

SAN JOSÉ STATE UNIVERSITY

Alumni News

Mechanical Engineering

Hello Alumni,

Greetings from the ME Department. This past year has seen a lot of activity by our students and faculty. Our current undergraduate enrollment sits at 654, and MSME enrollment is 162, so there are always many things going on. Check out some of our news below, and if you're in downtown San Jose, stop by to see us!

Alumni event planned!

Come back to SJSU on **Friday, May 8, 6:00 pm - 8:30 pm**. We'll have hors d'oeuvres, and some 2020 senior design students will be showing off their prototypes.

Please [RSVP](#) at so we can plan for how much food to order. Alternately, you can go to our [ME website](#). The RSVP link is at the bottom of the page. Non-alumni guests are also welcome! Most full time ME faculty will be there. The event will be held in the Engineering Building, Room 285/287. We'd love to catch up with you!

Regards,
Nicole Okamoto, Chair

STAY CONNECTED

Focus on new faculty



Dr. Farzan Kazemifar

Education: B.Sc. in Mechanical Engineering, Sharif University of Technology (Tehran, Iran),
M.Sc. and Ph.D. in Mechanical Engineering, University of Illinois at Urbana-Champaign.

Date Joined SJSU: Fall 2019

Courses Taught: ME111 Fluid Mechanics, ME114 Heat Transfer, ME 115 Thermal Engineering Lab

Research: The research experience and expertise of Dr. Kazemifar is in the area of fluids and thermal sciences. He employs optical and laser-based measurement techniques to study fluid

flow and heat transfer in applications related to energy and the environment. He has extensive experience in multi- phase flow as it occurs in geological sequestration of CO₂. One of his current projects, funded by the National Science Foundation (NSF) is on studying dynamics of multiphase flow in porous media using image-based velocity measurement tools. In one of his new projects, funded by the California Air Resources Board (CARB), he is studying technologies for CO₂ direct capture from air, and utilization of captured CO₂ in industrial, petrochemical, and manufacturing processes.

What he likes about SJSU: Diverse, talented and motivated students, and fellow faculty who are passionate about teaching and dedicated to impactful research.

Faculty and student awards and publications are shown at the end of the newsletter. Below are some example projects -- one related to research and two to teaching -- to give you an idea of the kind of work that's been going on lately in our department.

Research Collaboration with Lawrence Berkeley National Lab

By Dr. Raymond Yee

Dr. Raymond Yee and his graduate student Fang-Ming Lin collaborated with Lawrence Berkeley National Lab (the Berkeley Lab) to conduct material research on a tracking device in the Large Hadron Collider (LHC). The A Toroidal LHC Apparatus (ATLAS) strip tracking detector (see figure below from Fang-Ming Lin's MS thesis) is scheduled to be upgraded in 2025. The order of magnitude for the hit densities and the radiation damage are expected to increase. When radiation increases, the leakage current increases and the heat generated at the silicon trackers can lead to thermal runaway. Cooling is critical in these detectors.

In their study, a glassy graphitic foam was developed by AllComp Inc. as a precursor to the adhesives (glues). Graphenes with highly anisotropic thermal properties result in high thermal conductivity in the planar direction, while it is low in the normal direction. In these conditions, it is interesting to evaluate how varying thickness of the thermal interface materials (TIMs) optimizes for effective thermal conductivity. It was hypothesized that the direction where heat enters the graphitic foam and the size of the cross-sectional area normal to the heat flux direction would affect the overall effective thermal conductivity. Furthermore, the overall effective thermal conductivity is likely reduced when a gap is created between ligands and the bonded surface. Finite element simulations and experiments were performed and compared. The results also demonstrate that the parameters at the interface can be optimized to further improve the overall heat transfer via conduction. The details of the study is presented at the ASME IMECE Conference last November in Salt Lake City, Utah. (Below, Fang-Min Lin at IMECE Conference.)



