**Soha Niroumandijahromi**

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| University of Southern California Viterbi School of Engineering |  | Office: | Michelson Center for Convergent Bioscience,  1002 Childs Way,  Los Angeles, 90089, CA |
|  |  | e-mail: | snirouma@usc.edu |
|  |  |  | [Google Scholar](https://scholar.google.com/citations?user=vkmBf1YAAAAJ&hl=en&oi=ao) |

EDUCATION

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| 2021 – Present | **University of Southern California**, Los Angeles, CA |
|  | Ph.D. Student, Department of Mechanical Engineering |
|  | Advisor: Prof. Niema Pahlevan |
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| 2021 – 2023 | **University of Southern California**, Los Angeles, CA |
|  | M.S., Department of Mechanical Engineering |
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| 2016 – 2019 | **University of Tehran**, Tehran, Iran |
|  | M.S., Department of Aerospace and Mechanical Engineering |
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| 2011 – 2016 | **Yazd University**, Yazd, Iran |
|  | B.S., Department of Mechanical Engineering |

RESEARCH INTERESTS

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| Biofluid Mechanics, Data Science in Healthcare, Physics-informed Machine Learning, Non-invasive Methods in Cardiovascular Disease, Cardiovascular Biomechanics, Rheology, Soft matter, Spectral Numerical Methods, Scientific Computing |

ACADEMIC AND PROFESSIONAL EXPERIENCE

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| 2021 – Present | PhD student |
|  | Department of Mechanical Engineering,  University of Southern California, Los Angeles, CA |

AWARDS AND ACHIEVEMENTS

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| 2024 | **American Heart Association Predoctoral Fellowship Award** |
| 2023 | **American Heart Association Travel Grant Award (Basic Cardiovascular Sciences Council)** |

JOURNAL PUBLICATIONS

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| **9. Niroumandi S**, Alavi R, Wolfson AM, Vaidya AS, Pahlevan NM. Assessment of aortic characteristic impedance and arterial compliance from non-invasive carotid pressure waveform in the Framingham heart study. *The American Journal of Cardiology*. 2023 Oct 1;204:195-9. |
| **8.** Alavi R, Aghilinejad A, Wei H, **Niroumandi S**, Wieman S, Pahlevan NM. A coupled atrioventricular-aortic setup for in-vitro hemodynamic study of the systemic circulation: Design, fabrication, and physiological relevancy. *PLOS ONE*. 2022 Nov 4;17(11):e0267765. |
| **7.** Shojaeifard M, **Niroumandi S**, Baghani M. Swelling of pH-sensitive hydrogel pressure vessel under altered-pH coupled with inflation, extension, and torsion. *Meccanica*. 2022 Jun;57(6):1391-411. |
| **6.** Shojaeifard M, **Niroumandi S**, Baghani M. Programmable self-folding of trilayer and bilayer-hinge structures by time-dependent swelling of tough hydrogels. *Journal of Intelligent Material Systems and Structures.* 2022 Sep;33(16):2106-20. |
| **5.** Shojaeifard M, **Niroumandi S**, Baghani M. pH-Responsive Hydrogel Bilayer with Reversible, Bidirectional Bending Behavior. *Frontiers in Materials*. 2022 May 26;9:865652. |
| **4. Niroumandi S**, Shojaeifard M, Baghani M. On single and multiple pH-sensitive hydrogel micro-valves: a 3D transient fully coupled fluid–solid interaction study. *Transport in Porous Media*. 2022 Mar;142(1-2):295-316. |
| **3. Niroumandi S**, Shojaeifard M, Baghani M. PH-sensitive hydrogel-based valves: A transient fully-coupled fluid-solid interaction study. *Journal of Intelligent Material Systems and Structures*. 2022 Jan;33(1):196-209. |
| **2.** Shojaeifard M, **Niroumandi S**, Baghani M. Programming shape-shifting of flat bilayers composed of tough hydrogels under transient swelling. *Acta Mechanica*. 2022 Jan;233(1):213-32. |
| **1. Niroumandi S**, Shojaeifard M, Baghani M. Finite deformation of swollen pH-sensitive hydrogel cylinder under extension and torsion and its Poynting effect: analytical solution and numerical verification. *International Journal of Applied Mechanics*. 2021 Jul 20;13(06):2150071. |

PEER-REVIEWED CONFERENCE PROCEEDING PUBLICATIONS

**7.** Vaidya A, **Niroumandi S**, Mazandarani SP, Wolfson A, Pahlevan NM. Single Pressure Waveform Calculation of Total Arterial Compliance Predict Heart Failure Events in Framingham Heart Study. *Journal of the American College of Cardiology*. 2024 Apr 2;83(13):712-.

**6.** Vaidya A, **Niroumandi S**, Mazandarani SP, Wolfson A, Pahlevan NM. Left Ventricle Pulsatile Workload from A Single Pressure Waveform Using Physics-Based Machine Learning Approach and Cardiovascular Disease Events in The Framingham Heart Study. *Journal of the American College of Cardiology*. 2024 Apr 2;83(13):2451-.

**5.** Vaidya A, **Niroumandi S**, Mazandarani SP, Wolfson A, Pahlevan NM. Prognostic Value of Aortic Characteristic Impedance Calculated from A Single Carotid Waveform Using Hybrid Intrinsic Frequency-Machine Learning Approach. *Journal of the American College of Cardiology*. 2024 Apr 2;83(13):1988-.

