Hossein Sharifi

Contact Information	University of Kentucky Department of Mechanical Engineering, Lexington, KY, 40506 Links: Personal Website, Google Scholar, Github, Linkedin	(859) 213-6972 Hossein.sharifi@uky.edu

Research Interests	Cardiac Biomechanics, Multiscale Modeling, Computational Mechanics, Finite Element Analysis, Machine Learning, Data-Driven Modeling

Education

University of Kentucky, Lexington, KY, USA

Ph.D., Mechanical Engineering — Expected May 2023

- Thesis Topic: *Multiscale Modeling of Cardiac Growth and Baroreflex Control*
- Advisors:
  1. Jonathan F. Wenk, Ph.D
  2. Kenneth S. Campbell, Ph.D
- GPA: 3.94/4.0

University of Kentucky, Lexington, KY, USA

M.S., Civil Engineering (majored in Structural Engineering) — May 2018

- Thesis Topic: *Finite Element Evaluation of 2-Cell RC Box Culverts*
- Advisor: Issam E. Harik, Ph.D
- GPA: 4.0/4.0

Shiraz University Shiraz, Iran

B.S., Civil and Environmental Engineering, — December 2014

Research and Experience

Dassault Systems — May 2022 - present

Living Heart Project (Industry Technical Solution Intern)

- ENRICHMENT *in silico* clinical trial
  - Created a semi-automated framework to execute hundreds of FE simulation of mitral valves (explicit FEM).
  - Conducted sensitivity analyses to study the influential parameters of a template model of secondary mitral valve.
  - Built a ML-based "Virtual Patient Engine (VPE)" to create a virtual patient cohort inspired by physics-based data.
  - Performed an *in silico* clinical trial by clipping a virtual cohort of patients with secondary mitral regurgitation.

University of Kentucky — August 2018 - present

Department of Mechanical Engineering (Research Assistant)

- Developed an implicit FEM of left ventricular mechanics using FEniCS solver. (MyoFE project)
  - Multiscale modeling of LV growth
  - Multiscale modeling of acute myocardial infarction
  - Multiscale modeling of baroreflex control of arterial pressure
- Developed PyCMLuti Python package for generating scientific plots.
- Contributed in developing of a single hemispherical model of left ventricle (PyMyoVent project).
- Acquired cardiac magnetic resonance imaging (DENSE, dark and bright blood) of mice using 7T Bruker MR scanner.
  - Strain analysis of mice heart using cardiac magnetic resonance feature tracking

University of Kentucky Jan 2017 - May 2018
Department of Civil and Environmental Engineering (Research Assistant)
- Finite Element Modeling of 2-cell reinforced concrete box culverts

Kentucky Transportation Center (Research Assistant)
- Load rating of reinforced concrete arch and box culverts

Shiraz University May 2015 - March 2016
Department of Civil and Environmental Engineering
- Experimental study on seismic behavior of retrofitted reinforced concrete beam-column joints by FRP sheets

Computer Skills

- Engineering software: Abaqus, FEniCS Project, ParaView, CANDE, STAAD Pro, SAP 2000, ETABS, SAFE, CSI Bridge, BRASS-CULVERT, Auto CAD, Microsoft Office, LATEX
- Programming languages: Python, JavaScript, HTML, MATLAB
- Python packages: NumPy, pandas, SciPy, scikit-learn, Keras, TensorFlow, MPI4PY, Matplotlib

Publications

- **Published**

1. **Sharifi H.**, Mann, C.K., Wenk J. F., Campbell K. S. *A multiscale model of the cardiovascular system that regulates arterial pressure via closed loop baroreflex control of chronotropism, cell-level contractility, and vascular tone*, Biomech Model Mechanobiol, (2022). https://doi.org/10.1007/s10237-022-01628-8
2. **Sharifi, H.**, Mann, C.K., Rockward, A.L. et al. *Multiscale simulations of left ventricular growth and remodeling*, Biophys Rev 13, 729–746 (2021). https://doi.org/10.1007/s12551-021-00826-5
3. **Sharifi H**., Mann, C.K., Noor, A.Z., et al. *Reproducibility of systolic strain in mice using cardiac magnetic resonance feature tracking*, Cardiovasc Eng Tech, (2022). https://doi.org/10.1007/s13239-022-00621-7
4. **Sharifi H**., Peiris A., Harik I. E., *Triage Method for Load Rating Bridge Size Two-Cell Reinforced Concrete Box Culverts for the AASHTO LRFD Design Load*, Structure and Infrastructure Engineering (2021). https://doi.org/10.1080/15732479.2021.2015793

