

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

- 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).

## 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>

- **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.