**4.** Liu J, **Niroumandi S**, Petrasek D, Pahlevan NM. Non-Invasive Insulin Resistance Evaluation Using Carotid Pressure Waveforms in Framingham Heart Study. *Circulation*. 2023 Nov 6;148: A16533- A16533

**3.** **Niroumandi S**, Rinderknecht D, Bilgi C, Wolfson A, Vaidya A, King KS, Pahlevan NM. A Noninvasive Smartphone Assessment of Aortic Arch Pulse Wave Velocity and Total Arterial Compliance. *Circulation*. 2023 Nov 6;148:A18846-A18846.

**2.** **Niroumandi S**, Wolfson A, Vaidya A, Pahlevan NM. Abstract P367: Evaluation of Left Ventricular Pulsatile Workload in Heart Failure with Preserved Ejection Fraction Using a Single Pressure Waveform Form Framingham Heart Study. *Hypertension*. 2023 Sep;80: AP367- AP367.

**1.** **Niroumandijahromi S**, Vaidya A, Pahlevan NM. Hybrid Intrinsic Frequency Machine Learning Approach for Calculation of Total Arterial Compliance and Aortic Characteristic Impedance from A Single Carotid Waveform in Heart Failure With Preserved Ejection Fraction. *Hypertension*. 2022 Sep;79:A039- A039.

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| PATENTS |
| **1.** Alavi R, Amlani F, Gorji H, **Niroumandijahromi S**, Heng Wei H, and Pahlevan NM. (2024).  “Sequentially-Reduced Artificial Intelligence Based Systems And Methods For Cardiovascular Transfer Functions” (US-20230138773-A1).  [**https://ppubs.uspto.gov/dirsearch-public/print/downloadPdf/20240138773**](https://ppubs.uspto.gov/dirsearch-public/print/downloadPdf/20240138773) |

GRANTS

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| **1.** American Heart Association (AHA) predoctoral fellowship award  Period: 01/01/2024-12/31/2025  Amount: $67,388.00  Role: PI  Title: A Noninvasive Smartphone-based Approach for Assessment of Dementia Risk Predictors Using  Arterial Pressure Waveform |

CLINICAL TRIALS AND STUDIES

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| **A Noninvasive, inexpensive intervention for heart failure patients to reduce morbidity, hospitalizations, and improve quality of life.**  Location: University of Southern California,  Keck Medical School and Viterbi School of Engineering  Time Period: 2023-2027  Role: Co-Investigator  Principal Investigators: Ajay Vaidya, MD, Niema Pahlevan, PhD  Collaborating Investigator: Aaron Wolfson MD |

CONFERENCE PRESENTATIONS

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| **4.** **Niroumandi S**, Amlani F, Matthews R, Pahlevan N. The Influence of Left Ventricle and Aorta Interactions on the Coronary Blood Flow Using One-Dimensional Model of Hemodynamics and Wave Propagation in the Entire Circulatory System. Bulletin of the American Physical Society. 2023 Nov 19.  **3.** Alavi R, Aghilinejad A, Wei H, **Niroumandi S**, Wieman S, Pahlevan N. In-vitro coupled left atrioventricular-aortic hemodynamic simulator for systemic circulation. InAPS Division of Fluid Dynamics Meeting Abstracts 2021 (pp. E28-003).  **2.** **Niroumandi S**, Alavi R, Pahlevan N. A Machine Learning Methodology for estimation of vascular characteristics using a single carotid waveform. InAPS Division of Fluid Dynamics Meeting Abstracts 2021 (pp. H14-003).  **1. Niroumandi S**, Jafari A, Vakilipour S. 3-D simulation of pulsatile blood flow using a haemorheological model. In AERC 2019. | |
| MENTORING | | |
| **Christopher Lopez** | Summer Highschool Intensive in Next-Generation Engineering 2022, “Using Machine Learning to Predict Arterial Compliance”. | |
| **Jayden Solis** | Summer Highschool Intensive in Next-Generation Engineering 2022, “Artificial Organ Fabrication and Experiments”. | |
| **Vedika Kothari** | Summer Highschool Intensive in Next-Generation Engineering 2022, “Non-Invasive Prediction of Aortic Stiffness”. | |
| **Justine Ludden** | Summer Highschool Intensive in Next-Generation Engineering 2022, “Classification of CVD Patients using Machine Learning”. | |
| **Abigail Gugsa** | Summer Highschool Intensive in Next-Generation Engineering 2023, “Predicting Pulse Wave Velocity in Cardiovascular Disease Patients” | |
| **Melodie Ebrahimi** | Summer Highschool Intensive in Next-Generation Engineering 2023, “Correlations Between Heart Failure, Age, Arterial Compliance, and Other Biomarkers: Found Using Machine Learning Algorithms” | |
| **Nico Marazzi** | Summer Highschool Intensive in Next-Generation Engineering 2023, “Artificial Cardiovascular Organ Production” | |
| **Hyunwoo Lee** | Summer Highschool Intensive in Next-Generation Engineering 2023, “Using Machine Learning to Predict Cardiovascular Age” | |
| **Jessica Ferrie** | Summer Highschool Intensive in Next-Generation Engineering 2024, “Exploring the Circulatory System and Predicting Aortic Stiffness through Machine Learning Techniques”. | |
| **Sophia Choi** | Summer Highschool Intensive in Next-Generation Engineering 2024, “Investigation of the Circulatory System and Prediction of Cardiovascular Biomarkers Using Machine Learning”. | |
| **Dylan Thai** | Summer Highschool Intensive in Next-Generation Engineering 2024, “Investigation of Cardiovascular System Using A Mock Circulatory System”. | |
| **Janelle Hurtado** | Summer Highschool Intensive in Next-Generation Engineering 2024, “Predicting Arterial Stiffness through Circulatory System Analysis Using Machine Learning”. | |

ACADEMIC SERVICES

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| **NSF outreach Program Organizer** | coordinating 4 visits for Gardena Highschool students starting 2023 |