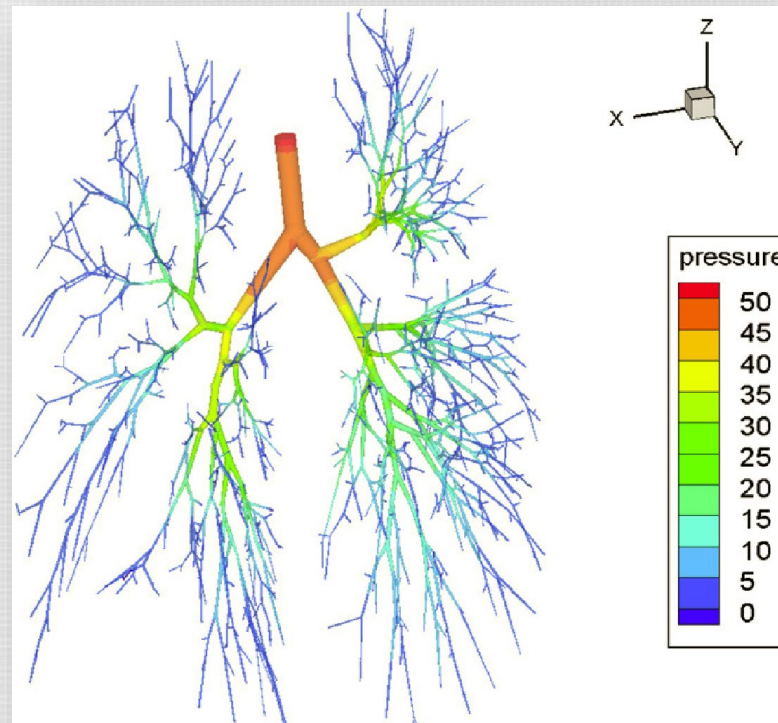# Biomedical Engineering Research

Biomedical Engineering Research

Dr. Rama Venkat
Dean, College of Engineering
Phone: (702) 895-1094
Email: Rama.Venkat@unlv.edu

Dr. Mohamed Trabia
Associate Dean, College of Engineering
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Email: Mohamed.Trabia@unlv.edu

Biomedical engineering is a research area in the College of Engineering at UNLV experiencing sustained growth.

Our faculty has been involved in many related activities over the last decade. The combination of experimental and computational facilities within the college is a basis for future collaboration with other entities in Southern Nevada.

We would like to introduce you to some of our researchers. Please feel to contact us if we can help with your projects and initiatives.

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COLLEGE OF ENGINEERING

Biomedical Engineering
Research Areas of Expertise

- Biosensor design
- Computational fluid dynamics
- Electro-mechanical sensors for compression therapy
- Electronic health record / next generation sequencing data analysis
- Lab-on-a-chip devices for automatic, fast detection and diagnosis
- Medical image processing
- Micro- and nano-electromechanical systems
- Nanoparticle and bio-molecule properties
- Wireless sensor networks
- Deep multi-task learning

- Bone fixation systems design and analysis
- Strength and stiffness of bones
- Music and audio technologies
- Development of low-cost prosthetic hands
- Testing portable body temperature conditioner
- System on a chip design
- Mechanical implant design for Obstructive Sleep Apnea patients
- Robotics, interfacing sensors, actuation
- Disease treatment through mechanics-based platforms
- Neuromorphic computing
- Biomedical imaging and healthcare
- Novel mechatronic systems design

Biomedical Engineering Research

Why UNLV?

- Las Vegas is a dynamic city with a population that includes multiple ethnicities and age groups.

- Las Vegas has attracted several organizations that are active in medical research including:

  - University of Nevada Reno School of Medicine
  - Cleveland Clinic Lou Ruvo Center for Brain Health

- In addition to the College of Engineering, multiple entities within UNLV have been active in advancing biomedical research:

  - School of Allied Health Sciences

  - School of Community Health Sciences

  - School of Dental Medicine

  - School of Medicine

  - College of Sciences

- We continue to focus on establishing synergy between these entities to advance scientific knowledge and strengthen the economy of Southern Nevada.

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Faculty Involved in
Biomedical Engineering Research

Dr. R. Jacob Baker
Professor, Department of Electrical and Computer Engineering

Dr. Yi-Tung Chen
Chair and Professor, Department of Mechanical Engineering
Co-Director, Center for Energy Research

Dr. Sarah Harris
Professor, Department of Electrical and Computer Engineering

Dr. Mingon Kang
Assistant Professor, Department of Computer Science

Dr. Shahram Latifi, P.E.
Professor, Department of Electrical and Computer Engineering
Co-Director, Center for Information Technology and Algorithms (CITA)

Dr. Samir Moujaes
Professor, Department of Mechanical Engineering

Dr. Brendan O'Toole
Professor, Department of Mechanical Engineering
Director, Center for Materials and Structures

Dr. Seungman Park
Assistant Professor, Department of Mechanical Engineering

Dr. Ronghuai Qi
Assistant Professor, Department of Mechanical Engineering

Dr. Emma Regentova
Professor, Department of Electrical and Computer Engineering

Dr. Bryar Shareef
Assistant Professor, Department of Computer Science

Dr. Andreas Stefik
Professor, Department of Computer Science

Dr. Mohamed Trabia
Professor, Department of Mechanical Engineering
Associate Dean for Research, Graduate Studies & Computing

Dr. Mei Yang
Professor, Department of Electrical & Computer Engineering

Dr. Woosoon Yim
Professor, Department of Mechanical Engineering
Director of Intelligent Structures and Control Laboratory
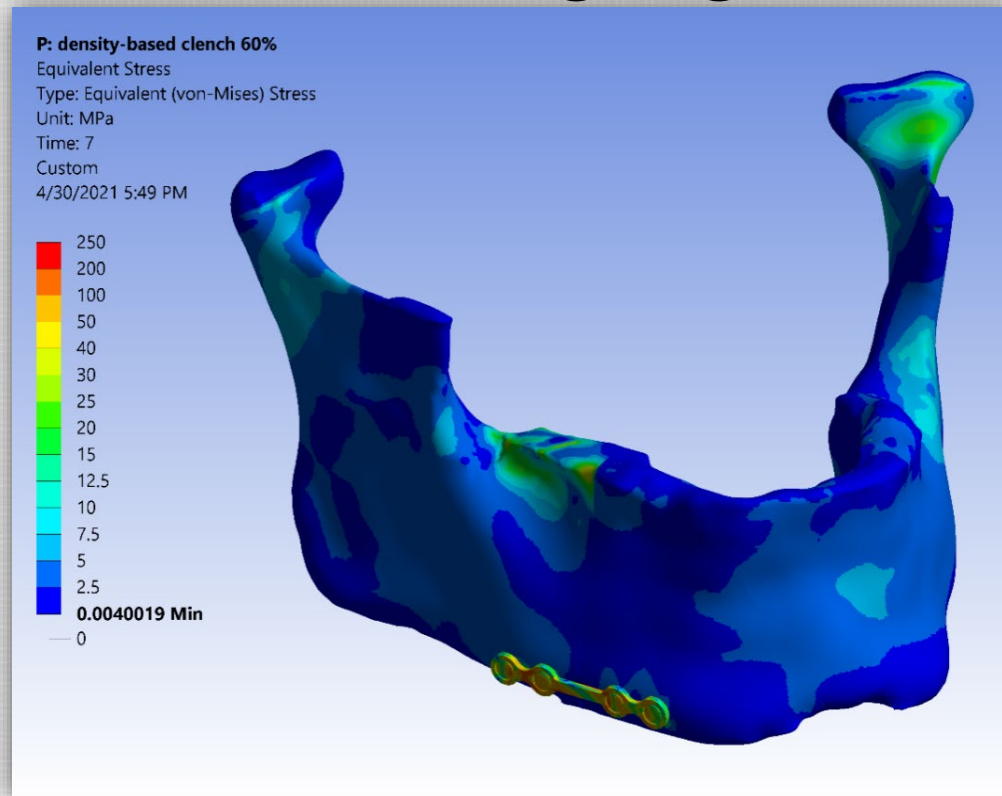
Dr. Shengjie (Patrick) Zhai
Assistant Professor, Department of Electrical and Computer Engineering
Senior Research Fellow, Nevada Nanotechnology Center

Dr. Hui Zhao
Professor, Department of Mechanical Engineering

Biomedical Engineering

Research Highlights

Dr. R. Jacob Baker

Professor, Department of Electrical and Computer Engineering

Phone: (702) 895-4125

Email: r.jacob.baker@unlv.edu

- Expertise
    - Electronics for Transcranial Magnetic Stimulation (TMS)
    - Electro-mechanical sensors for compression therapy
    - Droplet position detection of immunohistochemistry experiments
    - Biological imaging
    - CMOS integrated circuit microfluidics

Compression sensing garments

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Dr. R. Jacob Baker
Professor, Department of Electrical and Computer Engineering

Recent Publications

- Strong, H., Senda, D., Baker, R. J., and Hines, D., "Focal Stimulation of Movement Related Cortical Potentials in Mice using a Novel TMS Circuit Design," *Brain Stimulation, Vol. 14, Issue 6*, 2021.

- Senda, D., Strong, H., Hines, D., Hines, R., and Baker, R. J., "A Compact 1200V, 700A, IGBT-Based Pulse Generator for Repetitive Transcranial Magnetic Stimulation In Vivo Laboratory Experiments," *Review of Scientific Instruments, Vol. 92, Issue 8*, 2021.

- Y. Li and R. Jacob Baker. "Improving the performance of electrowetting on dielectric microfluidics using piezoelectric top plate control." *Sensors and Actuators B: Chemical*, 229, 63-74, 2016.

- Li, Y. and Baker, R. J., "A Highly Efficient and Reliable Electrowetting on Dielectric Device for Point-of-Care Diagnostics," Proceedings of 11th IEEE Dallas Circuits and Systems Conference, 2015.

- Li, Y., Li, H., and Baker, R. J., "A Low-Cost and High-Resolution Droplet Position Detector for an Intelligent Electrowetting on Dielectric Device," *Journal of Laboratory Automation*, pp. 1-7, 2015.

