

Ahmad Rehan Shaikh

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EDUCATION

University of California, San Diego

Masters of Science in Bioengineering

La Jolla, USA

Aug. 2023 – Sept 2025 (expected)

GPA- 3.88/4.0

B M S College of Engineering

Bachelor of Engineering in Mechanical Engineering

Rank- 1 (Gold Medalist)

Bangalore, India

Sep. 2017 – Aug. 2021

CGPA- 9.38/10.0

EXPERIENCE

Graduate Student Researcher

DVJ Lab, UCSD

PI: Daniela Valdez-Jasso

Dec. 2023 – Present

La Jolla, USA

- Formulated non-dimensional lumped models of the pulmonary vasculature in pulmonary arterial hypertension-induced rats to identify temporal disease progression metrics and pathogenesis indicators
- Created patient-specific 3D bi-ventricle finite element models using diffusion MRI images to analyse the spatial distribution of stresses over a cardiac cycle at disease progressive stages
- Trained in the operation of a 7T Bruker MRI system and performed cardiac MRI on rats for temporal finite element studies using Fenics and Febio
- Assisted in surgeries involving the invasive cardiovascular measurements of blood pressure, flow and ventricle volume in rats. Used LabView to gather data, Matlab, and Graphpad Prism for analysis and visualization

Teaching Assistant

Center for Global Sustainable Development, UCSD

Sept. 2023 – Present

La Jolla, USA

- Taught students engaged with not-for-profit organisations engineering social innovation and sustainable development, for five consecutive quarters under the Global Ties initiative
- Conducted poster sessions and program outreach, coordinated between seven courses within the department
- Organized UCSDs first inclusion to 'Invent for the Plant', a globally coordinated design challenge

Project Associate

The M2D2 Lab, Indian Institute of Science

PI: G K Ananthasuresh

Aug. 2021 – Aug. 2023

Bangalore, India

- **Musculoskeletal Biomechanics of the Foot**
 - Created a 3D parameterised model of the foot for rapid patient-specific model creation to computationally analyze disease progression in diabetic neuropathy
 - Performed FE simulations using Abaqus to replicate patient-specific Plantar Pressure during gait
 - Developed a computational framework to model and verify a novel compliant-mechanism-based footwear solution to diabetic neuropathy
 - Applied to, presented, and won the Biotechnology Ignition Grant, a central government fund for the translation of healthcare research to industry
- **Deployment System for Transcatheter Aortic Valve Replacement**
 - Designed a compliant-mechanism based stent holder for the deployment of a transcatheter aortic stent
 - Performed finite element simulations to assess function
 - Fabricated the components using SLA and DLM 3D printing
 - Developed an experimentation setup to assess performance
 - Collaborated with Sahajanand Medical Technologies for rapid in-field translation
- **Simulation of Twisted and Coiled Polymer Actuators**
 - Developed a computational methodology to predict the behaviour of a Twisted and Coiled Polymer Actuator under thermal actuation
 - Performed a sensitivity study to understand and develop a theory on the physics of twisted polymers
 - Collaborated with the Toyota Research Institute of North America
- **Numerical Model of Disc Spring Isolators**
 - Created a computational model to understand the quasi-static and dynamic behaviour of a series of non-linear quasi-zero stiffness disc springs using Abaqus
 - Developed a semi-analytical model of the disc-spring vibration isolator
 - Collaborated with the Toyota Research Institute of North America

- **Open-Shell Compliant Hinge Mechanism**

- Developed a parametric formulation for the study of a ‘twist and bend’ open-shell compliant hinge
- Initiated a gradient-descent-based shape optimization of the open-shell to obtain a desired torque v/s rotation profile using Python, Abaqus and SALOME
- Aided in the development and manufacturing of a sit-to-stand chair for geriatric care that employed the open-shell compliant hinge

- Assisted in projects based on topology optimisation of heat exchangers and the mechanobiology of cell growth

Product Design and Digital Manufacturing Intern

Jun. 2019 – Jul. 2019

Workbench Projects Pvt Ltd.

Bangalore, India

- Provided consultancy on product design primarily related to additive manufacturing
- Operated the digital fabrication zone including FDM 3D printing and CO2 laser cutting and assisted in three wood-working projects
- Familiarized with basic robotics and control tools used for motor control and heat sensing

PUBLICATIONS AND PATENTS

Temporal trends of lumped hemodynamic parameters in a rat model of pulmonary arterial hypertension

- Ahmad R. Shaikh and Daniela Valdez-Jasso
2025 ASME SB3C Summer Bioengineering Conference (2025)

Dynamic Offloading and Selective Redistribution of Plantar Pressure Using Connected Shallow Arches

- Priyabrata Maharana, Ahmad Shaikh and G K Ananthasuresh
ASME 2023 International Design Engineering Technical Conferences (2023)

A Customizable and Responsive Mechanism for a Chair to Assist During All Phases of Stand-to-Sit and Sit-to-Stand Maneuvers

- Sanchit Jhunjhunwala, Manoj Kumar R, Chandrashekhara KL, Sanjay Patil, Kiran J, Ahmad Shaikh and G K Ananthasuresh
ASME 2023 International Design Engineering Technical Conferences (2023)

Patent | **Dynamic Pressure Offloading Insoles**

- Priyabrata Maharana, Jyoti Shivaji Sonawane, Ahmad Rehan Shaikh, Chinmayee Prasad Curpod, Nikhil Murlidhar, Gondi Kondaiah Ananthasuresh and Pavan Belehalli
Intellectual Property India, Patent Number: 485580, Publication Number: 21/2023, (2023)