Innovations in ME Courses

By Dr. Vimal Viswanathan

Brain-based Instruction in Mechanical Design

In Fall 2018, Dr. Vimal Viswanathan developed course videos and other instructional materials for the Mechanical Design (ME 154) course. For developing these materials, he followed “Tailored Instructions and Engineered Delivery Using Protocols” (TIED UP) pedagogy that he co-developed as a part of a National Science Foundation (NSF) grant. TIED UP is a media-rich blended model where elements from other popular pedagogies are combined to ensure effective delivery of course materials. The guiding protocols (see the figure) are a higher-education adaptation of the brain-based learning principles employed at several schools in K-12 levels. These protocols modify the concept delivery by instructors in such a way that the information can be easily grasped and stored by the students’ brains. By the application of the nine principles in TIED UP, Dr. Viswanathan developed 41 videos for the Mechanical Design course which have received over 5000 views from students till date. The videos are available at the following link: <https://tinyurl.com/uuxezjv>

Protocols used for concept delivery in TIED UP Flipped Instruction in Dynamics

Dynamics (ME 101) has been a course with a high failure rate in ME. In an effort to improve the instruction in this course, Drs. Raghu Agarwal and Vimal Viswanathan applied flipped pedagogy on most of the sections of this course over the past few semesters. The flipped method requires students to prepare for each class by reading a section of their textbook, watching a video on the topic and completing a pre- class quiz. To ensure that the students watch the video and read the textbook, embedded quizzes are included in both. During the class time, the students receive a very short lecture (~10 min) reiterating the main points followed by problem solving sessions. A group problem solving is also included in the class time (see the figure). In a majority of sessions, digital quizzes are administered via iClicker software. At the end of the class, the students are assigned two additional problems as homework. This methodology has contributed

to an enthusiasm in students to learn the materials and helped in attaining near 100% attendance in all sections. The failure rate in the course has also reduced by a significant amount.

See Below: A group problem solving session from Dr. Viswanathan's ME 101 class (Spring 2020)



New Robotics Minor in the Works Your Feedback Needed!

The mechanical engineering department is working on the development of a new minor in robotics with a target start date of Fall 2021. The department has set up a team of collaborators

from Mechanical, Electrical, Aerospace, and Computer Engineering to develop the sequence of courses.

The minor will have several options. The hardware track will include mostly courses in mechanical engineering, such as ME 101 Dynamics, ME 106 Fundamentals of Mechatronics, and ME 192 Robotics and Manufacturing Systems. It will be open to non-ME major who meets the prerequisites of coursework in circuit analysis and differential equations. The Computer Engineering track will offer multiple sub-tracks – one in embedded systems and electronic design and another in algorithms. Prerequisites to the computer engineering tracks will be CMPE 30 (their freshman programming class) or ME 106 Fundamentals of Mechatronics. It is expected that all options would require 12 units of coursework.

Before starting the minor, we need to assess the need. We'd love to get your feedback. Please go to <https://forms.gle/p1xoZwh4Z2nFfn4D8> for more information about the minor and to answer a few questions. Alternately, you can go to our ME website at www.sjsu.edu/me. There link is at the bottom of the page. We'd like to know if you think this minor would be helpful in your industry and if it had been available when you were a student if you would have pursued it.

ME to Participate in new Wildfire Research Center

I am sure that all of you are familiar with the devastation caused by wildfires in California. SJSU is planning to take a lead role in researching wildfire behavior, causes and spread through a cluster hire. Five new faculty are being recruited in wildfire meteorology/modeling, wildfire remote sensing, fire ecology, wildfire combustion, and wildfire management. We are currently recruiting a new mechanical engineering faculty member with research expertise in the area of wildfire combustion to be part of this center. Something unique about this center will be the collaboration of faculty in engineering, social sciences, and science, all focusing on different but interconnected areas of the same problem.

For more information, check out the SJSU president's [blog](#) or the [website](#) of the current center (which will be greatly expanded next year).

Grants Received (Summer 2019-Present)

Tyukov, "Photovoltaic Lab Stands -- Designing the new lab stands for better response for transition power energy engineering to green clean energy technologies," California State University Lab Innovations with Technology Grant, 2019-2020.

Co-PIs from ME department: Amirkulova F. A. and Yee R. PI: Keles O. and 2 more Co-PIs and 2 collaborators from Rutgers University and UC Merced. "Acquisition of a metal additive manufacturing system for multi-disciplinary research and education at a minority-serving institution" 2019-2020, NSF-MRI grant award (\$326,960).

Amirkulova F. A. (PI), Khatami E., Fan J., Yu Z., and Gerstoff P, "Deep learning and optimization based design of metamaterials and metadevices," SJSU College of Engineering Grant, 2020-2021 (\$100,000).

Kazemifar (PI), "Collaborative Research: Intermittency in Multi-Phase Flows in 2D and 3D Porous Media: Coordinated Experiments and Modeling," National Science Foundation, 9/2019-8/2021 (\$65,000).

