

New Projects in 2018-2019

Developing Small Satellite Formation Flying Capability by Distributed State Estimation and Intelligent Control of Swarm using Vision-based Guidance

- Faculty: **Dr. Hadi Fekrmandi**
- Funding Source: NASA EPSCoR's Research Initiation Grant (RIG) Award
- Project Period: April 1, 2019 – September 30, 2020
- Budget: \$105,000

Developing Software Algorithms for Robust File Transfer in Small Satellite Swarms

- Faculty: **Dr. Hadi Fekrmandi**
- Funding Source: L3HARRIS University Engagement Program (UET)
- Project Period: August 26, 2019 – May 13, 2020
- Budget: \$5,000

Development of Fault Identification and Risk Management (FIRM) Intelligent Health Monitoring for Unmanned Underwater Submarines (UUV) Using Deep Learning

- Faculty: **Dr. Hadi Fekrmandi**
- Funding Source: DOD Grant from ONR's University Research Engagement program
- Project Period: August 7, 2019 – June 30, 2022
- Budget: \$60,000

Development of Strain-Annealable Processes for Iron-Based Amorphous Magnetically Soft Inductor Cores

- Faculty: **Dr. Nikolaus Bruno**
- Funding Source: South Dakota Board of Regents
- Project Period: August 22, 2019 – August 21, 2020
- Budget: \$90,000

EAGER:MAKER: Student Learning Trajectories from Making Activities

- Faculty: **Dr. Micah Lande**
- Funding Source: National Science Foundation (Division Of Engineering Education and Centers)
- Project Period: December 1, 2019 – June 30, 2020
- Budget: \$179,000

NASA Apollo 50th - Apollo Next Giant Leap Student Challenge

- Faculty: **Dr. Jason Ash**
- Funding Source: NASA SDSGC Project Innovation Grant
- Project Period: 2019 – 2020
- Budget: \$20,000

Planning Grant: Engineering Research Center for Naturally Inspired Resilient, Sustainable and Adaptable Infrastructure

- Faculty: Dr. Bret Lingwall (PI), **Dr. Andrea Surovek** (Co-PI)
- Funding Source: National Science Foundation
- Project Period: September 2018 – September 2019
- Budget: \$100,000

Seed Funding: Assessment of Creative Process in Open-Ended Engineering Design Projects

- Faculty: **Andrea Surovek**
- Funding Source: William and Stella Hughes Grant, SD Mines
- August 2019 – August 2020
- Budget: \$4,400

Thermomechanical Analysis of FINEMET Type Ribbons

- Faculty: **Dr. Nickolaus Bruno**
- Funding Source: NASA GRC
- Project Period: May 2019
- Budget: \$6,375

Faculty Research Publications in 2018-2019

Dr. Nickolaus Bruno

- Peer-Reviewed Publications
 - P. J. Shamberger, **N.M. Bruno**, "Review of Metallic Phase Change Materials for High Heat Flux Transient Thermal Management Applications", **Applied Energy 258 (2020) 113955.**
 - B. Emre, S. Yuce, **N.M. Bruno**, I. Karaman, "Martensitic Transformation and Magnetocaloric Properties of NiCoMnSn Magnetic Shape Memory Alloys", **Intermetallics 106 (2019) 65–70.**
- Talks Given
 - **N.M. Bruno**, "Development of Strain-Annealable Processes for Iron-Based Amorphous Magnetically-Soft Inductor Cores", **Glenn Talks Live, NASA Glenn Research Center, Cleveland, OH (2019).**

