

# Nazanin Minaian

## Graduate Research Assistant

Dedicated **Research Assistant** with a strong background in smart materials. Skilled in experimental design, data analysis, and literature reviews. Detail-oriented and committed to research integrity. Collaborative team player with excellent communication and organizational skills. Seeking to make a meaningful impact in mechanical engineering research.

### Work History

#### 2018-06 - **Graduate Research Assistant**

**Current**  
University of Nevada, Las Vegas  
Las Vegas, Nevada

##### **Active Materials and Smart Living (AMSL) Laboratory**

PI: Professor Kwang Jin Kim ([www.kwangjinkim.org](http://www.kwangjinkim.org))

- Conducted research on electroactive polymers (EAPs), focusing on ionic polymer-metal composites (IPMCs) and polymer gels.
- Designed and conducted experiments on underwater applications of soft and flexible EAP fluid flow sensors.
- Fabricated EAP materials in a wet laboratory environment.
- Developed physics-based models using COMSOL software for fluid-structure interaction (FSI) studies, and vortex shedding (in-lab apparatus environment simulation).
- Lead on Particle Imaging Velocimetry (PIV) equipment setup and operation.
- Wrote standard operating procedures (SOP) and implemented safety protocols for Class 4 laser usage.
- Designed and manufactured experimental testing platforms utilizing additive manufacturing and laser cutting for rapid prototyping.
- Modeled sea mammal internal structures within Simpleware ScanIP via DICOM images for educational training and underwater platform usage.
- Gathered, reviewed, and summarized literature from scientific journals.
- Communicated directly with multiple vendors for acquiring and configuring substantial equipment related to the experimental setup.

#### 2019-06 - **Visiting Research Assistant**

**2019-07**  
Korea Institute of Science and Technology (KIST),  
Seoul, South Korea

##### **Soft Mechatronics (SM) & Robotics Laboratory**

PI: Professor Youngsu Cha ([Website](#))

- Collaborated with a multinational team in South Korea researching soft robotics and artificial muscles at the Korea Advanced Institute of Science and Technology (NSF Grant #1545857).
- Fabricated and modeled a piezoelectric energy harvesting ring-type transducer comprised of a PVDF film supported by a PDMS substrate.

### Contact



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[www.linkedin.com/in/nazanin-minaian](http://www.linkedin.com/in/nazanin-minaian)



**Website**  
<https://minaian.com/>

### Skills

- Coding
- Solid Modeling
- Finite Element Analysis
- Additive Manufacturing / 3D Printing
- Imaging and Image Processing
- Particle Imaging Velocimetry (PIV)
- Technical Writing (Project Reports, Editing, SOPs, Proposals, White Papers, Conference Presentations, Academic Publications)
- Materials Analyses (SEM, DMA, FTIR, Microscopy)
- Laboratory Equipment Operations

### Software

- SOLIDWORKS
- Python
- Jupyter
- OpenCV
- MATLAB
- Wolfram Mathematica
- Simpleware ScanIP
- COMSOL Multiphysics
- Adobe Creative Suite
- OriginLab
- LabVIEW
- TSI INSIGHT 4G/V3V
- Tecplot

### Interests

Art (Painting, Sketching, Digital Art), DIY (Crafts, Home Repair, Decor), Video Games, Twitch

- Designed and assembled a testing apparatus for the energy harvester ring, along with a finger-bending model using additive manufacturing and laser cutting.
- Coauthor of Best Poster in the 4th International Conference on Active Materials and Soft Mechatronics (AMSM).

Streaming, Tabletop Games, and other general nerd things (recently getting into Warhammer 40K miniature painting!)

## Education

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**2018-06 - Current**    **Ph.D. Mechanical Engineering**  
*University of Nevada, Las Vegas*  
**GPA 3.98**

### Award Recipient

- Marjorie & Victor Kunkel (2020-2021) Scholarship
- Nevada Space Grant Consortium (2020-2021) Fellowship
- College of Engineering Computer Science / Engineering Research (2020) Fellowship

### Relevant Coursework

Advanced Thermodynamics, Introduction to Fuel Cell, Transport Phenomena in Bioengineering, Finite Element Applications in Mechanical Engineering, Advanced Topics: Small Systems, Special Topics: Imaging and Image Processing, Mathematical Physics I, Observational Astronomy Techniques, Computational Fluid Dynamics, Advanced Fluid Mechanics I, Advanced Fluid Mechanics II, Aerodynamics

**2015-08 - 2018-05**    **BSE. Mechanical Engineering**  
*University of Nevada, Las Vegas*  
*Minor in Technology Commercialization*  
**GPA 3.91, magna cum laude graduate**

### Award Recipient

- Atkins Global Interdisciplinary Award (Spring 2018)
- Member of TBP Engineering Honor Society

## Engineering Projects

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### Koshee Innovation Research - Searching for an Effective Filler Material used in Barrier Coatings

- Current lead on this project. Preliminary research and proposal on anti-fouling methods for proprietary company pool coating materials was presented at a symposium by local startup company, Koshee
- Was selected as the top pick for funding from a group of graduate-level researchers at UNLV. Currently working with Koshee to further improve thermal and anti-fouling characteristics of proprietary pool coating material.

### DICOM-based Models and 3D Printing Collaboration with the National Marine Mammal Foundation (NMMF)

- Utilizing acquired DICOM images to create CAD models designed to be additively manufactured (utilizing various software suites such as Simpleware ScanIP and Autodesk ReMake).
- This project is an ongoing effort in gaining insight into new working mechanisms that will aid in underwater vehicle or platform design – largely inspired by biological components.

- Currently the lead on this project and working with the National Marine Mammal Foundation to create a scalable Sea Lion pelvis model that can be used for training volunteers on blood extraction.
- Mentoring two undergraduate students as a technical advisor who are utilizing this method for their university capstone project.