Kazemifar (PI), "A Review of Emerging Technologies and Methods for Carbon Sequestration," California Air Resources Board, 3/2020-2/2021 (\$25,000).

Other Awards

Formula SAE team - Took 22nd out of 120 international teams and 1st place among California teams in the 2019 competition in Michigan. They beat out powerhouse engineering schools like Georgia Tech, Ohio State, and Purdue.

Baja SAE team - Took 35th out of 99 teams in the 2019 California competition, including a top 20 finish in the “Endurance” category.

Dr. Fred Barez – Elected to the Silicon Valley Engineering Council Hall of Fame, Spring 2020.

Danielle Li-Wen Shen, student assistant at the front desk – College of Engineering 2019 Scott T. Axline Memorial Student Award for Excellence in Service

Dr. Vimal Viswanathan – College of Engineering 2019 Faculty Award for Excellence in Teaching

Dr. Feruza Amirkulova - Received an NSF Travel Stipend as well as an Acoustical Society of America Young Investigator Travel Grant

Student and Faculty Publications

(Summer 2019-Present, with ME Faculty Listed in Bold)

Amirkulova F., Norris N., “Acoustic Multiple Scattering Gradient of Total Scattering Cross Section and Its Application to Cloaking.” J. Theoretical & Comp. Acoustics. (Accepted for publication)

Amirkulova F., Norris N., “Broadband Acoustic Cloak Design using Gradient-based Optimization,” Phononics 2019: 5th Int. Conf. on Phononic Crystals/Metamaterials, Phonon Transport, Topological Phononics, June 2019, Tucson, Arizona, paper number: PHONONICS2019-0118, pp. 227-228.

Amirkulova F., Norris N. Pornaras, D.-R.L., and Wang, W.C., “Design of Acoustic Metaclusters for the Sound Control using Optimization and Deep Learning,” J. Acoust. Soc. Am. 2019, 146 (4), 2877-2877

Ashuri, T., Hamidi, R.J., **Armani, A.**, Reasnor, T., Ahmadi, S., and Iqbal, K., "Biomedical Soft Robots: Current Status and Perspective," Biomedical Engineering Letters (submitted).

Baloda, Y., Datye, A., **Zaidi, S.**, "Experimental and Theoretical Analysis of Fin Design Impact on Rocket Performance," AIAA Region I Student Conference, State College, Pennsylvania, April 24-25, 2020 (accepted).

Baloda, Y., Jaiswal, A., He, X., Datye, A., **Zaidi, S.**, "Theoretical and Experimental Performance Evaluation of Shark-Caved, Sounder, and Trapezoidal Fins," Annual National Conference on Undergraduate Research (NCUR), Montana State University, Bozeman, March 26-28, 2020 (abstract accepted).

Bashash, S., and Lun-Lee, K., "Automatic Coordination of Internet-connected Thermostats for Power Balancing and Frequency Control in Smart Microgrids," Energies, 12, 1936, 2019

Bashash S., Shariat S., "Clustering-Based Control Optimization of Hard Disk Drive Servo System for Population-Level Performance Enhancement," Proceedings of 2019 American Control Conference, Philadelphia, PA, July 2019.

Chu, E., Silva, A., Maruyama, T., Nguyen, S., Duque, E., **Zaidi, S.**, "Discussion on Thermosyphon's Design for Passive Cooling of High-Power LED Panels," Advancements in Thermal Management Conference, Denver Colorado, August 6-7, 2020 (Proposal Accepted).

Chu, E., **Zaidi, S.**, **Okamoto, N.**, and **Thurlow, E.**, "Investigation of Start-Up Power Requirements for an Axially Grooved Thermosyphon," Advancements in Thermal Management Conference, Denver Colorado, August 7-8, 2019.

Cole, L., Sindhu, K., Raza, A., Sunil, R., Shirol, S., and **Zaidi, S.**, "Theoretical and Experimental Investigation of Transient Heat Transfer along Heat Sink Fins with and without Thermosyphons," Annual National Conference on Undergraduate Research (NCUR), Montana State University, Bozeman, March 26- 28, 2020 (abstract accepted).

Datye A., Maveli, U., and **Zaidi, S.**, "Meta-Analysis MATLAB Code to Incorporate Effects of

Heterogeneity for Continuous, Binary and Correlational Data Analysis, Annual National Conference on Undergraduate Research (NCUR), Montana State University, Bozeman, March 26-28, 2020 (abstract accepted).