Dr. Prasoon Diwakar

- Peer-Reviewed Publications
 - Dieffenbach, Payson C., Carolyn M. Borkowski, Ahmed Elsieid, **Prasoon K. Diwakar**, Tatyana Sizyuk, and Ahmed Hassanein. "Effects of laser wavelength on aluminum plasma in transverse magnetic fields." *Physics of Plasmas* 26, no. 4 (2019): 043302.
 - Gondhalekar, Carmen, Bartek Rajwa, Euiwon Bae, Valery Patsekin, Jennifer Sturgis, Huisung Kim, Iyell-Joon Doh, **Prasoon Diwakar**, and J. Paul Robinson. "Multiplexed detection of lanthanides using laser-induced breakdown spectroscopy: a survey of data analysis techniques." In *Sensing for Agriculture and Food Quality and Safety XI*, vol. 11016, p. 1101609. International Society for Optics and Photonics, 2019.
 - Krug, Danielle M., **Prasoon K. Diwakar**, and Ahmed Hassanein. "A temporal study of cell death signaling responses to cold atmospheric plasma and electroporation in human cancer cells." *IEEE Transactions on Plasma Science* 47, no. 6 (2019): 2868-2874.
 - Gondhalekar, Carmen, Bartek Rajwa, Euiwon Bae, Valery Patsekin, Jennifer Sturgis, Huisung Kim, Iyell-Joon Doh, **Prasoon Diwakar**, and J. Paul Robinson. "Detection of E. coli labeled with metal-conjugated antibodies using lateral flow assay and laser-induced breakdown spectroscopy" *Analytical biochemistry*, in Press
 - **Diwakar, Prasoon**, Tejo Bheemasetti , Sofia Pozsonyiova, Melissa Fernandez , Emily Orme , Romila Pradhan, Daniel Diaz, David Hahn, Shane Lee. " Application of Advanced Machine Learning Classification Techniques to Analyze Complex LIBS Spectra" SCIX 2019, Palms Springs, CA, Oct 13-18, 2019.
 - Thakur Payal, Tanvi Govil, , Kristen I. Haller , Nicole L. Miller , **Prasoon K. Diwakar**, Sudhir Syal, David Salem, Rajesh Sani, " Comparative study of the effects of cold atmospheric plasma and electroporation on bacterial cells to enhance the substrate utilization" SCIX 2019, Palms Springs, CA, Oct 13-18, 2019.
 - Pozsonyiova, Sofia, Melissa Fernandez , Emily Orme, **Diwakar, Prasoon**," Bridging the Gap: Integrating Statistical Modeling and Machine Learning Methods to Better Classify and Visualize LIBS Data" SCIX 2019, Palms Springs, CA, Oct 13-18, 2019.

Dr. Hadi Fekrmandi

- Peer-Reviewed Publications
 - Dadashzadeh, Behnam, **Fekrmandi, Hadi**. "Tracking of Maximum Electrical Power for a Piezoelectric Energy Harvesting System" *International Journal of Recent Technology and Engineering (IJRTE)*, ISSN: 2277-3878 (Online), Volume-8 Issue-3, September 2019. Page No.: 6465-6469.
 - **Fekrmandi, Hadi**. "Autonomous Inspection and Maintenance (AIM) Crawler for Nondestructive Testing and Evaluation of Cu-Ni Piping System in Highly Corrosive Environments." 32nd Florida Conference on Recent Advances in Robotics May 9-10, 2019, Florida Polytechnic University, Lakeland, Florida

- **Fekrmandi, Hadi**, Skye Rutan-Bedard, Alexander Frye, Michael Yoon, and Randy Hoover. "Vision-based Guidance and Navigation for Swarm of Small Satellites in a Formation Flying Mission." 32nd Florida Conference on Recent Advances in Robotics May 9-10, 2019, Florida Polytechnic University, Lakeland, Florida
- **Fekrmandi, Hadi**, and Phillip Hillard. "A pipe-crawling robot using bio-inspired peristaltic locomotion and modular actuated non-destructive evaluation mechanism." In *Bioinspiration, Biomimetics, and Bioreplication IX*, vol. 10965, p. 1096508. International Society for Optics and Photonics, 2019.

Dr. Micah Lande

- Peer-Reviewed Publications
 - Steven Weiner, **Micah Lande** & Shawn Jordan (in press). Designing (and) Making Teachers: Using Design to Investigate the Impact of Maker Education Training on Pre-service STEM Teachers. *International Journal of Engineering Education*. Special Issue from Mudd Design Workshop.
 - Yue Liu & **Micah Lande** (in press). Arcs of Learning: Projected and Actual Student Learning Trajectories Through Undergraduate STEM Disciplines. *International Journal of Engineering Education*. Special Issue from Mudd Design Workshop.
 - Alexandra (Coso) Strong, **Micah Lande** & Robin Adams (2019). Teaching without a net: Mindful design education. Submitted to *Education Today: Technical Contexts, Programs & Best Practices*. Springer.
 - Yue Liu & **Micah Lande** (2019). Design process geometries: Shapes & learning trajectories of engineering students' design process concept maps. American Society for Engineering Education. NSF Grantees Session. Tampa, FL.
 - Hadi Ali & **Micah Lande** (2019). Design educators' conceptions of prototyping in engineering design courses. American Society for Engineering Education. Education and Research Methods division. Tampa, FL.
 - Hadi Ali & **Micah Lande** (2019). Understanding the roles of low-fidelity prototypes in engineering design activity. American Society for Engineering Education. Design and Engineering Education division. Tampa, FL.
 - Hadi Ali, Jennifer Bekki, Samantha Brunhaver, Shawn Jordan & **Micah Lande** (2019). Pedagogical ninjas: Using an additive innovation cycle for faculty development of teaching-focused faculty. American Society for Engineering Education. Professional development division. Tampa, FL.
 - Rohini Abhyankar, Samantha Brunhaver, **Micah Lande** & Ann McKenna (2019). In the business of innovation: Development of a canvas tool to promote and sustain pedagogical risk taking by faculty. NSF Grantees Session. Tampa, FL.

