Soha Niroumandijahromi

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

EDUCATION

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

RESEARCH INTERESTS

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

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

AWARDS AND ACHIEVEMENTS

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

JOURNAL PUBLICATIONS

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.

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

GRANTS

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

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

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

1. Christopher Lopez	Summer Highschool Intensive in Next-Generation Engineering 2022, "Using Machine Learning to Predict Arterial Compliance".
2. Jayden Solis	Summer Highschool Intensive in Next-Generation Engineering 2022, "Artificial Organ Fabrication and Experiments".
3. Vedika Kothari	Summer Highschool Intensive in Next-Generation Engineering 2022, "Non-Invasive Prediction of Aortic Stiffness".
4. Justine Ludden	Summer Highschool Intensive in Next-Generation Engineering 2022, "Classification of CVD Patients using Machine Learning".
5. Abigail Gugsa	Summer Highschool Intensive in Next-Generation Engineering 2023, "Predicting Pulse Wave Velocity in Cardiovascular Disease Patients"
6. 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"
7. Nico Marazzi	Summer Highschool Intensive in Next-Generation Engineering 2023, "Artificial Cardiovascular Organ Production"
8. Hyunwoo Lee	Summer Highschool Intensive in Next-Generation Engineering 2023, "Using Machine Learning to Predict Cardiovascular Age"
9. Jessica Ferrie	Summer Highschool Intensive in Next-Generation Engineering 2024, "Exploring the Circulatory System and Predicting Aortic Stiffness through Machine Learning Techniques".
10. Sophia Choi	Summer Highschool Intensive in Next-Generation Engineering 2024, "Investigation of the Circulatory System and Prediction of Cardiovascular Biomarkers Using Machine Learning".

11. Dylan Thai	Summer Highschool Intensive in Next-Generation Engineering 2024, “Investigation of Cardiovascular System Using A Mock Circulatory System”.
12. Janelle Hurtado	Summer Highschool Intensive in Next-Generation Engineering 2024, “Predicting Arterial Stiffness through Circulatory System Analysis Using Machine Learning”.

ACADEMIC SERVICES

NSF outreach Program	4 visits for Gardena Highschool students starting 2023