

GUY ELISHA

Curriculum Vitae

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EDUCATION

Northwestern University, Evanston, IL
Ph.D., Mechanical Engineering

Expected
June 2024

Focus Area: Computational Mechanics and Biological Fluid Dynamics

Research Topic: Biomechanics of organ physiology. Use mathematical models and stability analysis to provide formal, theory-based answers to solve clinical problems. Current work focuses on esophageal disorders and aortic aneurisms.

University of Oklahoma, Norman, OK
B.S., (Hons) Mechanical Engineering
Valedictorian, *summa cum laude*.

2014 - 2019

Focus Area: Structural dynamics and HVAC

University of Oxford, Study Abroad Program, Oxford, England

June-Aug
2016

A study abroad summer program at the University of Oxford with the University of Oklahoma's Honors College. Analyzed banned books in Great Britain by looking at their political influence and literary interpretation.

Red Cross Nordic United World College, Flekke, Norway

2012 - 2014

International educational program which aims to unite people, nations and cultures for peace and a sustainable future through education.

Academic Focus: Mathematics and Visual Art

RESEARCH AND DESIGN EXPERIENCES

Graduate Research Assistant

2019 -
present

Department of Mechanical Engineering, Northwestern University

- Collaborate with the Northwestern's Feinberg School of Medicine to advance knowledge and clarity on esophageal and aortic trends
- Esophagus Research
 - Processed large clinical data set and identified two major trends seen in healthy esophageal peristaltic activity
 - Reproduced clinical observations using simulations and revealed the underlying mechanism behind the two trends

- Advanced the study on peristaltic activity in tubular organs in an aim of creating a mechanics informed neural network analysis that is clinically relevant
- Aorta Research
 - Used an analytic mathematical approach to reveal a stability parameter can be used as a diagnostic biomarker to determine the future behavior of aortic aneurysms
- Uterus Research
 - Conducted a mathematical analysis which helps to better understand the relation between the uterus and the fallopian tubes
- Sphincters Research
 - Investigated and hypothesized a new perspective which help to unify and better understand human sphincters
 - Developed simulations and processed clinical data to validate the hypothesis

Undergraduate Research Assistant

Department of Aerospace and Mechanical Engineering, University of Oklahoma

2018 - 2019

- Developed methodology and algorithms to enhance the accuracy of a home thermal model, which will be implemented in software codes on a smart thermostat hardware platform
- Validated and improve a MATLAB code that examines the accuracy of the model
- Computed a standardized table that will serve future nationwide studies for minimizing HVAC expenses while maximizing indoor comfort

Undergraduate Research Assistant

Department of Civil Engineering and Environmental Science, University of Oklahoma

2017

- Detected the dynamic characteristics of a building during ground motion
- Examined a new methodology for the monitoring of dynamic characteristics of buildings using a MATLAB code
- Published two academic papers as a second author

Fluid Flow Analysis Over a Bicycle Fairing

Department of Aerospace and Mechanical Engineering, University of Oklahoma

2019

- Designed a fairing to improve the aerodynamic performance of a recumbent bicycle
- Analyzed the design and improved it using computational techniques (CFD and FEA)
- Wrote a manufacturing plan and conducted a material selection analysis and testing

Human Powered Vehicle Challenge

Department of Aerospace and Mechanical Engineering, University of Oklahoma

2016 - 2019

- Designed, analyzed the loads, and built a recumbent bicycle as a member of the university's engineering competitive team, Sooner Powered Vehicle
- Competed with the team at the annual competition organized by the American Society of Mechanical Engineers (ASME), Human Powered Vehicle Challenge
- Directed and chaired the team as the Vice President as well as the Safety Officer

WindBAG Challenge

Department of Aerospace and Mechanical Engineering, University of Oklahoma

2018

- Designed, manufactured, and tested a system capable of converting wind energy into stored mechanical and electrical energy, used to propel a vehicle
- Internalized the Principle of Engineering Design and developed competencies required for a career as a professional engineer
- Understood and translated customer requirements into technical specifications while emphasizing authentic design and teamwork

PUBLICATIONS

Elisha, G., Acharya, S., Halder, S., Carlson, D. A., Kou, W., Kahrilas, P. J., Pandolfino, J. E., Patankar, N. A. (2022) Peristaltic regimes in esophageal transport. *Biomech Model Mechanobiol.* In press.