Dr. Pierre Larochelle

- Conference Papers
 - **Larochelle, P.** and Venkataramanujam, V., An Improved Principal Coordinate Frame for use with Spatial Rigid Body Displacement Metrics, Proceedings of the 15th IFToMM World Congress on the Theory of Machines and Mechanisms, Krakow, Poland, June 30 - July 4, 2019.
 - **Larochelle, P.** and Ishak, I., A Robot Arm Based Additive Manufacturing System, Proceedings of the 2019 CCToMM Symposium on Mechanisms, Machines, and Mechatronics, Montréal, Québec, May16-17, 2019.
- Journal Papers
 - Ishak, I. and **Larochelle, P.**, MotoMaker: A Robot FDM Platform for Multi-Plane and 3D Lattice Structure Printing, *Mechanics Based Design of Structures and Machines*, 2019. DOI: 10.1080/15397734.2019.1615943.
 - Ishak, I., Fleming, D., and **Larochelle, P.**, Multiplane Fused Deposition Modeling: a Study of Tensile Strength, *Mechanics Based Design of Structures and Machines*, 2019. DOI: 10.1080/15397734.2019.1596127.
- Patent
 - **Larochelle, P.** and Venkataramanujam, V., Reconfigurable Motion Generator, U.S. Patent #10302181, issued May 28, 2019.

[Dr. Bamdad Lessani](#)

- Conference Presentations
 - F. Rousta, **B. Lessani**, Eulerian-Lagrangian simulation of non-isothermal particle-laden flows, 71st Annual Meeting of the APS Division of Fluid Dynamics, Nov. 18-20, 2018, Atlanta, Georgia.
- Journal Publications
 - F. Rousta, **B. Lessani**, Near-wall heat transfer of solid particles in particle-laden turbulent flows, *International Communications in Heat and Mass Transfer*, *Submitted Aug. 2019, Under Review for minor revisions.*

[Dr. Karim Muci](#)

- Conference Papers
 - **Muci-Küchler, K.H.; Degen, C.M.**; Bedillion, M.D. and Lovett, M.; “Extending Systems Thinking Skills to an Introductory Mechanical Engineering Course”. 2019 ASEE Annual Conference and Exposition, Tampa, Florida, June 15 to 19, 2019. ASEE Paper ID # 25669.
 - Bedillion, M.D.; Lovett, M.; **Muci-Küchler, K.H.** and **Degen, C.M.** “Teaching Systems Thinking in a Capstone Mechatronic Design Course”. 2019 ASEE Annual Conference and Exposition, Tampa, Florida, June 15 to 19, 2019. ASEE Paper ID # 25664.
 - **Degen, C.M.; Muci-Küchler, K.H.**; Bedillion, M.D.; Huang, S. and Ellingsen, M.D. “Measuring the Impact of a New Mechanical Engineering Sophomore Design Course on Students’ Systems Thinking Skills”. 2018 ASME International Mechanical Engineering Congress & Exposition (IMECE 2018), Pittsburgh, Pennsylvania, November 9-15, 2018. ASME Paper IMECE2018-87624.

[Dr. Khosro Shahbazi](#)

- Journal Publications
 - **Khosro Shahbazi**, High-order finite difference schemes for compressible multi-component flow computations, *Computer and Fluids*, 190 (2019) 425-439.
 - Kayode M. Ajayi, **Khosro Shahbazi**, Purushothum Tukkaraja and Kurt Katzenstein, Estimation of radon diffusivity tensor for fractured rocks in cave mines using a discrete fracture network model, *Journal of Environmental Radioactivity*, 196 (2019) 104-112.
 - Kayode M. Ajayi, **Khosro Shahbazi**, Purushothum Tukkaraja and Kurt Katzenstein, Numerical investigation of the effectiveness of radon control measures in cave mines, *International Journal of Mining Science and Technology*, 29 (2019) 469-475.
 - Kayode M. Ajayi, **Khosro Shahbazi**, Purushothum Tukkaraja and Kurt Katzenstein, Prediction of airway resistance in Panel Cave Mines using a discrete and continuum model, *International Journal of Mining Science and Technology*, 29 (2019) 781-784.
 - Kayode M. Ajayi, **Khosro Shahbazi**, Purushothum Tukkaraja and Kurt Katzenstein, A discrete model for prediction of radon flux through fractured rocks, *International Journal of Rock Mechanics and Geotechnical Engineering*, 10 (2018) 879-892.