Patents

Patent pending for smart technology to optimize the treatment of lower extremity swelling using monitored compression therapy, 2022.
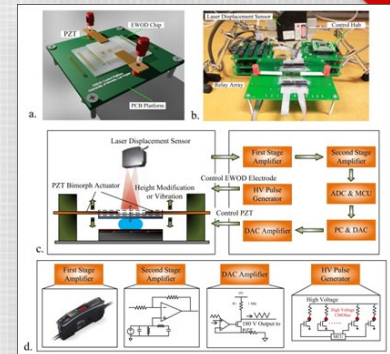
UNLV | HOWARD R. HUGHES COLLEGE OF ENGINEERING
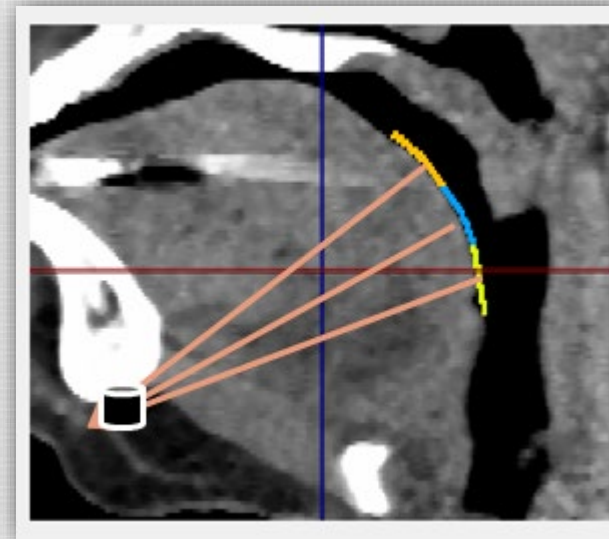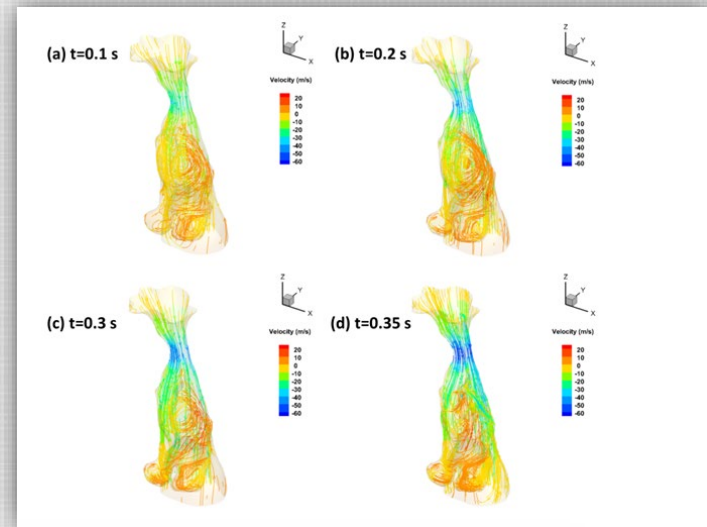
Dr. Yi-Tung Chen

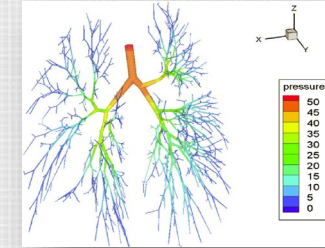Chair & Professor, Department of Mechanical Engineering
Co-Director, Center for Energy Research
Phone: (702) 895-1202

Email: yitung.chen@unlv.edu

- Expertise
  - Pulmonary air flow and cardiovascular blood flow modeling
  - Biosensor design
  - Pharmacokinetics
  - Biomolecular simulation
  - Computational fluid dynamics
  - Computational heat transfer and mass transfer
  - Medical image processing
  - Fluid and structural interaction

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Dr. Yi-Tung Chen
Chair & Professor, Department of Mechanical Engineering
Co-Director, Center for Energy Research

Recent Projects

- Computational fluid dynamics (CFD) studies of airflow in a digital reference model of the 17-generation airway (bronchial tree) were accomplished using numerical modeling, based on the anatomical model.

- The lung model consists of 6.744e6 unstructured tetrahedral computational cells. A steady-state airflow rate was used to simulate the transient turbulent flow regime using a large eddy simulation turbulence model.

- The nature of the secondary vortical flows, which develop in such asymmetric airways, was demonstrated to vary with the specific anatomical characteristics of the branching conduits.

Relevant Publications

- Yang Liu, Yitung Chen, Woosoon Yim, and Robert Wang, "Study of the suture-patch device through the tongue for sleep apnea using fluid-structure interaction modeling," *Journal of Otolaryngology and Rhinology*, Vol. 4, Issue 2 (2018), 4:048; pp. 1-9.

- Yang Liu, Jennifer Mitchell, Yitung Chen, Woosoon Yim, Wenxiao Chu, and Robert Wang, "Study of the upper airway of obstructive sleep apnea patient using fluid structure interaction," *Respiratory Physiology & Neurobiology*, 249 (2018), pp. 54-61

- Tevfik Gemci, Valery Ponyavin, Yitung Chen, Huajun Chen, Richard Collins, "Computational Model of Airflow in Upper 17 Generations of Human Respiratory Tract," *Journal of Biomechanics*, 41 (2008), pp.2047-2054.
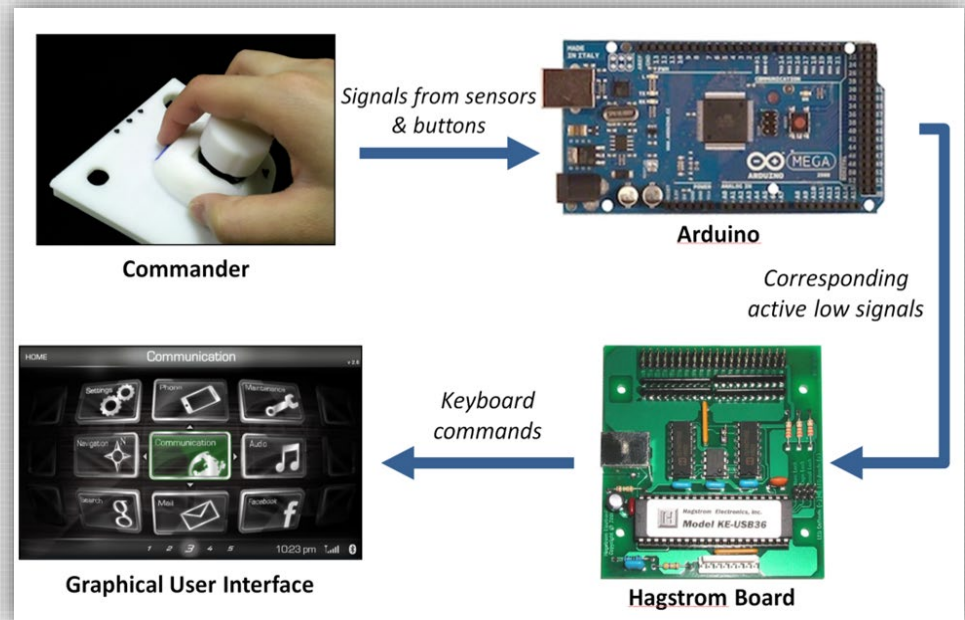
Dr. Sarah Harris

Professor, Department of Electrical and Computer Engineering

Phone: (702) 895-4518

Email: sarah.harris@unlv.edu

- Expertise
    - Digital design, reconfigurable computing
    - System on a chip design
    - Embedded systems
    - Robotics, interfacing sensors, actuation

Dr. Sarah Harris

Professor, Department of Electrical and Computer Engineering

Relevant Publications

- M Lazeroff, G Ryder, <u>SL Harris,</u> PK Tsourkas. "Phage Commander, an application for rapid gene identification in bacteriophage genomes using multiple programs." *Phage* 2 (4), 204-213 (2021).

- M Lazeroff, <u>S Harris,</u> P Tsourkas. "Phage Commander, a software tool for rapid annotation of bacteriophage genomes using multiple programs." *bioRxiv* (2020).

- R Dizon, A Solis, A Essaqi, M Isaacs, A McKenna, A Gibbs, D Lee, <u>S. L. Harris</u>. "Fly Roller: Development of an Instrument to Exercise Fruit Flies." 17th International Conference on Information Technology–New Generations …(2020).

- Kakakhel, Z., Owen, R., <u>Harris, S</u>. and Harris, D., "MIPSfpga: An unobfuscated commercial MIPS core and SoC that runs Linux," Embedded World Conference, 2016, Nuremburg, Germany.

- <u>Harris, Sarah L</u>., and Harris, David Money, "Digital Design and Computer Architecture: ARM® Edition," *Elsevier Publishers*, 2015.

- Lee, D.V., Bertram, J.E.A., Anttonen, J.T., Ros, I.G., <u>Harris, S.L</u>., and Biewener, A.A., "A Collisional Approach to Quadrupedal Gait Dynamics." *Journal of the Royal Society Interface*, 2011.

- Hsiong, W., Huntzicker, S., King, K., Lee, A., Lim, C., Wang, J., <u>Harris, S</u>., Jahn, J., "Performance and Area Tradeoffs in Space-Qualified FPGA-Based Time-of-Flight Systems," International Conference on Electronic Measurement and Instruments, 2009, Beijing, China.
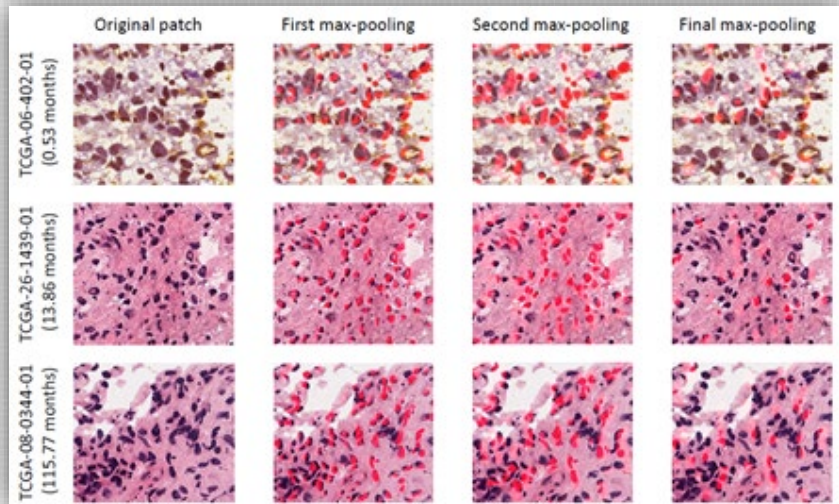
Dr. Mingon Kang

Assistant Professor, Department of Computer Science

Director, DataX Lab (http://www.dataxlab.org)

