

New Projects in 2019-2020

SD-FIRST: A program aimed to increase recruitment, retention, and success of first-generation students

- Faculty: Pls: **Cassandra Birrenkott**, Lisa Carlson, Jon Kellar, Michael West
- Funding Source: NSF DUE S-STEM Track 2: Design and Development (Single Institution)
- Project Period: January 2021 – December 2025
- Budget: \$998,819

Collaborative Research: Using Complex Problem Based Learning in Undergraduate Engineering Classrooms to Prepare Creative Engineers with the Skills to Solve Global Problems

- Faculty: Dr. Bret Lingwall (PI), **Dr. Andrea Surovek** (Co-PI), Collaborative with Dr. Roni Reiter-Palmon (University of Nebraska Omaha Dept. of O/I Psychology)
- Funding Source: National Science Foundation
- Budget: \$300,000

Advanced Robotics for Manufacturing (ARM)

- Faculty: Dr. J. Tomblin of Wichita State University (PI), **Dr. Pierre Larochelle** (Co-PI)
- Funding Source: Education and Workforce Development Regional Robotics Collaborative
- Project Period: February 20, 2020 – September 30, 2020
- Budget: \$250,000

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 (transfer)
- Budget: \$179,000

Advancing Self-Localization and Intelligent Mapping (SLIM) for Swarm of Autonomous Unmanned Underwater Vehicles using Machine Learning (NEEC program)

- Faculty: **Dr. Hadi Fekrmandi** (PI), Dr. Randy Hoover (Co-PI)
- Funding Source: DOD NSWC
- Project Period: May 1, 2020 – April 31, 2023
- Budget: \$150,000

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

- Faculty: **Dr. Nickolaus Bruno** (PI)
- Funding Source: SD Board of Regents
- Project Period: August 22, 2019 – December 31, 2020
- Budget: \$90,000

Next-Generation Energy Storage Research and Development

- Faculty: **Dr. Weibing Xing**
- Funding Source:
- Project Period: October 6, 2020 – December 31, 2022
- Budget: \$70,000

Plasma Jet Coating for Biofilm Applications

- Faculty: **Dr. Prasoon Diwakar** (PI), Dr. Gadhamshetty (Co-PI)
- Funding Source: NSF SD EPSCoR
- Project Period: October 2020 – October 2021
- Budget: \$50,000

Faculty Research Publications in 2019-2020

[Dr. Cassandra Birrenkott](#)

- Peer-Reviewed Publications
 - Grady, M.E., **Birrenkott, C.M.**, May, P.A., White, S.R., Moore, J.S., Sottos, N.R. (2020). Localization of Spiropyran Activation. *Langmuir*, 36(21) 5847-5854.
 - Muci-Kuchler, K.H.; **Birrenkott, C.M.**; Bedillion, M.D.; Lovett, M. and Whitcomb, C. "Incorporating Systems Thinking and Systems Engineering Concepts in a Freshman-Level Mechanical Engineering Course". 2020 ASEE Virtual Conference, June 22 to 26, 2020.
 - Jensen, P.H., West, M., Kellar, J., Kellogg, S., Brickey, A., **Birrenkott, C.**, Benning, J., McCormick, K. "Systems Approach to Increasing the Number of Engineers, Especially Women, by Implementing Curricular and Co-curricular Best Practices", Proceedings of the American Society for Engineering Management 2019 International Annual Conference, October 23-26, 2019, Philadelphia, PA.

[Dr. Nickolaus Bruno](#)

- Peer-Reviewed Publications
 - **N.M. Bruno**, Ronald D. Noebe, Vladimir Keylin, Alex Leary, Grant Feichter, "A preliminary stress-annealing process and its effect on magnetic properties of Fe-based soft magnetic alloys", Submitted as a NASA Technical Memorandum (08/25/2020).
 - **N.M. Bruno**, S. Yuce "On the instability of the giant direct magnetocaloric effect in CoMn_{0.915}Ge_{0.085}Ge at. % metamagnetic compounds", *Sci. Rep.* 10 (2020) 14211.
 - 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.
 - **N.M. Bruno**, "Thermomechanical and electromagnetic properties of novel strain-annealed Nanoperm derivatives", Faculty Fellowship Program Final Report (2020).
 - **N.M. Bruno**, "Tuning magnetic permeability of amorphous/nanocomposite soft magnetic alloys through continuous strain-annealing", Faculty Fellowship Program Final Report (2019).