[Dr. Andrea Surovek](#)

- Conference Presentations
 - Alyssa Kiesow, Meredith Redlin, Joyce Eduful, Cynthia Anderson, Paula Mabee, Pam Rowland, and **Andrea Surovek**, “Salaries in Higher Education Systems: A System-wide Perspective on Career Advancement and Gender (Sex) Equity” AWIS Equity in STEM Community Convening, Oct 6, 2019, Cleveland, OH.
 - **Surovek, A.**, “Achieving the SEI Vision: Where is the Creativity in Structural Engineering Education?” ASCE Structures Congress, Orlando, FL, April 2019.
 - **Surovek, A.** (Session Moderator and Presenter) “The Nature of Structures: Biomimicry in Structural Design and Analysis”, ASCE Structures Congress, Orlando, FL, April 2019.
- Peer-Reviewed Conference Papers

- Bir, Devayan D., Ahn, Benjamin, Cetin, Bora, Akinci-Ceylan, Cecil, Cetin, Kristen S., **Surovek, Andrea E.**, & Thompson, Kyle R. (2019). Connecting Dots: Coding Multiple Data Sources to Enhance Qualitative Analysis. *ASEE Annual Conference Proceedings*.
- Lerdal, Kristin, **Surovek, Andrea**, Cetin, Kristen, Cetin, Bora, & Ahn, Benjamin. (2019). Tools for Assessing the Creative Person, Process, and Product in Engineering Education. *ASEE Annual Conference Proceedings*.
- Talks Given
 - **Surovek, A.**, “Learning from Nature – Biomimicry as a New Model for Structural Sustainability”, Kisailus Biomimetic and Nanostructured Materials Lab, University of California Riverside, Oct 2019.

Faculty & Student Awards in 2018-2019

- **Dr. Nickolaus Bruno** received the NASA Glenn Research Center Faculty Fellowship Award (June 2, 2019 through August 14th, 2019) from the High Temperature and Smart Alloys Branch at NASA Glenn Research Center in the form of a summer fellowship that paid \$16,500. During the fellowship, Dr. Bruno aided in the development of a strain-annealing process for FINEMET type ribbons to achieve higher efficiency in inductor cores intended for electrified propulsion systems.
- **Dr. Hadi Fekrmandi** was awarded a NASA EPSCoR travel award for participating at the 2019 - Small Satellite Production - Driving a Revolution.
- Student Awards
 - Dr. Fekrmandi's graduate assistant **Alexander Frye** was awarded a CSE graduate assistantship.
 - Dr. Fekrmandi's graduate assistant **Yun Seok Gwon** was named the 2018-19 ME Outstanding Recent Graduate.
 - ME student **Kristen Haller** received the 2019 SD Mines C.H.A.D. Award.
 - Dr. Diwakar's students **Kristen Haller** and **Nicole Miller** received the Society for Applied Spectroscopy (SAS) Travel Grant award to attend SCIX 2019 conference. The awardees are chosen from undergraduate students across the country.
 - ME student **Matthew Jones** received the 2nd place student paper award from The ASME Noise Control and Acoustics Division.
 - Dr. Diwakar's students **Christian Leckband** and **Nicole Miller** were RESPEC Research Undergraduate award finalists. Students are selected based on their research proposals. Christian and Nicole were top finalist students selected.
 - Dr. Andrea Surovek's student **Hannah Moen** received PhD support for the project entitled Characterization of Termite Mound Soils from the SD Mines' Office of Sponsored programs from August 2019 – August 2020 for \$18,000.
 - ME student **Grant Nelson** was included in the 2019 SD Mines Leadership Hall of Fame.
 - ME students **Daniel Rohde** and **Daniel Rynders** received a South Dakota Space Grant Consortium Educational Stipend.
 - Dr. Fekrmandi's undergraduate research assistant **Skye Rutan-Bedard** was awarded the prestigious DOD SMART Scholarship
 - ME student **Samuel Ryckman** received the ASME John & Elsa Gracik Scholarship and a South Dakota Space Grant Consortium Educational Stipend.
 -