#### **Field Deployable Modular 3D Printer for Sports Equipment (Patent Pending)**

- Was added to this novel patent pending project as a result of improving the proposal scope and conceptualization through market analysis of the current Sports Equipment Manufacturing Industry (SEMI).
- Tasks include training and advising undergraduate researchers on this project on additive manufacturing, writing project reports, presentations, and general lab manufacturing supervision. Additionally wrote talking points for podcast promotion.

#### **AMSL Fluid-Structure Interaction (FSI) Laboratory Facility**

- Lead on managing the fluid dynamics division of the Active Materials and Smart Living (AMSL) lab within UNLV.
- Tasks include procurement of equipment and negotiating with the university regarding competitive exemption of equipment purchasing.
- Equipment includes but not limited to a Loligo® Systems Swim Tunnel (185L), TSI V3V Particle Imaging Velocimetry (PIV) System, and a three-phase VFD which required additional electrical setup per university building requirements.
- Responsible for decisions on equipment location, operation, and was lead on installation.
- A standard operating procedure (SOP) was written and approved along with extensive safety considerations and training plans as required from the building where the lab resides.
- A safety enclosure was also designed and fabricated to meet safety guidelines.

#### **Computer Vision-based Fluid-Structure Interaction Tracking Software**

- Developed a user interactive notebook within Wolfram Mathematica that can track object deflection, travel velocity, and particle tracking of acquired videography related to IPMC underwater sensor data.

#### **MEMS-based Flow Meter Using an Ionic Polymer-Metal Composite Sensor**

- Designed a small-scale vortex flow meter with an interior diameter of 10 mm and implemented a 5 mm rectangular IPMC sensor to detect the frequency of vortices shedding from a bluff body.
- SLA printed and wired fully functional prototype.
- Performed COMSOL fluid-structure analysis to verify acquired experimental data.

#### **Spiral Shape Energy Harvester with Silicone Finger Bending Model Using PVDF**

- Assisted a South Korean colleague as a visiting research assistant at the Korean Institute of Science and Technology (KIST).

- Project involved the conceptualization and fabrication of a PVDF energy harvesting ring that utilized spiral geometry for increased transduction capabilities.
- Testing of the prototypical samples involved designing and assembling a testing apparatus with an Ecoflex-based finger model that simulated a single finger joint.
- This project resulted in achieving the Best Paper Award at the 4th International Conference on Active Materials and Soft Mechatronics (AMSM) 2019.

#### **Design of Fuel Cell Powered UNLV Engineering Building**

- Collaborative project where, within MATLAB, a diffusion flux model using solid oxide fuel cells (SOFC) was developed to theoretically power the Science and Engineering Building (SEB) of UNLV.
- The designed system was comprised of a 6.4 MW dual inverter and performed at 40% efficiency at the maximum load and 48% efficiency at the typical operational load of the building (2.6 MW).

#### **Undergraduate Capstone Project: Laminar Flow Faucet-less Smart Sink**

- Conceptualized and fabricated a novel faucet-less sink with multiple radially placed laminar nozzles within the sink basin to provide unobstructed hand and face washing capabilities.
- Focus on CAD modeling, fluid dynamic analysis, material selection, fabrication, marketing, and dissemination of results.
- Awarded 1st Place Interdisciplinary Engineering Design Award 2018.

#### **Publications/Presentations**

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**Google Scholar:** <https://scholar.google.com/citations?hl=en&user=jHSonusAAAAJ>

**2018-06 - Google Scholar:** [https://](https://scholar.google.com/citations?hl=en&user=jHSonusAAAAJ)

**Current** [scholar.google.com/citations?hl=en&user=jHSonusAAAAJ](https://scholar.google.com/citations?hl=en&user=jHSonusAAAAJ)

- **Minaian, N.**, Neubauer, J., Kim, K. J., 2023, "Flexible Electroactive Polymer Gel-based Artificial Skin: Flow Sensing and Visualization," Proc. SPIE 12482, Electroactive Polymer Actuators and Devices (EAPAD) XXV
- **Minaian, N.**, Olsen, Z.J., Kim, K. J., 2022, "An IPMC Open-Circuit Sensing Model with the Addition of Fluid-Structure Interaction (FSI)," Proc. SPIE 12042, Electroactive Polymer Actuators and Devices (EAPAD) XXIV
- **Minaian, N.**, Kim, K. J., 2021 "Continuing the investigation of the sensing response of ionic polymer-metal composites: effects of geometry and orientation," SPIE Smart Structures Conference/SPIE, Online Conference, #SSN02-13, March 2021
- **Minaian, N.**, Olsen, Z. J., Kim, K. J., 2020, "Ionic Polymer-Metal Composite (IPMC) Artificial Muscles in Underwater Environments: Applications in Soft-robotic Sensing, Actuation, and Controls" Bioinspired Sensing, Actuation, and Control in Underwater Soft Robotic Systems, Springer
- Kim, Y., **Minaian, N.**, Kim, K. J., Cha, Y., 2019, "Spiral shape energy harvester with silicone finger bending model using PVDF," AMSM ThPS-105, P00099
- **Minaian, N.**, Stalbaum, T., Kim, K. J., 2019, "A feasibility study in the use of ionic polymer-metal composites in

rectangular cantilever form as flow sensor devices," Proc. SPIE 10966, Electroactive Polymer Actuators and Devices (EAPAD) XXI

- Shen, Q., Stalbaum, T., **Minaian, N.**, Oh, I.K. and Kim, K.J., 2018. "A robotic multiple-shape-memory ionic polymer-metal composite (IPMC) actuator: modeling approach". Smart Materials and Structures, 28(1), p.015009.