[Dr. Prasoon Diwakar](#)

- Conference Papers
 - **Diwakar PK**, Pozsonyiova S, Pradhan R, Kessinger S, Leckband C, Chen K, Kellar J, Diaz D, Hahn DW; LIBS and Raman Spectroscopy Integration with Advanced Machine Learning Methods to Analyze Complex Samples, SCIX 2020, Virtual conference, Oct 12-15, 2020
 - Bright T, Dewitt K, Mathews C, Govil T, Sani R, Hoops J, Brenza T, Singh N, **Diwakar P**; Macrophage stimulation by Cold Atmospheric Plasma and Electroporation, SCIX 2020, Virtual conference, Oct 12-15, 2020
 - In-situ Elemental Rock Testing (In-SERT) Probe: Development Feasibility of a LIBS and Raman Spectroscopy Based Characterization System; Shane C. Lee, **Prasoon K. Diwakar**, SCIX 2019, Palm Springs CA, Oct 13-18, 2019
 - Multiplexed detection of lanthanide-based labels by LIBS – the constraints and limits of spectral unmixing; Bartek Rajwa, Carmen Gondhalekar, Euiwon Bae, Valery Patsekina, Jennifer Sturji, Iyll-Joon Doh, **Prasoon K. Diwakar**, Xianglei

- Mao, Vassilia Zorba, Rick Russo, J. Paul, Robinson, SCIX 2019, Palm Springs CA, Oct 13-18, 2019
- Bridging the Gap: Integrating Statistical Modeling and Machine Learning Methods to Better Classify and Visualize LIBS Data; Sofia Pozsonyiova, Melissa Fernandez, Emily M. Orme, **Prasoon K. Diwakar**, SCIX 2019, Palm Springs CA, Oct 13-18, 2019
 - Effects of Electroporation and Cold Atmospheric Plasma on Human Lung Cancer Cells; Kristen I. Haller, Nicole L. Miller, Jordan A. Hoops, **Prasoon K. Diwakar**, Timothy M. Brenza, SCIX 2019, Palm Springs CA, Oct 13-18, 2019
 - Informal STEM Education Using LIBS in HighSchool; **Prasoon K. Diwakar**, Melissa Fernandez, Emily M. Orme, Neha Choudhary, Theodore Caplow, Nathalie Manzano, Claudia Ochatt, SCIX 2019, Palm Springs CA, Oct 13-18, 2019
 - Comparative study of the effects of cold atmospheric plasma and electroporation on bacterial cells to enhance the substrate utilization; Payal Thakur, Tanvi Govil, Kristen I. Haller, Nicole L. Miller, **Prasoon K. Diwakar**, Sudhir Syal, David Salem, Rajesh Sani, SCIX 2019, Palm Springs CA, Oct 13-18, 2019
 - Peer-Reviewed Publications
 - Harilal, S.S., **Diwakar, P.K.** and Miloshevsky, G., 2020. Ultrafast and filament-LIBS. In Laser-Induced Breakdown Spectroscopy (pp. 139-166). Elsevier.
 - Gondhalekar, C., Biela, E., Rajwa, B., Bae, E., Patsekina, V., Sturgis, J., Reynolds, C., Doh, I.J., **Diwakar, P.**, Stanker, L. and Zorba, V., 2020. Detection of E. coli labeled with metal-conjugated antibodies using lateral-flow assay and laser-induced breakdown spectroscopy. Analytical and Bioanalytical Chemistry, 412(6), pp.1291-1301.