Elisha, G., Halder, S., Acharya, S., Carlson, D. A., Kou, W., Kahrilas, P. J., Pandolfino, J. E., Patankar, N. A. (2022). Pressure–area loop based phenotypic classification and mechanics of esophagogastric junction physiology. Submitted to *Biomech Model Mechanobiol.*

Elisha, G., Halder, S., Acharya, S., Carlson, D. A., Kahrilas, P. J., Pandolfino, J. E., Patankar, N. A. (2021). A unified understanding of the function of human sphincters using functional luminal imaging probe. Arxiv.

Elisha, G., Halder, S., Acharya, S., Carlson, D. A., Kahrilas, P. J., Pandolfino, J. E., Patankar, N. A. (2022). Mechanics perspective on pressure-cross-sectional area hysteresis at the esophagus body. Arxiv.

Zhao, T. Y., **Elisha, G.,** Johnson, E. M. I., Halder, S., Smith, B. C., Allen, B. D., Markl, M., Patankar, N. A. (2021). A fluid-structure instability driven physiomechanical marker for aneurysm growth. arXiv:2111.10030.

Halder, S., Yamasaki, J., Acharya, S., **Elisha, G.,** Kou, W., Pandolfino, J. E., Kahrilas, P. J., Patankar, N. A. (2021). Esophageal virtual disease landscape for disease pathogenesis and diagnostics using mechanics-informed machine learning. Submitted.

Harvey, P., **Elisha, G.** (2018). Vision-based vibration monitoring using existing cameras installed within a building. *Structural Control and Health Monitoring (Online)*, 25(11).

Harvey, P., **Elisha, G.,** Casey, C. (2018). Experimental investigation of an impact-based, dual-mode vibration isolator/absorber system. *International Journal of Non-Linear Mechanics*, 104, 59-66.

MANUSCRIPTS IN PREPARATION

Elisha, G., Halder, S., Acharya, S., Carlson, D. A., Kahrilas, P. J., Pandolfino, J. E., Patankar, N. A. (2021). Pressure-area loop analysis of the esophagogastric junction in GERD, EoE, and Ssc patients using functional luminal imaging probe.

CONFERENCE PRESENTATIONS

ORAL PRESENTATIONS

Elisha, G., Halder, S., Patankar, N. A. (2022, April 14). A unified understanding of the function of human sphincters using functional luminal imaging probe. *Gender Equity in Academic Research Symposium*, Evanston, IL, USA.

Elisha, G., Acharya, S., Halder, S., Pandolfino, J. E., Kahrilas, P. J., Patankar, N. A. (2021, November 23-25). Pressure–area loop based phenotypic classification and mechanics of esophagogastric junction physiology. *APS Division of Fluid Dynamics*, Phoenix, AR, USA.

Zhao, T. Y., **Elisha, G.,** Johnson, E. M. I., Halder, S., Smith, B. C., Allen, B. D., Markl, M., Patankar, N. A. (2021, November 23-25). The fluid-structure instability driving aneurysm formation and growth. *APS Division of Fluid Dynamics*, Phoenix, AR, USA.

Halder, S., Yamasaki, J., Acharya, S., **Elisha, G.,** Kou, W., Pandolfino, J. E., Kahrilas, P. J., Patankar, N. A. (2021, November 23-25). Esophageal virtual disease landscape for disease pathogenesis and diagnostics using mechanics-informed machine learning. *APS Division of Fluid Dynamics*, Phoenix, AR, USA.

Elisha, G., Acharya, S., Halder, S., Pandolfino, J. E., Kahrilas, P. J., Patankar, N. A. (2020, November 22-24). Peristaltic regimes in esophageal transport. *APS Division of Fluid Dynamics*, Chicago, IL, USA.

Acharya, S., Halder, S., **Elisha, G.,** Kou, W., Kahrilas, P. J., Pandolfino, J. E., Patankar, N. A. (2020, November 22-24). Fluid mechanics-informed clinical practice in gastroenterology. *APS Division of Fluid Dynamics*, Chicago, IL, USA.

Halder, S., Acharya, S., **Elisha, G.,** Kou, W., Pandolfino, J. E., Kahrilas, P. J., Patankar, N. A. (2020, November 22-24). Mechanics-informed radiology, fluoroscopy, and endoscopy enabled by deep learning techniques. *APS Division of Fluid Dynamics*, Chicago, IL, USA

POSTER PRESENTATIONS

Elisha, G., Halder, S., Patankar, N. A. (2022, July 16). A unified understanding of the function of human sphincters using functional luminal imaging probe. *Context, Connections, and Community Symposium*, Evanston, IL, USA.