Phone: (702) 895-4884

Email: mingon.kang@unlv.edu

- Expertise
  - Data science, machine learning, big data analytics
  - Deep learning in bioinformatics
    - Interpretable deep learning
    - Integrative deep learning
  - Integrative analysis of multiple types of data such as medical image and multi-omics data
  - Medical image analysis
  - Electronic health record (EHR)/ next generation sequencing (NGS) data analysis

Dr. Mingon Kang

Assistant Professor, Department of Computer Science

Recent publications

- H Lee, <u>M Kang</u>, Y Li, D Seo, D Kim, "Epidemic Vulnerability Index for Effective Vaccine Distribution Against Pandemic," International Symposium on Bioinformatics Research and Applications, 22-34, 2021.
- JH Oh, W Choi, E Ko, <u>M Kang</u>, A Tannenbaum, JO Deasy, "PathCNN: interpretable convolutional neural networks for survival prediction and pathway analysis applied to glioblastoma." *Bioinformatics 37* (Supplement_1), i443-i450, 2021.
- S.K. Kim, X. Liu, J. Park, D. Um, G. Kilaru, C.-M. Chiang, <u>M. Kang</u>, K. Huber, K. Kang, T.K. Kim, "Functional coordination of BET family proteins underlies altered transcription associated with memory impairment in Fragile X syndrome", *Science Advances* (IF: 13.116), 2021.
- S. Kim, S. Yang, K. Lim, E. Ko, H. Jang, <u>M. Kang</u>, P. Suh, and J. Joo, "Prediction of Alzheimer's disease-specific phospholipase c gamma-1 SNV by deep learning-based approach for high-throughput screening", Proceedings of the National Academy of Sciences of the United States of America (PNAS) (IF: 9.412), 2021.
- S. Kosaraju, J. Hao, H. Koh, and <u>M. Kang</u>, "Deep-Hipo: Multi-scale Receptive Field Deep Learning for Histopathological Image Analysis", *Methods* (IF: 3.782), 2020.
- J. Hao, S. Kosaraju, N. Tsaku, D. H. Song, and <u>M. Kang</u>, "PAGE-Net: Interpretable and Integrative Deep Learning for Survival Analysis Using Histopathological Images and Genomic Data", Pacific Symposium on Biocomputing (PSB), 2019.
- T. Mallavarapu, J. Hao, Y. Kim, J.H. Oh, <u>M. Kang</u>, "Pathway-based Deep Clustering for Molecular Subtyping of Cancer," *Methods*, 2019.
- Y. Kim, J. Hao, T. Mallavarapu, J. Park, and <u>M. Kang</u>, "Hi-LASSO: High-Dimensional LASSO," *IEEE Access*, 2019, pp 44562-44573, 2019.
- J. Hao, M. Masum, J. H. Oh, and <u>M. Kang</u>, "Gene- and Pathway-based Deep Neural Network for Multi-omics Data Integration to Predict Cancer Survival Outcomes," 2019 International Symposium on Bioinformatics Research and Applications (ISBRA), 2019.
- J. Hao, Y. Kim, T. Mallavarapu, J.H. Oh, and <u>M. Kang</u>, "Cox-PASNet: Pathway-based Sparse Deep Neural Network for Survival Analysis", Proceedings of IEEE International Conference on Bioinformatics & Biomedicine (IEEE BIBM), 2018.
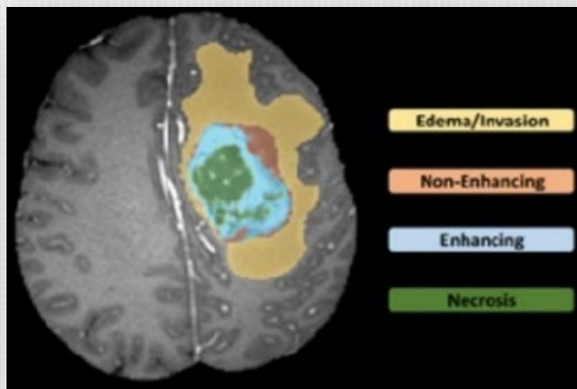
Dr. Shahram Latifi, P.E.

Professor, Department of Electrical and Computer Engineering
Co-Director, Center for Information Technology and Algorithms (CITA)

Phone: (702) 895-4016

Email: shahram.latifi@unlv.edu

- Expertise
    - Hidden biometrics
    - Machine learning
    - Anomaly detection in medical imaging
    - Subepidermal imaging
    - Neuromorphic computing

Edema/Invasion

Non-Enhancing

Enhancing

Necrosis

Dr. Shahram Latifi, P.E.

Professor, Department of Electrical and Computer Engineering
Co-Director, Center for Information Technology and Algorithms (CITA)
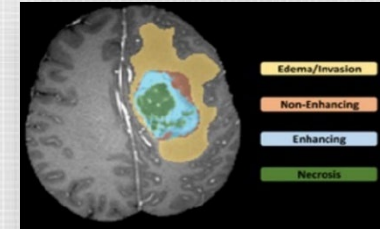
Recent Projects

- "Machine Learning and Radiomic Features to Predict Overall Survival Time for Glioblastoma Patients" with Lina Chato (PhD Student).

- "A Hybrid and Collaborative Wireless Sensor Network for Non-invasive Glucose Monitoring" with Dr. Patricia Gatlin, School of Nursing, 2016.

Relevant Publications

- P. Rajendra, S. Latifi, "Prediction of Diabetes using Logistic Regression and Ensemble Techniques", *Computer Methods and Programs in Biomedicine*, Elsevier, Volume 1, pp. 1-8, 2021, 100032.

- L. Chato and S. Latifi, "Machine Learning and Radiomic Features to Predict Overall Survival Time for Glioblastoma Patients", *Journal of Personalized Medicine*, pp. 1-15, 2021.

- S. Manzoor, S. Latifi, "A Health Detection Model Based on Facial Data", Int'l Conference on Information Technology, New Generations, pp 463-468, 2021.

- L. Chato, P. Kachroo, and S. Latifi, "An Automatic Overall Survival Time Prediction System for Glioma Brain Tumor Patients based on Volumetric and Shape Features", MICCAI 2020 conference (virtual), BrainLes workshop (BraTS 2020 challenge, 2020.

- S. Latifi, and N.T. Reyes, (2019) "Audio Enhancement and Synthesis using Generative Adversarial Networks (GANs): A Survey", *International Journal of Computer Applications*, 182, 27–31, 2019.

- S. Latifi, Y. Wei, and Y. Xu, (2019). "A Survey of Sound-based Biometrics used in Species Recognition." In IEEE IEMCON 2019 (pp. 197–201).

- L. Chato and S. Latifi, "Application of Machine Learning to Biometric Systems- A Survey," *Journal of Physics*, Vol. 1098, pp. 1-5, 2018.

- E. Sharifahmadian and S. Latifi, "Smart Compression for Telemedicine*", International Journal of Computer Applications*, pp. 1-6, Vol. 98, No. 6, 2014.

Dr. Samir Moujaes

Professor, Department of Mechanical Engineering

Phone: (702) 895-3265

Email: samir.moujaes@unlv.edu

- Expertise
    - Testing Portable Body Temperature Conditioner (PBTC) with computer-aided diagnostics systems
    - Testing thermal manikin for performance of PBTC under various controlled conditions

Above: Portable body temperature conditioner (PBTC) developed by Rocky Research and tested by Nevada School of Medicine and UNLV

Right: Thermal manikin tested by UNLV for the performance of the PBTC under various controlled thermal conditions

Dr. Samir Moujaes
Professor, Department of Mechanical Engineering

Relevant Publications
Thermal Comfort (journal papers & research projects)

- "Temperature profiles of sunlight-exposed surfaces in a desert climate: Determining the risks for pavement burns"; Chestovich PJ, Sarhoukanoff R, Flores CE, Carroll JT, Saquib SF, Moujaes S.; American Burn Association 2021 Annual Meeting (abstract submitted and accepted in 2020; paper written for March 2021 presentation).
- "The effects of Exhaust Air Vent Location on Thermal Comfort Inside a Residential Building Equipped with an Evaporative Cooling System"; Armin Saraei, Samir Moujaes; *Building Simulation Journal*, Springer Verlag publishers; accepted on October 28 (13 pages); 2020.
- "Testing of a Novel Portable Body Conditioner Using a Thermal Mannikin"; D. Heller, A. Heller, S. Moujaes, S. Williams, R. Hoffmann, P. Sarkisian, K. Khalili, U. Rockenfeller, T. Browder, D. Kuhls, J. Fildes; *Journal of Biomedical Instrumentation and Technology*, September/October 2016; pp. 338.
- "Characterization of a Conditioning Hypothermic/ Hyperthermic Portable Device for use in Field Installations", S. Moujaes for the US Army Office, University of Reno School of Medicine, November 13-Jan. 2015.
- "CFD Performance Prediction of a Parallel Counter-parallel Flow Heat Exchanger Used for the Treatment of Hypothermia." S. Moujaes and A. Heller J. *Energy Eng.*, 10.1061 EY.1943-7897.0000289 , 04015034, 2015.
- "Treatment of Hypothermia in Trauma Victims: Thermodynamic Considerations", L. Gentillelo, S. Moujaes, *Journal of Intensive Care Medicine*, vol. 10, no.1, p. 5-16, 1995.

Renewable Energy (journal papers & research projects)

- "Thermal-Fluid Analysis of a Parabolic Trough Solar Collector of a Direct Supercritical Carbon Dioxide Brayton Cycle: A Numerical Study"; Samad Gharehadghi; Samir Moujaes; Alireza Mahdavi Nejad; in review to the Solar Energy Journal (47 pages) (2021).
- "Performance Experimentally of a PCM Material in an Arid Environment", Infiniti R; June–November 2016, S. Moujaes PI.

Dr. Brendan O'Toole

Professor, Department of Mechanical Engineering
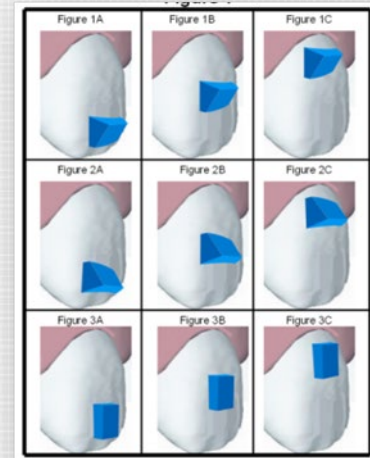Director, Center for Materials and Structures

Phone: (702) 895-3885

Email: Brendan.Otoole@unlv.edu

Website: www.egr.unlv.edu/~bj/

- Expertise
  - Development of low-cost prosthetic hands
  - Strength and stiffness of bones
  - Design and analysis of composite orthotics
  - Experimental evaluation of orthodontic devices
  - Mitigation of impact-induced injuries

In collaboration with the Dental School, investigation of the effects of location, shape, and orientation of attachments for the retention of thermoformed orthodontic aligners.