Dei Rossi, J., Keles, O., and **Viswanathan, V.**, “Fused Deposition Modeling with Added Vibrations: A Parametric Study on the Accuracy of Printed Parts,” ASME's International Mechanical Engineering Congress and Exposition (IMECE 2019), Salt Lake City, UT.

Drake, E., **Okamoto, N.**, and **Thurlow, E.**, “The Use of CFD to Analyze and Predict the Pressure Drop Along Flat Oval Duct Fittings,” accepted for the ASHRAE 2020 Annual Conference

Fahey, L., **Amirkulova F.**, and Norris N., “Broadband Acoustic Metamaterial Design using Gradient-Based Optimization,” J. Acoust. Soc. Am. 2019, 146 (4), 2830-2830.

Furman, B., Ahsan, S., and Wertz, B., “Making the Move from C to Python With Mechanical Engineering Students”, (under review), ASEE 2020 Annual Conference & Exhibition, Montreal, Canada, June 21-24, 2020.

Han C.M., Catoe D., Munro S.A., Khnouf R., Santiago J.G., Snyder M.P., Salit M.L., Cenik C., “Simultaneous RNA purification and size selection using an on-chip isotachopheresis with ionic spacer,”19, 2741–2749, Lab Chip, 2019.

Ihsan, M., and **Viswanathan, V.**, “Self-powering Gyms: A Case Study on Energy Harvesting from a Static Bicycle”, ASME's International Mechanical Engineering Congress and Exposition (IMECE 2019), Salt Lake City, UT.

Khnouf R., **Han C.M.**, Munro S.A., “Isolation of enriched small RNA from cell-lysate using on-chip isotachopheresis,” 40 (23-24), 3140-3147, Electrophoresis, 2019.

Klochko, N.P., Klepikova, K.S., Kopach, V. R.m and **Tyukhov, I.**, “Development of Semi-transparent ZnO/FTO Solar Thermoelectric Nanogenerator for Energy Efficient Glazing,” Solar Energy, Volume 184, 2019, p. 230-239.

Kshitiz K. and **Yee, R. K.**, “Parametric Study of Metal 3D Printing Process Using Finite Element

Simulation”, ASME 2019 International Mechanical Engineering Congress & Exposition, Salt Lake City, Utah, Nov 8-14, 2019.

Kumbhani N. and **Bashash S.**, "A Supervisory Lateral Slip Prevention Controller for Autonomous Vehicles", Proceedings of 2019 ASME Dynamic Systems and Control Conference, Park City, UT, Oct. 2019.

Lee, S.J., Nguyen, D.M., Grewal, H.S, Puligundla, C., Saha, A.K., Nair, P.M., Cap, A.P., and Ramasubramanian, A.K., "Image-Based Analysis and Simulation of the Effect of Platelet Storage Temperature on Clot Mechanics Under Uniaxial Strain," Biomechanics and Modeling in Mechanobiology, vol. 19, pp. 173–187, 2020.

Li, W., **Armani, A.**, McMillen, D., Leu, M., Hilmas, G., Watts, J., “Additive Manufacturing of Zirconia Parts with Organic Sacrificial Supports,” International Journal of Applied Ceramic Technology (under review).

Lin, F. M. and **Yee, R. K.**, “Heat Transfer Interface to Graphitic Foam,” ASME 2019 International Mechanical Engineering Congress & Exposition, Salt Lake City, Utah, Nov 8-14, 2019.

Millard, N. and **Yee, R. K.**, “Design Analysis of Metacarpophalangeal Single-Piece Joint Prosthesis to Increase Motion in Abduction/Adduction,” ASME 2019 International Mechanical Engineering Congress & Exposition, Salt Lake City, Utah, Nov 8-14, 2019.

Mokadam, A., **Viswanathan, V.**, and Suresh, M., “Online Product Review Analysis to Automate the Extraction of Customer Requirements,” ASME International Design Engineering Technical Conferences, St. Louis, MO, 2020 (in Review).

Mokri, J., **Okamoto, N.**, and Neagu, S., “Implementation of a Near-Peer Mentoring Program between a High- School Technology Class and a University Undergraduate Engineering Class,” Proceedings of the 2020 ASEE Annual Conference (under review).

Okamoto, N., “Implementing Competency-Based Assessment in an Undergraduate Thermodynamics Course,” Proceedings of the 2020 ASEE Annual Conference (accepted).