Zhao, T. Y., **Elisha, G.**, Johnson, E. M. I., Halder, S., Smith, B. C., Allen, B. D., Markl, M., Patankar, N. A. (2022, February 2-5). Fluid-Structure Stability Analysis to Predict Aortic Dilation. *Society for Cardiovascular Magnetic Resonance Scientific Sessions*, Fort Lauderdale, FL, USA.

TEACHING EXPERIENCE

Teaching Assistant and Grader

2021&2022

Department of Mechanical Engineering, Northwestern University, Evanston, IL

Courses: Engineering Fluid Mechanics, Fundamentals of Fluid Dynamics

- Taught weekly recitation session
- Held weekly office hours and engage with students
- Planned and graded weekly assignment and exam

Graduate Student Mentor

2020&2022

Department of Mechanical Engineering, Northwestern University, Evanston, IL

- Mentored and trained an undergraduate and masters students in their first research experience
- Facilitated weekly meetings and assigned weekly tasks

Mechanical Engineering and Mathematics Tutor

2017 - 2019

Student Learning Center, Norman, Oklahoma

- Assisted and instructed students in mechanical engineering and mathematics courses such as Heat Transfer, Thermodynamics, Statics, Dynamics, and Differential Equations.
- Collaborated with professors and fellow employees in developing effective teaching strategies and forming study groups.

English Learner Reading Instructor

2019

Madison Elementary School, Norman, Oklahoma

- Taught English and helped a young English learner read a new book each week
- Explained new vocabulary to them in simple, understandable terms
- Engaged in fun conversations that allow the learner to use their new vocabulary

Mathematics and Hebrew Instructor

2014 - 2015

Youth Center, Tel-Aviv, Israel

- Taught and instructed mathematics to elementary and middle school students of lower income refugee families.
- Encouraged the students to succeed in school and guided them through the journey of entering a foreign discourse community by teaching the local language.

HONORS AND AWARDS

- Martin Outstanding Doctoral Fellowship 2022
- Walter P. Murphy Fellowships 2019
- Student Speaker at the Gallogly College of Engineering Convocation 2019
- Pre-Capstone Best Practice 2018
- Jennifer Scott Smith Memorial Scholarship 2018
- Mechanical Engineering Undergraduate Feature 2018
- Design of Mechanical Components Outstanding Junior 2018
- Honors Engineering Research 2016
- University of Oklahoma's Honors College 2015-2019
- 2016 David L. Boren Scholarships Institute of International Education 2016
- United World College Davis Scholar 2015-2019
- Red Cross Nordic United World College Scholar 2012-2014

LEADERSHIP AND EXTRA - CURRICULAR ACTIVITIES

- Board member and Social Chair at GradSWE - graduate student community of the Society of Women Engineers 2022-present
- Board member and Social Chair at Graduate Women Across Northwestern 2021-present
- Northwestern Triathlon club (member) 2020-present
- Northwestern Cycling club (member) 2019-present
- Aerospace and Mechanical Engineering Student Advisory Council (member) 2018-2019
- Sooner Engineering Entrepreneurs (member) 2018-2019
- University of Oklahoma Triathlon Club (member) 2017-2019
- Human Powered Vehicle (VP + member) 2016-2019
- University of Oklahoma Cycling Club (VP + member) 2015-2019

Public Speaking and Presentations

- Manage work life balance presentation at the Graduate Women in Science and Engineering mentorship circle Aug. 2021
- Gave the student speech at the engineering graduation ceremony at the University of Oklahoma May 2019

- Presented the methodology and results displayed in the article “Vision-based vibration monitoring using existing cameras installed within buildings” to civil engineering master and Ph.D. students Nov. 2017
- Gave a presentation at the University of Oklahoma’s social justice event, Mosaic-Social Justice Symposium Nov. 2016

TECHNICAL SKILLS

High Performance Computing (HPC), Computational Fluid Dynamics (CFD), Finite Element Analysis (FEA), Machine Learning, and Continuum Mechanics

Programming languages: MATLAB, C, C++, Python, Mathematica

Commercial packages: ANSYS, Abaqus, SolidWorks, QuickDAQ, LabVIEW, MultiSim

ARTICLES ABOUT ME

Graduation speech

<http://www.youtube.com/watch?v=ISJh0cFh0Lk&t=19m55s>

ME student feature

https://issuu.com/ouame/docs/ame_newsletter_redesign_2017-18_fin/28