3D printed prosthetic hand for a 5-year-old girl who has Poland Syndrome

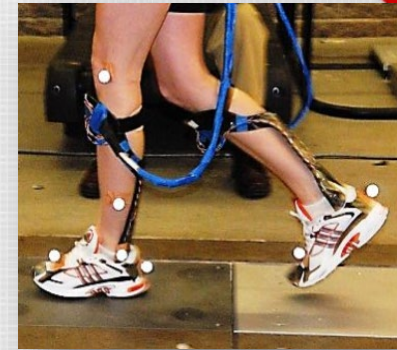UNLV | HOWARD R. HUGHES COLLEGE OF ENGINEERING

Dr. Brendan O'Toole
Professor, Department of Mechanical Engineering

Recent Projects
- Development of fatigue machine for testing of knee and shoulder joints
- Development of low-cost prosthetic hands
- Characterization of orthodontic devices and materials
- Evaluating effect of hibernation on bone strength in ground squirrels
- Shock absorbing properties of elastomeric mouth pieces
- Experimental evaluation of the failure of solder joints in dental wire connections
- Shear testing of orthodontic brackets
- Retention of thermoformed aligners with varying mounting brackets
- Design and fabrication of polymer composite Ankle Foot Orthosis (AFO)
- Experimental evaluation of the performance of AFOs in situ and in a laboratory environment


The Kinesiology and Civil Engineering departments collaborated on the deformation of a composite Ankle Foot Orthosis (AFO). It was measured while walking on a force plate to analyze the AFO effectiveness.

Relevant Publications
- M. Ramos Gonzalez, B. O'Toole and Z. Wang, "Experimental Study of Bio-Polymer Knee Implant", ASME IMECE-88479, Pittsburg PA, 2018.
- Z. Wang, B. O'Toole, V. Carbajal Nunez, D. Ta, "Design and Manufacturing of Implantable Expanding Cage", ASME IMECE, Tampa FL, 2017.
- J.S. Dufek, E.S. Neumann, M.C. Hawkins, B. O'Toole, "Charcot-Marie-Tooth: AFO Mechanics and Gait Patterns", Invited article, *Lower Extremity Review*, 6(2): 23-30, 2014. Web. http://lermagazine.com/article/charcot-marie-tooth-afo-mechanics-and-gait-patterns.
- J.S. Dufek, E.S. Neumann, M.C. Hawkins, B. O'Toole, "Functional and Dynamic Response Characteristics of a Custom Composite Ankle Foot Orthosis for Charcot-Marie-Tooth Patients", *Gait & Posture*, v39, n1, pp 308 – 313, 2014.
- D. Cowley, J. Ma, B. O'Toole, "The Effect of Gingival-Margin Design on the Retention of Thermoformed Aligners", *Journal of Clinic Orthodontics* Vol. 46, No. 11, pp 697-702, 2012.
- E. Neumann, M. Hawkins, J. Dufek, B. O'Toole, "Outcomes for Eight Charcot-Marie Tooth Patients using Custom Carbon-Fiber Composite AFO's", Accepted to the American Orthotic and Prosthetic Association Conference, Las Vegas, NV, 2011. Received the **Howard R. Thranhardt Award**.
- J.C. Utz, S. Nelson, B. O'Toole, and F. van Breukelen, "Bone strength is maintained after 8 months of inactivity in hibernating golden-mantled ground squirrels, *Spermophilus lateralis*", *Journal of Experimental Biology*, May 2009.
- M.L. Jones, J. Mah, and B. O'Toole, "Retention of Thermoformed Aligners with Various Shapes and Orientations of Attachments", *Journal of Clinic Orthodontics*, v XLIII n 2, pp 113-117, February 2009.
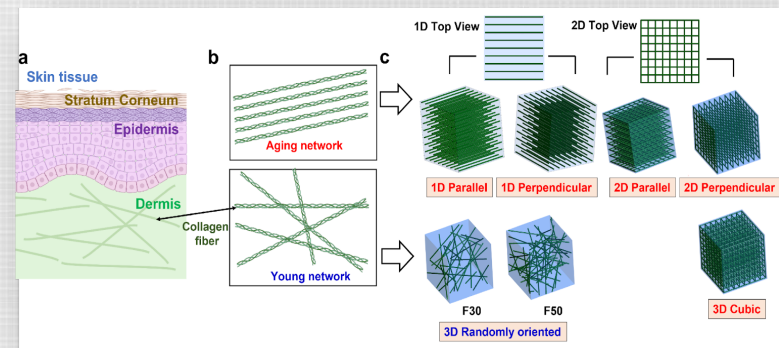
Dr. Seungman Park

Assistant Professor, Department of Mechanical Engineering

Email: seungman.park@unlv.edu

- Expertise
    - Functionality assessment and mechanical characterization of biological systems
    - Disease treatment through mechanics-based platforms
    - Underlying molecular/ cellular mechanism of diseases
    - Quantitating drag/traction forces, bond strength, and mechanical/ viscoelastic/transport properties of cells, tissues, and biomaterials
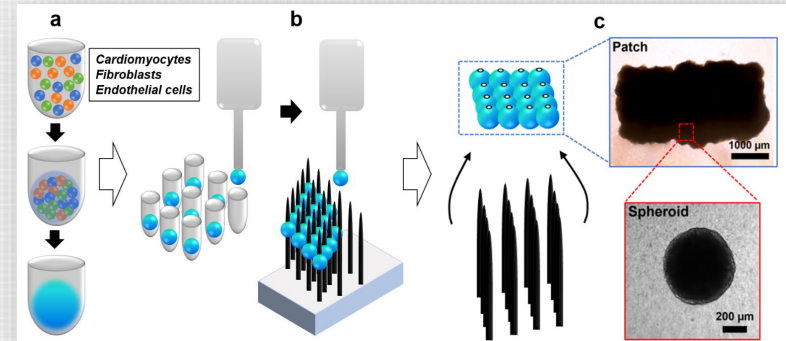

Tissue Engineering

Computational Modeling for Biology/Medicine

Dr. Seungman Park
Assistant Professor, Department of Mechanical Engineering

Recent Publications

- Matthew Pittman, Ernest Iu, Keva Li, Mingjiu Wang, Junjie Chen, Nilay Taneja, Myung Hyun Jo, Seungman Park, Wei-Hung Jung, Le Liang, Ishan Barman, Taekjip Ha, Stavros Gaitanaros, Jian Liu, Dylan Burnette, Sergey Plotnikov, Yun Chen, "Membrane Ruffling is a Mechanosensor of Extracellular Fluid Viscosity" *Nature Physics*, Accepted

- Seungman Park, Byunggik Kim, "Aging-related structural changes in 3D extracellular matrix affects its mechanics" *Medical Engineering & Physics*, 2022, 106, 103843

- Seungman Park, "Biochemical, structural and physical changes in aging human skin, and their relationship" *Biogerontology*, 2022, 1-14

- Gaofeng Wang, Evan Sweren, Haiyun Liu, Eric Wier, Martin P. Alphonse, Nasif Islam, Ang Li, Yingchao Xue, Ruosi Chen, Junjie Chen, Seungman Park, Yun Chen, Sam Lee, Yu Wang, Nate K. Archer, William Andrews, Maureen Kane, Erika Dare, Zhiqi Hu, Elizabeth A. Grice, Lloyd S. Miller, Luis Andres Garza, "Bacteria Induce Skin Regeneration via IL-1β Signaling" *Cell Host & Microbe*, 2021, 29, 1–15

- Cecillia Lui, Alexander Chin, Seungman Park, Yang Bai, Enoch Yeung, Chulan Kwon, Gordon Tomaselli, Yun Chen, Narutoshi Hibino, "Mechanical stimulation enhances the development of scaffold-free, 3D-printed, engineered heart tissue grafts" *Journal of Tissue Engineering and Regenerative Medicine*, 2021, 15:503–512

- Seungman Park, Wei-Hung Jung, Matthew Pittman, Junjie Chen, Yun Chen, "The effects of stiffness, viscosity, and geometry of microenvironment in homeostasis, aging and diseases" *Journal of Biomechanical Engineering*, 2020, 142(10), 100804

- Seungman Park, Yu Shi, Myung Hyun Jo, Taekjip Ha, Li-Fan Lu, Daniel Reich, Yun Chen, "Force-dependent trans-endocytosis by breast cancer cells depletes costimulatory receptor CD80 and attenuates T cell activation" *Biosensors and Bioelectronics*, 2020, 165(1), 112389

- Zhenhui Liu, Se Jong Lee, Seungman Park, Konstantinos Konstantopoulos, Kristine Glunde, Yun Chen, Ishan Barman, "Cancer cells display increased migration and deformability in pace with metastatic progression" *FASEB Journal*, 2020, 34(7), 9307-9315

- Seungman Park, Yoon Ki Joo, Yun Chen, "Versatile and high-throughput force measurement platform for dorsal cell mechanics" *Scientific Reports*, 2019, 9, 13826

- Seungman Park, Jiaxiang Tao, Li Sun, Chen-Ming Fan, Yun Chen, "Economic, modular and portable skin viscoelasticity measurement device for in situ longitudinal studies" *Molecules*, 2019, 24(5), 907
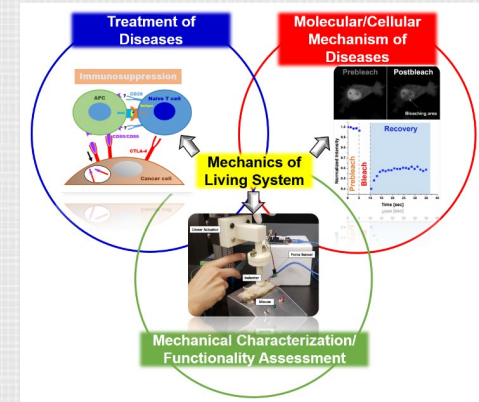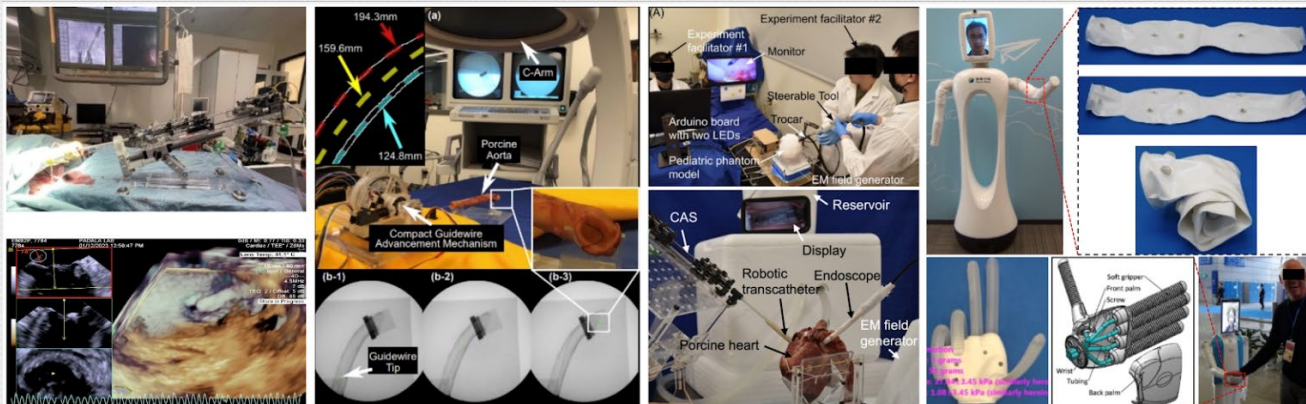
Dr. Ronghuai Qi