Awards

1. Travel award for attending to **Cardiac Physiome Workshop**
   Source of funding: National Science Foundation (NSF)
   Amount: $750 April 2023
2. Departmental travel award for attending to **Cardiac Physiome Workshop**
   Source of funding: Department of Mechanical Engineering, University of Kentucky
   Amount: $900 April 2023
3. Departmental travel award for attending to **Summer Biomechanics, Bioengineering, and Biotransport Conference (SB3C)**
   Source of funding: Department of Mechanical Engineering, University of Kentucky
   Amount: $900 June 2022

Presentations

- **Podium presentations**
  1. Title: Multiscale modeling of cardiac growth in simulations of valvular disease-PhD project — Febuary 2023
     Conference: **The Living Heart Project webinar**, United States, (Virtual)
  2. Title: 2022 Living Heart Technology Update — December 2022
     Conference: **8th International Symposium on The Living Heart And Virtual Twin For Humans**, United States, Brooklyn, NY (Virtual)
  3. Title: Multiscale modeling of cardiac valve disease using cell-level signals to drive myocardial growth — June 2022
     Conference: **Summer Biomechanics, Bioengineering, and Biotransport Conference (SB3C)**, United States, Cambridge, MD
  4. Title: Multiscale modeling of LV growth under autonomic regulation of baroreflex feedback loop — July 2021
     Conference: **Modeling the Cardiac Function: Theory, Numerical Methods, Clinical Applications**, Italy (Virtual)
  5. Title: Multiscale modeling of LV growth under autonomic regulation of baroreflex feedback loop — June 2021
     Conference: **Summer Biomechanics, Bioengineering, and Biotransport Conference (SB3C)**, United States (Virtual)
- **Poster presentations**
  1. Title: Multiscale modeling of cardiac valve disease using cell-level signals to regulate concentric and eccentric myocardial growth — July 2022
     Conference: 9th World Congress of Biomechanics (WCB), Taiwan (Virtual)
  2. Title: Multiscale modeling of cardiac valve disease using cell-level signals to regulate concentric and eccentric myocardial growth — April 2022
     Conference: University of Kentucky Center for Clinical and Translational Science (CCTS)
  3. Title: Quantifying the Effects of Hypertrophic Cardiomyopathy (HCM) using MRI — July 2019
     Conference: University of Kentucky Gill Heart & Vascular Institute, Cardiovascular Research Day

Leadership and Teamworking

Dassault Systems (Living Heart Project team) — May 2022 - present
- ENRICHMENT of *in silico* clinical trials for treating patients with secondary mitral regurgitation

University of Kentucky — August 2018 - present
Department of Mechanical Engineering
- Cardiac magnetic resonance imaging of more than 500 mice using 7T MR scanner

University of Kentucky - Kentucky Transportation Center (KTC)
- Leading a group of undergraduate students in load rating of nearly 600 in-service reinforced concrete box culverts — Jan 2017 - December 2017
- Leading a group of visiting scholars in load rating of in-service reinforced concrete arch culverts using FEM — Jan 2018 - May 2018

Teaching Experience

Teaching Assistant
- ME 501 - Mechanical Design with Finite Element Methods — Fall 2019
  Instructor: Jonathan F. Wenk, Ph.D

Department of Mechanical Engineering,
University of Kentucky

- CE 584 - Design of Timber and Masonary Structures — Fall 2017
  Instructor: Hans Gesund, Ph.D
  Department of Civil and Environmental Engineering,
  University of Kentucky

Relevant Courses

University of Kentucky, Department of Civil Engineering

- Biostatistics - CPH 580 — Fall 2018
- Mechanics of Plastic Solids I - ME 603 — Spring 2019
- Matrix Theory & Numeric Linear Algebra I - MA 522 — Fall 2018
- Mechanics of Composite Materials - ME 506 — Fall 2017
- Foundation of Solid Mechanics - ME 641 — Fall 2017
- Introduction to Finite Element Analysis - CE 621 — Spring 2017
- Advanced Structural Analysis - CE 682 — Fall 2016

Coursera (Online Course)

- Introduction to Deep Learning & Neural Networks with Keras — Spring 2022
- Machine Learning with Python — Spring 2022
- Applied Plotting, Charting & Data Representation — Summer 2020
- Introduction to Data Science in Python — Summer 2020
- Introduction to Programming with MATLAB — Summer 2015

Certificates

- **Introduction to Computer Vision and Image Processing** — March 2022
- **Introduction to Deep Learning & Neural Networks with Keras** — Feb 2022
- **Machine Learning with Python** — Feb 2022
- **Applied Plotting, Charting & Data Representation** — July 2020
- **Introduction to Data Science in Python** — June 2020
- **Introduction to programming with MATLAB** — Sept 2015
- HSE Management System training course by TUV Rheinland — May 2014

Volunteer Activites

- Participating in large vaccination of the University of Kentucky's employees and students against delta variant of COVID-19. — Sep 2021

References

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University of Kentucky

Kenneth S. Campbell
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University of Kentucky