Dr. Hadi Fekrmandi

- Peer-Reviewed Publications
 - B. Dadashzadeh, A. Allahverdizadeh, M. Esmaeili, and **H. Fekrmandi**, "A case study on influence of utilizing hill-type muscles on mechanical efficiency of biped running gait," International Applied Mechanics, vol. 56, no. 4, 2020. [published]
 - Y. Banadaki, N. Razaviarab, **H. Fekrmandi**, and S. Sharifi, "Toward enabling a reliable quality monitoring system for additive manufacturing process using deep convolutional neural networks," Production Manufacturing Research, 2020. [in review]
- Conference Papers
 - A. Frye, **H. Fekrmandi**, R. C. Hoover, and A. H. Tamjidi, "Validation of distributed state estimation for localization of small satellites and swarm formation," in 33rd Florida Conference on Recent Advances in Robotics, 2020, pp. 35–39. [published Online, available at: <https://fcrar2020.fit.edu/proceedings.pdf>].
- Book/Book Chapters
 - **H. Fekrmandi**, S. Rutan-Bedard*, A. Frye*, and R. Hoover, Validation of Vision-Based State Estimation for Localization of Agents and Swarm Formation, Proceedings of the 2020 USCToMM Symposium on Mechanical Systems and Robotics. USCToMM MSR 2020, ser. Mechanisms and Machine Science, vol 83. Springer, 2020. [peer-reviewed, DOI: https://doi.org/10.1007/978-3-030-43929-3_20]
 - J. Allen, S. Rutan-Bedard, and **H. Fekrmandi**, Robotic Inspection Crawler for Small Diameter Complex Piping, Proceedings of the 2020 USCToMM Symposium on Mechanical Systems and Robotics. USCToMM MSR 2020, ser. Mechanisms and Machine Science, vol 83. Springer, 2020. [peer-reviewed, DOI: https://doi.org/10.1007/978-3-030-43929-3_26]

- Presentations
 - **H. Fekrmandi**, “Multi-agent Autonomous GN&C using SVGS for Lunar Surface Mobility Applications”. Invited speaker by control systems design and analysis (EV-41) division, NASA Marshall space flight Center, Huntsville, AL, Aug. 2020. [Also presented in SD Mines ME Seminar Series, Link to YouTube Video]
 - **H. Fekrmandi**, B. Colvin, A. Abbaspour, “Development of Fault Identification and Risk Management (F.I.R.M.) Intelligent Health Monitoring for Unmanned Underwater Vehicles (UUVs) using Machine Learning, Workshop on Naval Applications of Machine Learning (NAML2020), NIWC Pacific (Point Loma), San Diego, CA, Feb. 24-26, 2020. [Link to Poster]

[Dr. Micah Lande](#)

- Peer-Reviewed Publications
 - Steven Weiner, **Micah Lande**, & Shawn Jordan (2020). What to “make” of school: Revealing conflicting institutional logics of grassroots making and formal education. *Journal of Research on Technology in Education*.
 - James Larson, Shawn Jordan, **Micah Lande**, & Steven Weiner (2020). Supporting self-directed learning in a project-based embedded systems design course. *IEEE Transactions on Education*. 63(2): 88-97.
 - Steven Weiner, **Micah Lande**, & Shawn Jordan (2020). Designing (and) making teachers: Using design to investigate the impact of maker education training on pre-service STEM teachers. *Int’l. Journal of Engineering Education*. 36 (2): 702-711.
 - Hadi Ali, Jennifer Bekki, Samantha Brunhaver, Shawn Jordan, & **Micah Lande** (2020). An Additive Innovation-Based Faculty Development Program: Methods for Case Study Research. American Society for Engineering Education annual conference. NSF Grantees session. [virtual conference due to COVID19].
 - **Micah Lande** (2020). Learning Trajectories Through Undergraduate Engineering Curricula and Experiences. NSF Grantees session. American Society for Engineering Education annual conference. [virtual conference due to COVID19].
 - Hadi Ali, Barbara Kinach, & **Micah Lande** (2019, November). Innovating Scaffolded Prototyping for Design Education: Toward A Conceptual Framework Derived from Mathematics Pedagogy. Forty-First Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education. St Louis, MO
 - Hadi Ali & **Micah Lande** (2019, November). Data-Driven Decisions in Prototyping and Product Development: A Framework for Uncertainty and Decision-Making. ASME 2019 International Mechanical Engineering Congress and Exposition. Salt Lake City, UT.

[Dr. Pierre Larochelle](#)

- Conference Papers
 - **Larochelle, P.** and McCarthy, J.M., editors, Proceedings of the 2020 USCToMM Symposium on Mechanical Systems and Robotics (MSR 2020), Rapid City, SD, May 14-16, 2020. ISBN 978-3-030-43928-6. DOI: 10.1007/978-3-030-43929-3.

[Dr. Karim Muci](#)

- Conference Papers
 - **Muci-Kuchler, K.H.**; Birrenkott, C.M.; Bedillion, M.D.; Lovett, M. and Whitcomb, C.A. “Incorporating Systems Thinking and Systems Engineering Concepts in a Freshman-Level Mechanical Engineering Course”. 2020 ASEE Virtual

Conference, June 22 to 26, 2020. ASEE Paper ID # 29822. Selected as the ASEE Systems Engineering Division's (SED) Best Paper for the 2020 Conference.