Assistant Professor, Department of Mechanical Engineering

Email: ronghuai.qi@unlv.edu

- Expertise
    - Multi-scale robotics (e.g., medical/surgical/soft robotics) and intelligent systems
    - Novel mechatronic systems design
    - System modeling, optimization, and control
    - Human-robot interaction

Dr. Ronghuai Qi
Assistant Professor, Department of Mechanical Engineering

Recent Publications

- Ronghuai Qi*, Namrata U. Nayar*, and Jaydev P. Desai, "Compact Design and Task Space Control of a Robotic Transcatheter Delivery System for Mitral Valve Implant," *IEEE Transactions on Medical Robotics and Bionics*, 2023. *Co-first author
- Ronghuai Qi, Namrata U. Nayar, and Jaydev P. Desai, "Telerobotically Controlled Transcatheter Delivery System for Mitral Valve Implant," *IEEE Robotics and Automation Letters*, vol. 8, no. 6, pp. 3629-3636, June 2023.
- Kent K. Yamamoto*, Timothy A. Brumfiel*, Ronghuai Qi*, Joshua J. Chern, and Jaydev P. Desai, "Preclinical Evaluation of a Novel Steerable Robotic Neuroendoscope Tool," *Operative Neurosurgery,* Accepted. *Co-first author
- Timothy A. Brumfiel, Ronghuai Qi, Coley Chapman, Asif Rashid, Shreyes N. Melkote, Joshua J. Chern, and Jaydev P. Desai, "Small Scale Robotic Tooling for Use in Flexible Robotic Endoscopic Tools," *IEEE Transactions on Medical Robotics and Bionics*, 2023.
- Amir Khajepour, Sergio Torres Mendez, Mitchell Rushton, Hamed Jamshidianfar, Ronghuai Qi, Alireza Pazooki, Laaleh Durali, and Amir Soltani, "A Warehousing Robot: From Concept to Reality," In: Caro, S., Pott, A., Bruckmann, T. (eds) Cable-Driven Parallel Robots. CableCon 2023*. Mechanisms and Machine Science*, vol 132. Springer, Cham. (Best Application Paper)
- Namrata U. Nayar, Ronghuai Qi, and Jaydev P. Desai, "Modeling of a Robotic Transcatheter Delivery System," in Proc. IEEE International Conference on Robotics and Automation (ICRA), London, United Kingdom, 2023, pp. 4675-4681.
- Namrata U. Nayar*, Ronghuai Qi*, and Jaydev P. Desai, "Toward the Design and Development of a Robotic Transcatheter Delivery System for Mitral Valve Implant," *IEEE Transactions on Medical Robotics and Bionics*, vol. 4, no. 4, pp. 922-934, Nov. 2022. *Co-first author
- Ronghuai Qi, Amir Khajepour, and William W. Melek, "Redundancy Resolution and Disturbance Rejection via Torque Optimization in Hybrid Cable-Driven Robots," *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, vol. 52, no. 7, pp. 4069-4079, July 2022.
- Patrick Lis, Achraj Sarma, Grace Trimpe, Timothy Brumfiel, Ronghuai Qi, and Jaydev P. Desai, "Design and Modeling of a Compact Advancement Mechanism for the COAST Guidewire Robot," in Proc. IEEE International Conference on Robotics and Automation (ICRA), 2022, Philadelphia, PA, USA, May 23-27, 2022, pp. 1176-1182.
- Ronghuai Qi, Amir Khajepour, and William W. Melek, "Modeling, Tracking, Vibration and Balance Control of an Underactuated Mobile Manipulator (UMM)," *Control Engineering Practice*, vol. 93, pp. 104159, 2019.
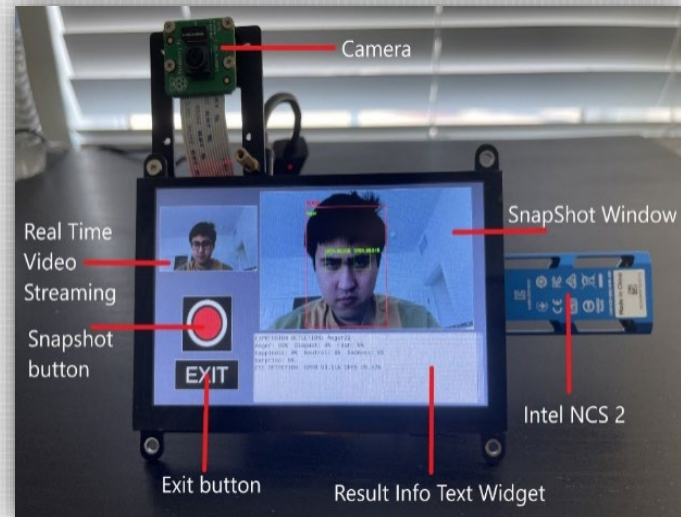
Dr. Emma Regentova

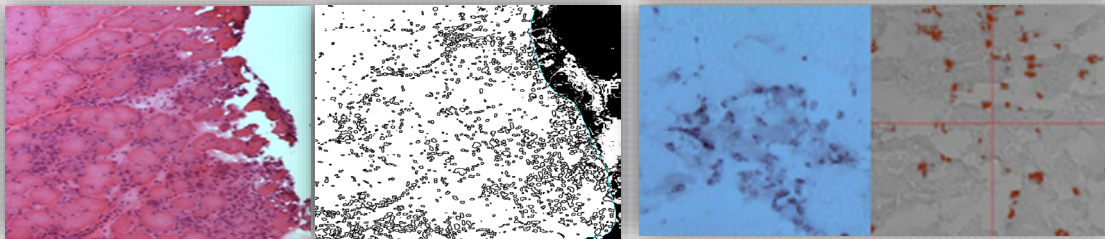Professor, Department of Electrical and Computer Engineering
Phone: (702) 895-3187

Email: emma.regentova@unlv.edu

Website: http://www.ee.unlv.edu/~regent/

- Expertise
  - Biomedical imaging and healthcare
  - Hyperspectral methods
  - Embedded signal/image processing (DSP) and machine learning (ML)

Evaluation of patient pain level/suffering from facial expression: Raspberry Pi 4b, Pi Camera Module V2 & NCS 2, CNN


In collaboration with Dr. M. Yang (ECE) and Dr. B. St. Pierre-Schneider (School of Nursing): Quantification of protein cells distribution in light microscopy images of injured muscles

UNLV | HOWARD R. HUGHES COLLEGE OF ENGINEERING

Dr. Emma Regentova

Professor, Department of Electrical and Computer Engineering

Relevant Publications

- Y. Jiao, H. Derakhshan, B. St. Pierre- Schneider, E. Regentova, M. Yang, "Automated Quantification of White Blood Cells in Light Microscopic Images of Injured Skeletal Muscle," in Proc. 8th IEEE Annual Computing and Communication Workshop and Conference (CCWC), 2018, Las Vegas, NV.
- Ali P. Yazdanpanah, E.E. Regentova, "Compressed Sensing MRI Based on Shearlet Sparsity and Nonlocal Total Variation: SS-NLTV," *Journal of Medical Imaging*, 201, 4(2), 026003, 2017.
- Ali Pour Yazdanpanah, Farideh Shahraki, Emma Regentova, "Sparse View CT Reconstruction Based on Nonconvex L1-L2 Regularization," accepted by ICIPACV 2017: International Conference on Image Processing, Analysis and Computer Vision, 2017, London, United Kingdom.
- Ali P. Yazdanpanah, E. E. Regentova, G. Bebis, "Algebraic Iterative Reconstruction-Reprojection (AIRR) Method for High Performance Sparse-View CT Reconstruction," *Applied Mathematics & Information Sciences,* 10, No. 6, 1-8 (2016).
- Ali Pour Yazdanpanah, Emma E. Regentova, "Sparse-View CT Reconstruction Using Curvelet and TV-Based Regularization," *Image Analysis and Recognition*, Vol. 9730 of the series Lecture Notes in Computer Science pp 672-677, 2016.
- G. Veni, E. E. Regentova, A. K. Mandava, "A New Method of Detecting Microcalcification Clusters for Computer Aided Digital Mammography," Nineteenth International Conference On Systems Engineering (ICSENG 2008), Las Vegas, 2008, pp. 532 – 537.
- G. Veni, E. E. Regentova, L. Zhang, "Detection of Clustered Microcalcifications using SUSAN Edge Detector, Adaptive Contrast Thresholding and Spatial filters," International Conference on Image Analysis and Recognition, Porto, Portugal, 2008, pp. 837-843.
- J. Zheng, E. Regentova, "Independent Component Analysis for Microcalcifications Detection in Digital Mammograms," *AJICT*, Vol. 4, No. 2, 2008, pp.59-64.
- E. Regentova, L. Zhang , J. Zheng, G. Veni, "Microcalcification detection based on wavelet domain hidden Markov tree model: Study for inclusion to computer aided diagnostic prompting system," *Medical Physics*, 2007, Volume 34, Issue 6, pp. 2206-2219.
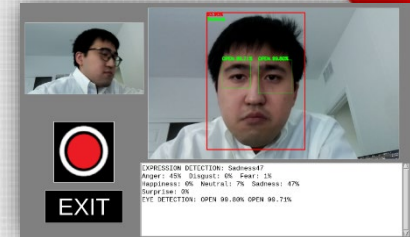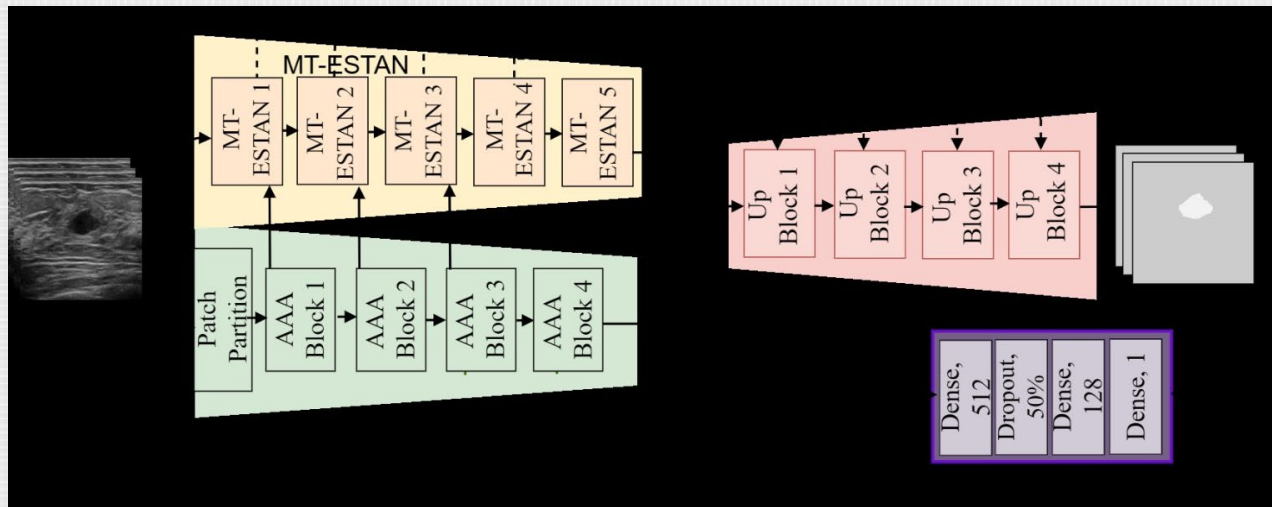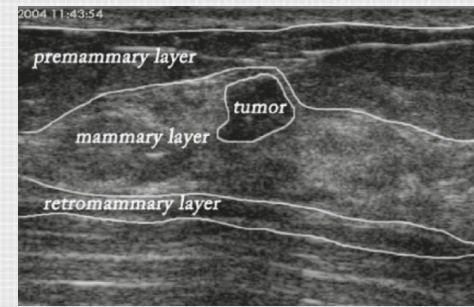
Dr. Bryar Sheeraf