Effect of coating on the continuous cycle actuation of shape memory alloy wires: analyses and experiments

- Ahmad Shaikh, Shardul Panwar, Ryohei Tsuruta and Umesh Gandhi
ASME 2022 Conference on Smart Materials, Adaptive Structures and Intelligent Systems(2022)

A quasi-longitudinal study of the effect of hemodynamical parameters on the biomechanics of rupture in Abdominal Aortic Aneurysms

- Samarth S Bhatt, Amritanshu Dixit, Ahmad Rehan Shaikh, Rangavittal HK and Tejas Canchi
Proceedings for Eighth International Conference on Theoretical, Applied, Computational and Experimental Mechanics (2021)

A Novel Spatially Varying Heterogeneous Material Model to Accurately Characterize Arterial Wall Properties in Abdominal Aortic Aneurysms

- Ahmad Rehan Shaikh, Amritanshu Dixit, Samarth S Bhatt, Rangavittal HK and Tejas Canchi
Proceedings for the Fifth Australasian Conference on Computational Mechanics (2020) 260-262

SKILLS AND RELEVANT COURSEWORK

Soft Skills: Oration, Academic Writing, Hands-on, Critical Thinking, Teamwork, Dedicated

Languages: English (fluent), Hindi (conversational), Urdu (conversational), Kannada (conversational)

Relevant Coursework: Patient Centered Clinical Medicine, Cardiovascular Physiology, Cardiovascular Fluid Mechanics, Continuum Mechanics Applied to Medicine and Biology, Engineering Drawing, Non-Destructive Testing, Theory of Elasticity and Plasticity

Modelling and Simulation: Solidworks(CSWA), Fusion360, SALOME, Abaqus, FeBio, COMSOL, Fenics

Programming and Scripting Languages: MATLAB, Python3 (Abaqus and SALOME API), C++, \LaTeX , Git

Medical Imaging and Analyses: Slicer 3D, ImageJ, LabView, Graphpad Prism, MRtrix3

Miscellaneous Tools: Mendeley, OBS Studio, Inkscape, JMP, Microsoft Office (Word, Excel, Powerpoint)

PROJECTS

- Undergraduate Thesis | **A quasi longitudinal study of the effect of morphological parameters on the biomechanics of rupture in Abdominal Aortic Aneurysms** Nov. 2020 - Aug. 2021
- Modeled and simulated fully developed, idealized abdominal aortic aneurysms to identify relationships between rupture parameters
 - Developed a novel spatially varying material model to characterise arterial wall properties using FeBio
 - Performed a CFD study with four hemodynamic parameters using ANSYS CFX to ascertain the cause of premature rupture of small aneurysms
- Autonomous Ground Vehicle Simulation in ROS** Jul. 2020 - Sep. 2021
- Simulated autonomous navigation and mapping with obstacle avoidance of a vehicle using ROS within the Gazebo environment
 - Additionally implemented a 5 DOF universal arm for pick and place functionality of the vehicle
- Electro-Thermal-Elastic Simulation Code for Thermal Micro-Actuators** Jul. 2020 - Aug. 2021
- Developed a 2D-beam finite element code in MATLAB (and translated to Python3) to simulate joule heating and thermal expansion of microactuators
 - Implemented the SPICE algorithm for Electrical analysis, 1-Dimensional FEM for Thermal analysis and 2-Dimensional Beam FEM for Elastic analysis
 - Achieved an error of under 1% compared to commercial simulation software

LEADERSHIP EXPERIENCE

- Principal Member, Muslim Graduate Student Association, UCSD Aug. 2024 - Present
- Course Instructor, Psychology 101, BMSCE IEEE (taught a class of 30) Jan. 2019 - Apr. 2019
- Joint Secretary, BMSCE IEEE Student Branch (2 terms) Feb. 2018 - Feb. 2020
- Lead Coordinator, BMSCE Model UN Society Jun. 2018 - Jun. 2019

CERTIFICATIONS

- Micro MBA, Rady School of Business, UCSD Aug. 2024
- BioMEMS and Microfluidics, IIT Kanpur, NPTEL Dec. 2020
- Foundation Course on MEMS Design, Institute of Smart Structures and Systems Jul. 2020
- Matrix Algebra for Engineers, The Hong Kong University of Science and Technology, Coursera Jun. 2020
- Dynamic Behaviour of Materials, IIT Guwahati, NPTEL Dec. 2019

AWARDS

- 2nd place, Best Undergraduate Thesis 2020-21, Department of Mechanical Engineering, BMSCE Jun. 2021
- Certificate of Merit, Highest Academic Performance 2019-20 (2 semesters), Department of Mechanical Engineering, BMSCE Jun. 2020
- 1st place, Pitch Perfect- A Technical Pitch Competition, Phase Shift 2019 - A National Level Annual Tech Symposium Sep. 2019
- Best Annual Report of The Year 2018, IEEE Bangalore Section Branch Counselors Meet Feb. 2019
- Nation-Wide Rank of 40 of 1470 In Mechanical Engineering, National Engineering Olympiad 3.0 Sep. 2020
- Mrs. Lynette Lobo Award for the Highest Marks In Economics of the Batch of 2014-15 May. 2015

EXTRA-CURRICULAR ACTIVITIES

- Model United Nations: Member of the Executive Board- 4, Awards- 4, Participation- 5 2014 - 2021
- Debates: Moderator- 3, Semifinalist Adjudicator Award- 1, Participant- 4 2018 - 2020
- General Thimayya National Academy of Adventure Certified-Rock climbing (10 day camp), Water Sports (7 day camp) 2018 - 2019