015	Pott Foundation Faculty Development Award Committee - Member
2012–2019	Program Outcome Assessment Committees - A(Chair), E, G & I
2012–Present	Society of Automotive Engineers (SAE) Faculty Advisor
2010–Present	USI Freshman Engineering Committee Member/Chair (as of 2013)
2011-Present	Fundamentals of Engineering Exam Preparation Short review course for engineering students preparing for the Fundamentals of Engineering Exam

Mentorship

Senior Design

2017	Faith, N.T. – <i>Automated Barbell Cleaner</i>
2017	Knecht, K. – <i>Pancreatic Enzyme Replacement Therapy Device (PERT-D)</i>
2017	Terrell, J., & Woodard, S. – <i>Accuride Roll Housing Shaft Design</i>
2017	Tuma, S. – <i>LED Refrigeration Shelf</i>
2017	White, C.S. – <i>Society of Automotive Engineers Baja Vehicle Steering Design</i>
2016	Barger, C.D., Harkness, D.B. & Sudduth, J.M. - <i>Fixture Design for High Impact Shock Test of a Hellfire Missile</i>

- 2015 Brooks, V.I., Calvert, A.R. & Vrzina, D.D. - *2016 Society of Automotive Engineers Baja Car Frame Design*
- 2015 Eckert, D.E. & Roberts, C.A. - *Regrinder/Runner Reclaim Project*
- 2015 Mathis, W.N. & Webster, B.J. - *Elbow Joint Simulation Model for Occupational Therapy Range of Motion Assessment*
- 2015 Rhodes, J.M., Hayes, T.S. & Williams, A.M. - *Designing a High Altitude Radio Controlled Glider*
- 2014 Borman, L.A., Reed, C.E. & Miller, T. - *Wood Shaving Spreader*
- 2013 Elpers, P.J. & Rynkiewich, F.P. - *Society of Automotive Engineers Baja Car Planetary Transmission Design*
- 2013 Elpers, J.L. & Sitzman, D.J. - *Society of Automotive Engineers Baja Car Suspension System Design*
- 2013 Atkinson, J.M. - *The Characterization of Rotary Forging Using DEFORM 3DTM*
- 2012 Arnold D.C. & Wilhite, K.B. - *Design of Society of Automotive Engineers Baja Car Frame*
- 2012 Harms, M.E. - *Design of Hoyer Lift Retrofit kit for Improved Maneuverability*
- 2011 Sparrow, M.K. - *Laptop Garage Linkage Design*
- 2010 Smith, C.C. - *High Altitude Balloon Payload Release Mechanism*

Undergraduate Research

- 2015 Endeavor! Faculty Sponsor to Vrzina, D.D., Brooks, V.I., Calvert, A.R., Elpers, R.M., Hogan, C.J., McClary, H.R., Ditch, T.W., Fuhs, J.R., Johnson, N., Johnson, M.S. - *Redesign, Fabricating, and Testing of a Baja Society of Automotive Engineers Vehicle*
- 2014 Endeavor! Faculty Sponsor to Williams, A.M., Rhodes, J.M., and Hayes, T.S. - *Design of a High Altitude Radio Controlled Glider*
- 2013 Endeavor! Faculty Sponsor to Bradshaw, E.A., Wilhite, K.B., Elpers, P.J., Rynkiewich, F.P., Sitzman, D.J. - *Baja Society of Automotive Engineers (Drive Train)*
- 2012-2013 Early Undergraduate Research Mentor to Simpson, K.B. - *Finite Element Modeling of Lycaenide Butterfly Wings*
- 2011-2012 Early Undergraduate Research Mentor & Endeavor! Faculty Sponsor to Volz, L.J. - *Flexural Stiffness of Lycaenide Wings - Experiment & Finite Element Modeling*
- 2006 Davis, A. - *Quantifying Orientation of Turtle Utricle Otoconial Layers*

Outreach

- 2016–Present **Evansville Museum of Arts, History & Science** - Science Committee Member
- 2015 & 2018 **Science with a twist (Speaker)** is an informal public research discussion sponsored by the Evansville Museum of Arts, History & Science.
- 2014 **WNIN Interview** Interviewed by local National Public Radio station host (John Gibson) regarding butterfly research.
- 2013 **Evansville Museum of Arts, History & Science** Skulls and Bones Exhibit
- 2011-2013 **Tri State Science & Engineering Fair (Judge)** is a regional science fair for 4th through 12th grade students.
- 2011-2014 **SeaPerch (Judge)** is a competition for high school and middle school students to build and run an underwater remote operated vehicle with regional competitions hosted at USI.
- 2011 **URS Consulting** This consulting project consisted of providing URS finite element analysis of three potential solutions to a materials problem they faced with one of their products.
- 2009–Present **James R. Sochinski Award** - Donor & Voting Member

2011-2013 & 2004-2005 | **FIRST LEGO League (Judge)** is a national program designed to excite middle- to high-school students about science and engineering through the use of Robotic LEGOs to solve themed challenges.