Assistant Professor, Department of Computer Science

Phone: (702) 895-3918

Email: bryar.sheeraf@unlv.edu

- Expertise
  - Medical Image Analysis
  - Deep multi-task learning
  - Digital image processing and computer vision

UNLV | HOWARD R. HUGHES COLLEGE OF ENGINEERING

Dr. Bryar Sheeraf
Assistant Professor, Department of Computer Science

Recent Publications

- B. Shareef, M. Xian, A. Vakanski, J.Ding, C. Ning, H.D. Cheng, "A benchmark for breast ultrasound image classification," *Ultrasound in Medicine & Biology*, 2023.
- Bryar Shareef, Min Xian, Aleksandar Vakanski, Haotian Wang, "Breast Ultrasound Tumor Classification using a Hybrid Multitask CNN-Transformer Network", in *MICCAI* 2023.
- H. Wang, M. Xian, A. Vakanski, and B. Shareef, "SIAN: style-guided instance-adaptive normalization for multi-organ histopathology image synthesis," in IEEE International Symposium on Biomedical Imaging, 2023, pp. 1-5.
- B. Shareef, A. Vakanski, P. E. Freer, and M. Xian, "Estan: Enhanced small tumor-aware network for breast ultrasound image segmentation," *Healthcare*, vol. 10, no. 11, pp. 2262, 2022.
- Y. Zhang, M. Xian, H.-D. Cheng, B. Shareef, J. Ding, F. Xu, K. Huang, B. Zhang, C. Ning, and Y. Wang, "BUSIS: A Benchmark for Breast Ultrasound Image Segmentation," *Healthcare*, vol. 10, no. 4, pp. 729, 2022-04-14, 2022.
- B. Shareef, M. Xian, and A. Vakanski, "STAN: Small tumor-aware network for breast ultrasound image segmentation," in IEEE International Symposium on Biomedical Imaging, Iowa City, Iowa, USA, 2020, pp. 1-5.
- R. E. Hiromoto, M. Haney, A. Vakanski, and B. Shareef, "Toward a Secure IoT Architecture," *Advanced Control Techniques in Complex Engineering Systems: Theory and Applications: Dedicated to Professor Vsevolod M. Kuntsevich*, pp. 297-323, 2019.

Dr. Andreas Stefik

Professor, Department of Computer Science
Phone: (702) 895-3187

Email: andreas.stefik@unlv.edu

- Expertise
    - Software engineering
    - Programming languages
    - Empirical study design
    - Statistics
    - Accessibility
    - Music and audio technologies
    - Computer science education

Blind students at the Washington State School for the Blind learning to develop software by using the Quorum programming language.

UNLV | HOWARD R. HUGHES
COLLEGE OF ENGINEERING

Dr. Andreas Stefik
Professor, Department of Computer Science

Relevant Publications

- JL Tennison, PM Uesbeck, NA Giudice, A Stefik, DW Smith, JL Gorlewicz. "Establishing vibration-based tactile line profiles for use in multimodal graphics." *ACM Transactions on Applied Perception* (TAP) 17 (2), 1-14 (2020).
- RE Ladner, A Stefik, J Naumann, E Peach. "Computer Science Principles for Teachers of Deaf Students." *2020 Research on Equity and Sustained Participation in Engineering* (2020).
- T Spuck, J Hammerman, K Meredith, D Reichart, A Stefik, Y Catricheo, … "Research Supporting Multisensory Engagement by BVI and Sighted Students to Advance Integrated Learning of Astronomy and Computer Science." American Astronomical Society Meeting Abstracts # 235 235, 135.04 (2020).
- Andreas Stefik, Richard Ladner, William Allee, Sean Mealin. (Best Paper Award) "Computer Science Principles for Teachers of Blind and Visually Impaired Students," *SIGCSE* 2019 (accepted).
- Uesbeck, M., Stefik A.M. "A Randomized Controlled Trial on the Impact of Polyglot Programming in a Database Context". *9th Workshop on Evaluation and Usability of Programming Languages and Tools* (PLATEAU 2018). Schloss Dagstuhl-- Leibniz-Zentrum fuer Informatik, Volume 67, 2019.
- Andreas Stefik, Stefan Hanenberg, "Methodological Irregularities in Programming Language Research." *IEEE Computer*, 2017.
- Richard E. Ladner, Andreas Stefik, "AccessCSforall: making computer science accessible to K-12 students in the United States." *ACM SIGACCESS Accessibility and Computing*, 2017.
- Phillip Merlin Uesbeck, Andreas Stefik, Stefan Hanenberg, Jan Pedersen, and Patrick Daleiden. 2016. "An empirical study on the impact of C++ lambdas and programmer experience." In Proceedings of the 38th International Conference on Software Engineering (ICSE '16). ACM, New York, NY, USA, 760-771.
- Brad A. Myers, Andreas Stefik, Stefan Hanenberg, Antti-Juhani Kaijanaho, Margaret Burnett, Franklyn Turbak, and Philip Wadler. 2016. "Usability of Programming Languages: Special Interest Group (SIG) Meeting at CHI 2016." In Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems (CHI EA '16). ACM, New York, NY, USA, 1104-1107.

Dr. Mohamed Trabia

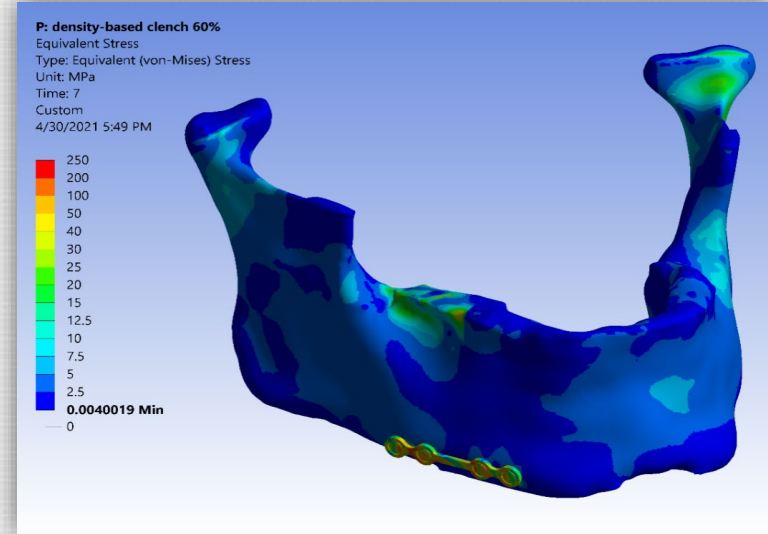Professor, Department of Mechanical Engineering

Associate Dean for Research, Graduate Studies & Computing

Phone: (702) 895-0957

Email: mohamed.trabia@unlv.edu

Website: www.me.unlv.edu/~mbt

- Expertise
  - Optimization of human-powered vehicle design
  - Bone fixation systems design and analysis
  - Fingertip force measurement and characterization
  - Electronic Braille reading system
 - Characterization of diabetic ulceration
  - Characterization of material models of tissues

P: density-based clench 60%
Equivalent Stress
Type: Equivalent (von-Mises) Stress
Unit: MPa
Time: 7
Custom
4/30/2021 5:49 PM

250
200
100
50
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30
25
20
15
12.5
10
7.5
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2.5
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Contact area images for separate subjects from video taken underneath the transparent walkway and processed binary images generated by coloration tracking algorithm.