Patel, H., Madhu, N., Nair, R., Kumar, M., Ganesh, A., Madireddy, I., **Zaidi, S.**, and **Viswanathan, V.**, "Characterization of Sensors employed in an automated Knee Brace for Leg Muscle Rehabilitation," Southern California Conferences for Undergraduate Research (SCCUR), San Marcos, CA (Poster only), 2019.

Pornaras, D.-R.L., Wang, W.C., Chen, Y., Kwak, G., **Amirkulova, F.** and Khatami, E., "Broadband Suppression of Total Multiple Scattering Cross Section Using Neural Networks," J. Acoust. Soc. Am. 2019, 146 (4), 2876-2877.

Sage, M., Madhu, N., Madireddy, I., Vemuri, A., Xing, S., **Zaidi, S.**, and **Viswanathan, V.**, "Development of an Electronic PCB Board for Instrumentation and Control to Operate a Knee-Brace for Leg Muscle Rehabilitation," National Conference on Undergraduate Research, Bozeman, Montana (abstract accepted), 2020.

Saw, S., Ramasubramanian, A.K., Simon, M., and **Lee, S.J.**, "Formation of Clot Analogs Between Co-Flow Fluid Streams in a Microchannel Device," in ASME-JSME-KSME 2019 8th Joint Fluids Engineering Conference, 2019.

Singh, S., Bellannagari, B., Satheeshkumar, N., **Zaidi, S.**, "Spectroscopic Study of a DBD Plasma Jet for Rapid Healing and Sterilization of Chronic Wounds," Annual National Conference on Undergraduate Research (NCUR), Montana State University, Bozeman, March 26-28, 2020 (abstract accepted).

Singh, S., Singh, K., Maveli, U., and **Zaidi, S.**, "Development of MATLAB Codes for Meta-Analysis Applicable to Medical Research Data," Southern California Conferences for Undergraduate Research (SCCUR), California State University, San Marcos, Nov 23, 2019.

Sreekanth, A., and **Viswanathan, V.**, "A Study on the Role of Computer-aided Design in Design Creativity and Education," Engineering Design Graphics Journal, 83(1), 2019.

Stanchik, A. V., Gremenok, V. F., Juskenas, R., **Tyukhov, I.**, "Effects of Selenization Time and Temperature on the Growth of Cu₂ZnSnSe₄ Thin Films on a Metal Substrate for Flexible Solar

Cells,” Solar Energy, Volume 178, 2019, p. 142-149.

Tran, M., **Okamoto, N.**, **Kabbani, H.**, and **Bashash, S.**, “Determination of Cost Savings Using Variable Speed Fans for Cooling Servers,” accepted for publication in the Proceedings of 36th Annual Semi-Therm, 2020.

Tyukhov, I., “ Use of Biomass for a Development of Nanocellulose-based Biodegradable Flexible Thin Film Thermoelectric Material, “ Solar Energy, 2020 (accepted for publication).

Viswanathan, V., Nukala, N.R., and Solomon, J., “Improving the Understanding of Course Concepts with Engineered Course Material Delivery,” IEEE Transactions on Engineering Education (Accepted for publication), 2020.

Viswanathan, V., Hurt, J., Talley, K., Shryock, K, Caldwell, B., and Linsey, J., 2020, “A Study on the Impact of a Sketch-based Tutoring System in Statics Instruction,” ASEE Annual Conference, Montreal, Quebec, Canada (in Review), 2020.

Viswanathan, V., Mirza, S., Nayak, C., and Calhoun, M., “Evaluation of a Puzzle-based Virtual Platform for Improving Spatial Visualization Skills in Engineering Freshmen,” Proceedings of the 2020 ASEE Annual Conference (under review).

Young, C., Ramasubramanian, A.K., Simon, M., and **Lee, S.J.**, "Time-Invariant Deformation of Blood During Necking on an Electrowetting Digital Microfluidic Platform," in ASME-JSME-KSME 2019 8th Joint Fluids Engineering Conference, 2019.

Zaidi, S., Huynh, A., Thach, P., Rubio, I., Patel, H., and **Viswanathan, V.**, “Design and Characterization of an Automated Assistive Knee Brace for Leg Muscle Rehabilitation,” ASME's International Mechanical Engineering Congress and Exposition (IMECE 2019), Salt Lake City, UT, 2019.



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