Dr. Andrea Surovek

- Presentations
 - **Surovek, A.** University of California Riverside, Kisailus Biomimetics and Nanostructured Materials Lab, "Termite Mound Topology", October 19, 2019
 - Kiesow, A (presenter) Redlin, M., Eduful, J., Anderson, C., Miskimins, R., Mabee, P., Podharadsky, A., Rowland, P., and **Surovek, A.**, "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.
 - Redlin, M., Emery, M. (presenters), Kiesow, A, Eduful, J., Anderson, C., Miskimins, R., Mabee, P., Podharadsky, A., Rowland, P., and **Surovek, A.**, "Can Top-Down Systems-level approaches result in policy change that increases equity and fairness?" AWIS Equity in STEM Community Convening, Oct 6, 2019, Cleveland, OH.
- Publications
 - **Surovek, A. E.**, & Liebl, A. L., & Kiesow, A. M., & Emery, M., & Rowland, P. F., & Anderson, C. (2020, June), *A Statewide Policy-driven Approach to Gender Equity* Paper presented at 2020 ASEE Virtual Annual Conference Content Access, Virtual On line . 10.18260/1-2--34054
 - Akinci-Ceylan, S., & Cetin, K. S., & Ahn, B., & Cetin, B., & **Surovek, A. E.** (2020, June), *A Qualitative Analysis of How a Student, Faculty, and Practicing Engineer Approach an Ill-structured Engineering Problem* Paper presented at 2020 ASEE Virtual Annual Conference Content Access, Virtual On line . 10.18260/1-2--34039

Faculty & Student Awards and Honors in 2019-2020

- **Dr. Jason Ash** received the ASME Outstanding Student Section Advisor Award for his continued service as the SD Mines ASME student section advisor and leadership within ASME international committees. Additionally, Dr. Ash has won the 2020 Outstanding Student Organization Advisor Award, which would normally be received at the Leadership Awards Reception on campus; due to the impact of COVID-19, this reception was cancelled for 2020.
- **Dr. Cassandra Birrenkott** advises the South Dakota Mines section of Tau Beta Pi, which has received the BOR Organizational Leadership Award.
- **Dr. Pierre Larochelle** was elected to serve as a founding Associate Technical Editor for the new [ASME Journal of Autonomous Vehicles and Systems](#).
- **Dr. Karim Muci**, along with co-authors **Drs. Cassandra Birrenkott**, Mark Bedillion, Marsha Lovett, and Clifford Whitecomb wrote “Incorporating Systems Thinking and Systems Engineering Concepts in a Freshman-Level Mechanical Engineering Course,” which was selected as Best Paper for the ASEE Systems Engineering Division (SED) for the 2020 ASEE Conference.
- **Dr. Karim Muci** was elected as Fellow of the American Society of Mechanical Engineers (ASME).
- **Dr. Karim Muci** was elected as associate editor of the American Society of Mechanical Engineers (ASME) Journal of Engineering and Science in Medical Diagnostics and Therapy.
- **Student Awards**
 - Carter Barkley, MS student advised by Dr. Cassandra Birrenkott, was awarded the G.L. Cloud Scholarship from the Society of Experimental Mechanics. The prize for this award was reimbursement of all student-rate SEM Annual conference fees and travel expenses incurred by the recipient in attending the SEM Annual conference where the award will be granted and recognition of the recipient through presentation of a framed certificate and a check in the amount of \$3,000 at the Conference Luncheon and Awards Ceremonies conducted in conjunction with the SEM Annual Conference.
 - Nicole Miller, ME undergraduate student advised by Dr. Prasoon Diwakar, won the 2020 Society for Applied Spectroscopy Undergraduate Award.
 - Nicholas Pugh and Christian Leckband, advisees of Dr. Prasoon Diwakar, were finalists for the 2020 RESPEC Undergraduate Scholarship.
 - Kaycee Johnson (Society of Women Engineers), Paige Ling (Professional Development Institute, American Society of Mechanical Engineers), Seth Pippenger (Clean Snowmobile Team), and Daniel Rohde (Moonrockers), ME students, received Outstanding Student Organization Member Awards for their notable contributions to their respective organizations.
 - Samuel Ryckman, ME student, received the NSPE-SD Jody Page Leadership Scholarship.
 - Morgan Tatge, ME student, received the NASA South Dakota Space Grant Consortium.