Dr. Mohamed Trabia
Professor, Department of Mechanical Engineering
Associate Dean for Research, Graduate Studies & Computing
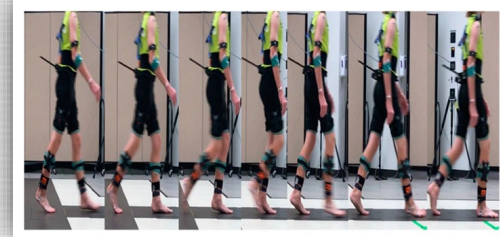
Relevant Publications

- C Ison, C Neilsen, J DeBerardinis, <u>MB Trabia</u>, JS Dufek, "Use of Pressure-Measuring Insoles to Characterize Gait Parameters in Simulated Reduced-Gravity Conditions," *Sensors 21* (18), 6244 (2021).
- Rahul Soangra, Michael Shiraishi, Richard Beuttler, Michelle Gwerder, LouAnne Boyd, Venkatesan Muthukumar, <u>Mohamed Trabia</u>, Afshin Aminian, Marybeth Grant-Beuttler, "Foot Contact Dynamics and Fall Risk among Children Diagnosed with Idiopathic Toe Walking", *Applied Sciences*. 2021; 11(6):2862. https://doi.org/10.3390/app11062862.
- Jessica DeBerardinis, Conner Neilsen, Daniel E. Lidstone, Janet S. Dufek, <u>Mohamed B. Trabia</u> "Enhancing the Accuracy of Ground Reaction Force Measurement during Walking Using Pressure-Measuring Insoles," *Journal of Biomechanical Engineering*, Vol 143, No, 1, 2021.
- Jessica DeBerardinis, Conner Neilsen, Daniel E. Lidstone, Janet S. Dufek, <u>Mohamed B. Trabia</u> "A Comparison of Two Techniques for Center of Pressure Measurements," *Journal of Rehabilitation and Assistive Technologies Engineering*, Volume 7, pp. 1–12, DOI: 10.1177/2055668320921063 (2020).
- Jessica DeBerardinis, Janet S. Dufek, <u>Mohamed B. Trabia</u>, "A Viscoelastic Ellipsoidal Model of the Mechanics of Plantar Tissues," *Journal of Biomechanics*, 2019.
- Daniel Lidstone, Janet Dufek, Jessica DeBerardinis, <u>Mohamed Trabia</u>, "Electronic Measurement of Plantar Contact Area During Walking Using an Adaptive Thresholding Method for Medilogic® Pressure-Measuring Insoles," accepted for publication, *The Foot*, 2019.
- Daniel E Lidstone, Louise M Porcher, Jessica DeBerardinis, Janet S Dufek, <u>Mohamed B Trabia</u>, "Concurrent Validity of an Automated Footprint Detection Algorithm to Measure Plantar Contact Area during Walking," *Journal of the American Podiatric Medical Association*, 2018.

Approved Patents

- 2014346863 (Australia), "Actuated Foot Orthotic with Sensors"
- 8,617,221, "Apparatus and methods for bone fracture fixation"
- 7,578,835, "Apparatus and methods for bone fracture reduction and fixation"
- 7,235,077, "Bone fixation device and method"

Dr. Mei Yang

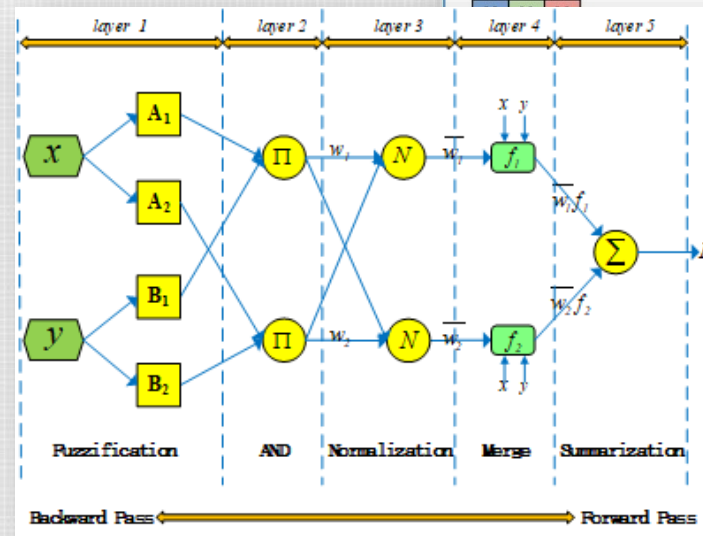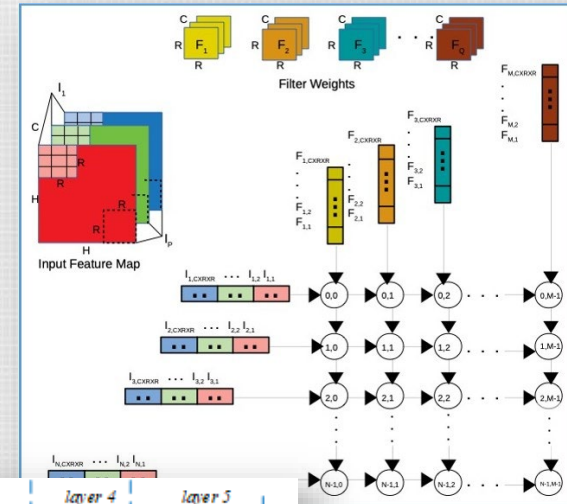Professor, Department of Electrical and Computer Engineering

Phone: (702) 895-2364

Email: mei.yang@unlv.edu

- Expertise:
  - Computer architecture, multi/many-core systems
  - Interconnection networks, photonic interconnects
  - Networks-on-chip
  - Machine learning
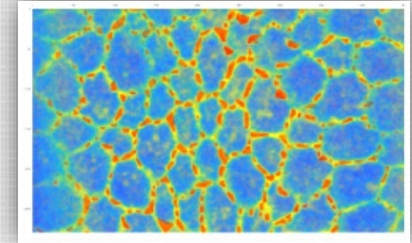 - Biomedical image analysis
  - Wireless sensor networks

Collaboration with Dr. Jiang (engineering)

Collaboration with Drs. Batista & Jiang (engineering)

Dr. Mei Yang
Professor, Department of Electrical and Computer Engineering

**Relevant Publications**

- B. Tiwari, <u>Mei Yang</u>, X. Wang, Y. Jiang, and V. Muthukumar, "Improving the performance of a NoC-based CNN accelerator with gather support," in Proc. 34th IEEE SoCC, 2020.
- Z. Fu, J. Cheng, <u>Mei Yang</u>, J. R. Batista, and Y. Jiang, "Wastewater discharge quality prediction using stratified sampling and wavelet de-noising ANFIS model," *Computer and Electrical Engineering*, vol. 85, 2020.
- Z. Fu, <u>Mei Yang</u>, J. R. Batista, "Using fuzzy models and time series analysis to predict water quality," *Int'l Journal of Intelligent Systems and Applications (IJISA)*, vol. 12, no. 2, 2020.
- Y. Jiao, M. Weng, and <u>Mei Yang</u>, "Multi-object portion tracking in 4D fluorescence microscopy imagery with deep feature maps," Proc. of IEEE/CVF Conf. and Computer Vision and Pattern Recognition (CVPR), 2019.
- Y. Jiao, B.S.P. Schneider, E. Regentova, and <u>Mei Yang</u>, "DeepQuantify: deep learning and quantification system of white blood cells in light microscopy images of injured skeletal muscles," *Journal of Medical Imaging*, vol. 6, no. 2, 2019.
- Y. Jiao, S. Latifi, and <u>Mei Yang</u>, "Self error detection and correction for noisy labels based on error correcting output code in convolutional neural networks," in Proc. 9th IEEE Annual Computing and Communication Workshop and Conference (CCWC), 2019.
- Y. Jiao, B. St. Pierre-Schneider, E. Regentova, and <u>Mei Yang</u>, "Automated quantification of white blood cells in light microscopic muscle images: segmentation augmented by CNN," in Proc. second Int'l Conf. Vision, Image and Signal Processing (ICVISP), 2018, Las Vegas, NV.
- Y. Jiao, H. Derakhshan, B. St. Pierre- Schneider, E. Regentova, <u>Mei Yang</u>, "Automated quantification of white blood cells in light microscopic images of injured skeletal muscle," in Proc. 8th CCWC, 2018, Las Vegas, NV.
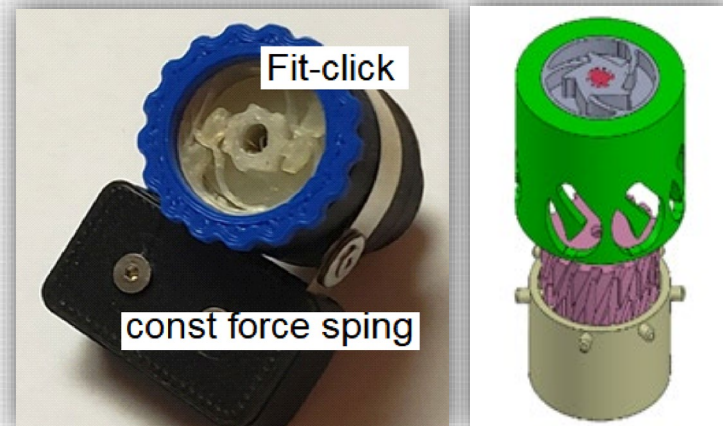
Dr. Woosoon Yim

Professor, Department of Mechanical Engineering
Director, Intelligent Structures and Control Laboratory
Phone: (702) 895-0956

Email: woosoon.yim@unlv.edu

- Expertise
    - Biosensors and devices
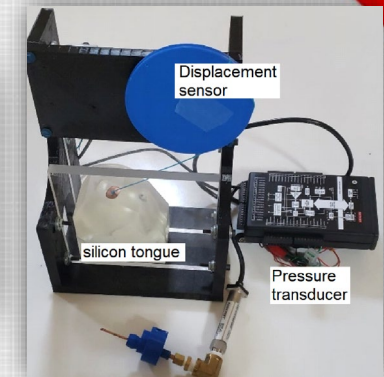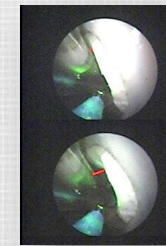   - Mechanical implant design for OSA (Obstructive Sleep Apnea) patients
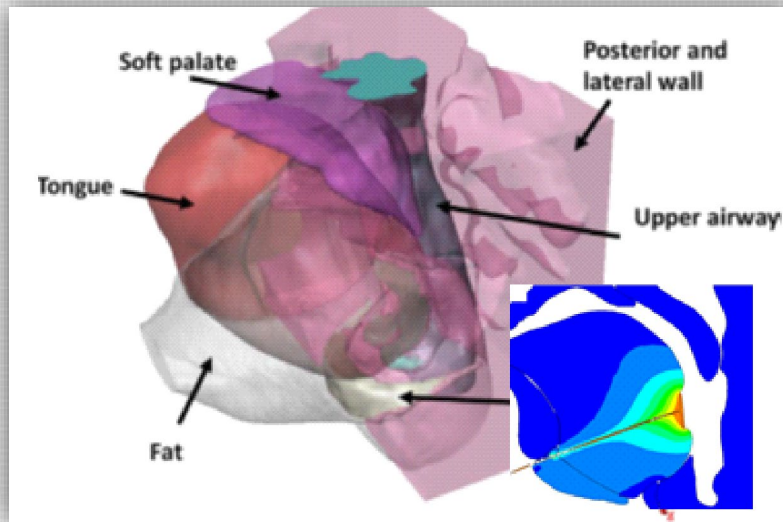
3D geometric model developed from patient's CT scan

Fit-Click assembly prototype with constant force spring

Dr. Woosoon Yim
Professor, Department of Mechanical Engineering
Director, Intelligent Structures and Control Laboratory

Experimental validation setup
for the Fit-Click device

Relevant Publications

- Yang Liu, Jennifer Mitchell, Yitung Chen, <u>Woosoon Yim</u>, Wenxiao Chu, and Robert Wang, "Study of the upper airway of obstructive sleep apnea patient using fluid structure interaction," *Respiratory Physiology & Neurobiology*, 249, (2018), pp. 54-61

- Y. Liu, J. Mitchell, <u>W. Yim</u>, Y. Chena, R. Wang, M. Trabia, "Frequency dependent viscoelastic properties of porcine upper airway," 7th World Congress of Biomechanics, Boston, Massachusetts, July 2014.

- S. J. Kim, D. Pugal, J. Wong, K. J. Kim, <u>W. Yim</u>, "A bio-inspired multi degree of freedom actuator based on a novel cylindrical ionic polymer-metal composite material," *Robotics and Automation Systems* (in print, 2013).

- J.S. Lee, <u>W. Yim</u>, C. Bae, and K.J. Kim, "Wireless actuation and control of ionic polymer-metal composite actuator using a microwave link," *International Journal of Smart and Nano Materials*, DOI:10.1080/19475411.2012.670141 (in print, 2012).
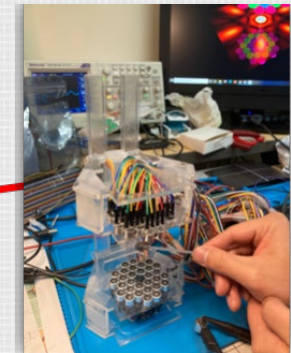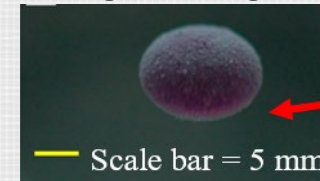
Dr. Shengjie (Patrick) Zhai

Assistant Professor, Department of Electrical and Computer Engineering

Phone: (702) 774-1409

Email: shengjie.zhai@unlv.edu

- Expertise
  - Novel nanomaterials and patterning techniques for bioelectronics, optoelectronics, and photovoltaics.
  - Plasmonic-enhanced biosensors for single-molecule biomedical analysis
  - Micro/Nanoelectromechanical systems (MEMS/NEMS)
  - Physiological organ biomimetic system built on a microfluidic chip
  - Multi external driven forces to drive living cells assembly for scaffold-free engineering human tissue models
  - Artificial intelligence-assisted health assessment

Scale bar = 5 mm

Acoustic Levitated gravity-free Bio-reactor and control software
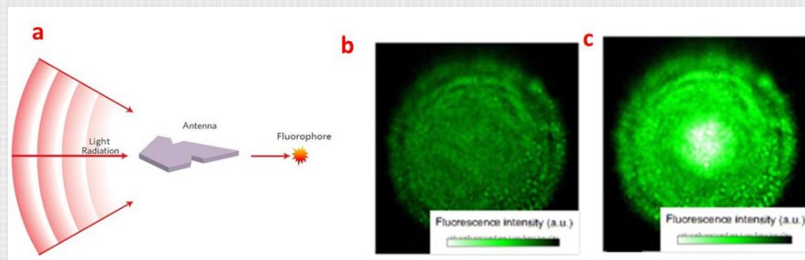
The fluorescence image on a) a smooth silicon substrate and b) & c) the substrate assembled from nanoparticles.

Dr. Shengjie (Patrick) Zhai

Assistant Professor, Department of Electrical and Computer Engineering

Recent Projects

- Sonic-Powered Microgravity Assisted Tissue Chip Models for the Effects and Countermeasures of Space Radiation on Human T-cell Distribution and Functions.
- An Artificial Intelligence assisted electronic sports (Esports) medicine and performance assessment system for optimizing Healthy body, healthy mind and high performance.
- The Integration of Plasmonic Nanoantenna and Super-hydrophobic Surface for Ultrasensitive Fluorescence Immunoassay.
- Bioinspired Nanomanufacturing of Graphene-embedded Superhydrophobic Surfaces with Mechanical and Chemical Robustness
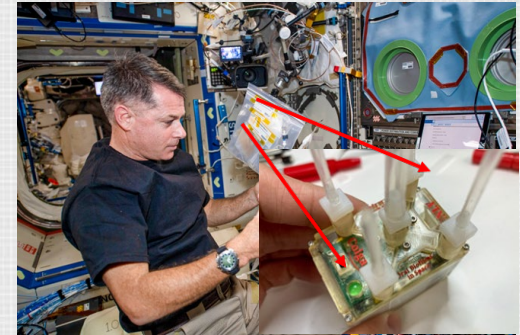
Oral Biofilms in Space (OBiS) A Novel Microfluidic Device for Biological Studies on the International Space Station

Recent Publications

- Ming Zhu, Sijia Li, Yu Kuang, Virginia B Hill, Amy B Heimberger, and <u>Shengjie Zhai</u>. "Application of Artificial Intelligence in Radiomic Diagnosis of Brain Tumors: Review, Taxonomy and Future Perspective", *Frontiers in Immunology* (2022)
- Ashley Lamb, Fengjie He, <u>Shengjie Zhai</u>, and Hui Zhao. "Silk Fibroin Supraparticles Created by The Evaporation of Colloidal Ouzo Droplets", *AIP Advances* (2021) (Featured article, Editor picked)
- Jian Ni, Ming Zhu, Yu Kuang, Yingtao Jiang, and <u>Shengjie Zhai</u>. "Multi-class Cardiovascular Disease Detection and Classification from 12-Lead ECG Signals Using an Inception Residual Network", *IEEE COMPSAC* (2020)
- <u>Shengjie Zhai</u>, and Hui Zhao, "Silica-Coated Metallic Nanoparticle-Based Hierarchical Super-Hydrophobic Surfaces Fabricated by Spin-Coating and Inverse Nanotransfer Printing", *Applied Physics Letters* (2019)
- <u>Shengjie Zhai</u>, Yihong Zhao and Hui Zhao. "High-Efficiency Omnidirectional Broadband Light-Management Coating Using the Hierarchical Ordered-Disordered Nanostructures with Ultra-Mechanochemical Resistance", *ACS applied materials & interfaces* (2019)
- Corey Malinowski, Fengjie He, <u>Shengjie Zhai</u> and Hui Zhao. "Nanopatterned Silk Fibroin Films with High Transparency and High Haze For Optical Applications", *RSC advances* (2019)
- Fengjie He, Huilong Liu, Xingliang Xiong and <u>Shengjie Zhai</u>. "Nematic Liquid Crystal Reorientation at Aqueous-LC Interface For Monitoring Biochemical Interactions by Specific Ions Effects", *Journal of Advanced Optics and Photonics* (2018)

Dr. Hui Zhao

Professor, Department of Mechanical Engineering

Phone: (702) 895-1463

Email: hui.zhao@unlv.edu

- Expertise
  - Fundamentals of micro- and nano-fluidics
  - Electrokinetic transport
  - Properties of nanoparticles and biomolecules
  - Development of techniques using electric fields to sort, separate, and immobilize cells and biomolecules
  - Biomaterials
  - Lab-on-a-chip devices for automatic, fast detection and diagnostics
  - Biosensing

X190 100μm

A microfluidic system designed for biofilm investigation in space (top left); Silk fibroin porous particles created by the Ouzo effect.

Dr. Hui Zhao
Professor, Department of Mechanical Engineering
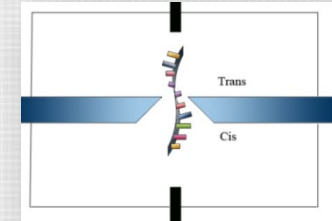
Recent Publications

- K Yin, X Ding, Z Xu, Z Li, X Wang, <u>H Zhao</u>, C Otis, B Li, C Liu, 2021 "Multiplexed colorimetric detection of SARS-CoV-2 and other pathogens in wastewater on a 3D printed integrated microfluidic chip." *Sensors and Actuators B: Chemical* 344, 130242.
- Ruiz, C., Kadimisetty, K., Yin, K., Mauk, M. G., <u>Zhao, H.,</u> Liu, C., 2020, "Fabrication of Hard–Soft Microfluidic Devices Using Hybrid 3D Printing", *Micromachine*, 11: 567.
- Yin, K., Ding, X., Li, Z., <u>Zhao, H</u>., Cooper, K., and Liu, C., 2020, "Dynamic aqueous multiphase reaction system for one-pot CRISPR-Cas12a based ultrasensitive and quantitative molecule diagnosis," *Analytical Chemistry*, 92: 8561-8568.
- Alidoosti, E. and <u>Zhao, H</u>., 2019, "The effects of electrostatic correlations on the ionic current rectification in conical nanopores", *Electrophoresis*, 40: 2665-2661.
- Zhai, S., and <u>Zhao, H</u>., 2019, "Silica-coated metallic nanoparticle-based hierarchical super-hydrophobic surfaces fabricated by spin-coating and inverse nanotransfer printing", *Applied Physics Letters*, 114: 233702.
- Zhai, S. and <u>Zhao, H</u>., 2016, "Enhancement of Sensitivity of the Solution-Phase Localized Surface Plasmon by a Nanostructured substrate", *MRS Advances*, 1: 2059-2064.
- Zhai, S. and <u>Zhao, H</u>., 2016, "Influence of concentration polarization on DNA translocation through a nanopore", *Physical Review E*, 93: 052409.
- Zhai, S., Jiang, Y., <u>Zhao, H</u>., and Das, B. J., 2014, "Direct writing of metallic nanoparticle concentric multi-ring structures by template-directed convective self-assembly processes", *Advanced Optical Materials*, 2: 632-635.