

# Audun MYERS

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## EDUCATION

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SEPT. 2018 - MAY 2022	<b>Michigan State University</b> , East Lansing, MI <i>Ph.D. in Engineering</i>   Major: Mechanical Engineering GPA: 3.85/4.00
SEPT. 2014 - AUG. 2018	<b>Grand Valley State University</b> , Allendale, MI <i>Bachelor of Science in Engineering</i>   Major: Mechanical Engineering GPA: 3.86/4.00

## PUBLICATIONS

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### Journal Papers

1. **Audun D. Myers**, Firas Khasawneh, and Elizabeth Munch, Persistent Homology of Coarse Grained State Space Networks. *arXiv preprint*, 2022.
2. **Audun D. Myers**, Firas Khasawneh, and Elizabeth Munch, Temporal Network Analysis Using Zigzag Persistence. *arXiv preprint*, 2022.
3. **Audun D. Myers**, Firas Khasawneh, and Elizabeth Munch, Topological Signal Processing Using the Weighted Ordinal Partition Network. *SIAM Journal on Applied Dynamical Systems [Under Review]*, 2022.
4. **Audun D. Myers** and Firas Khasawneh, Sublevel Set Entropy: A Signal Complexity Measure. *Chaos: An Interdisciplinary Journal of Nonlinear Science [Under Review]*, 2022.
5. **Audun D. Myers** and Firas Khasawneh, Damping Parameter Estimation using Topological Signal Processing. *Mechanical Systems and Signal Processing*, 2022.
6. **Audun D. Myers**, Firas Khasawneh, and Brittany Fasy, ANAPT: Additive noise analysis for persistence thresholding. *Foundations of Data Science*, 2022.
7. **Audun D. Myers**, Joshua Tempelman, David Petrusenko, and Firas Khasawneh, Low-cost Double Pendulum for High-quality Data Collection with Open-source Video Tracking and Analysis. *HardwareX*, Elsevier BV, 2020, 8, e00138.
8. **Audun D. Myers** and Firas A. Khasawneh, On the Automatic Parameter Selection for Permutation Entropy. *Chaos: An Interdisciplinary Journal of Nonlinear Science [Editor's Pick]*. 30, 033130, 2020.
9. **Audun D. Myers**, Elizabeth Munch, and Firas A. Khasawneh, Persistent Homology of Complex Networks for Dynamic State Detection. *Physical Review E* 100, 022314, 2019.
10. **Audun D. Myers** and Firas A. Khasawneh, Delay Parameter Selection in Permutation Entropy Using Topological Data Analysis. *arXiv preprint arXiv:1905.04329*, 2019.

### Conference Papers

1. **Audun D. Myers** and Firas A. Khasawneh, Combined Viscous and Coulomb Damping Estimation using Topological Signal Processing. *ASME International Design Engineering Technical Conference*, 2021.
2. **Audun D. Myers**, Melih Yesilli, Sarah Tymochko, Firas A. Khasawneh, and Elizabeth Munch, Teaspoon: A comprehensive python package for topological signal processing. *NeurIPS Workshop TDA and Beyond*, 2020.

3. **Audun D. Myers** and Firas A. Khasawneh, Dynamic State Analysis of a Driven Magnetic Pendulum Using Ordinal Partition Networks and Topological Data Analysis. *ASME International Design Engineering Technical Conference [Best Student Paper Award - 3rd Place]*, 2020.
4. Joshua R. Tempelman, **Audun D. Myers**, and Firas A. Khasawneh, Effects of Correlated Noise on the Performance of Persistence Based Dynamic State Detection Methods. *ASME International Design Engineering Technical Conference*, 2020.
5. Joshua R. Tempelman, **Audun D. Myers**, Melih C. Yesilli, and Firas A. Khasawneh, Vibration Testing of Lattice Metamaterials and Lumped Modeling Techniques. *ASME International Design Engineering Technical Conference*, 2019.

## SCIENTIFIC PRESENTATIONS

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1. **Audun D. Myers** and Firas A. Khasawneh (September 2022). Topological Analysis of Temporal Hypergraphs. Presentation at Society of Industrial Mathematics (SIAM) conference on Mathematics of Data Science (MDS).
2. **Audun D. Myers** and Firas A. Khasawneh (April 2022). Dynamic State Detection Using Persistent Homology. Presentation at the Joint Mathematics Meetings (JMM).
3. **Audun D. Myers** and Firas A. Khasawneh (January 2021). Damping Parameter Estimation using Topological Signal Processing. Presentation at the Society of Industrial and Applied Mathematics (SIAM) Dynamical Systems conference.
4. **Audun D. Myers**, Firas A. Khasawneh, and Brittany Fasy (January 2021). Separating Persistent Homology Noise from Time Series Data Applied to Damping Parameter Estimation. Invited presentation for the Computational Topology and Geometry (CompTaG) seminar series.
5. **Audun D. Myers**, Melih Yesilli, Sarah Tymochko, Firas A. Khasawneh, and Elizabeth Munch (October 2020). Teaspoon: A comprehensive python package for topological signal processing. Software demo and poster presentation at the NeurIPS 2020 Workshop on Topological Data Analysis and Beyond virtual conference.
6. **Audun D. Myers** and Firas A. Khasawneh (August, 2020). Dynamic State Analysis of a Driven Magnetic Pendulum using Ordinal Partition Networks and Topological Data Analysis. Paper remotely presented at the ASME IDETC-CIE conference.
7. Joshua R. Tempelman, **Audun D. Myers**, Jeffery Scruggs, and Firas A. Khasawneh (August, 2020). Effects of Correlated Noise on the Performance of Persistence Based Dynamic State Detection Methods. Paper remotely presented at the ASME IDETC-CIE conference.
8. **Audun D. Myers**, Elizabeth Munch, and Firas A. Khasawneh (June, 2019). Persistent Homology of Complex Networks for Dynamic State Detection. Paper presented at the 1st midwest graduate student conference: geometry and topology meet data analysis and machine learning, The Ohio State University, Columbus, OH.
9. **Audun D. Myers** and Firas A. Khasawneh (May, 2019). Delay Parameter Selection in Permutation Entropy Using Topological Data Analysis. Paper presented at the society for industrial and applied mathematics conference on applications of dynamical systems, Snowbird, UT.
10. **Audun D. Myers** and Firas A. Khasawneh (April, 2019). Delay Parameter Selection in Permutation Entropy Using Topological Data Analysis. Paper presented at the great lakes society for industrial and applied mathematics section meeting, University of Michigan, Ann Arbor, MI.

## TEACHING EXPERIENCE

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- JAN. 2020  
- APR. 2020
- Michigan State University*, Teaching Assistantship for Manufacturing Processes
- Assisted with teaching materials and student evaluation for 50 students.
- AUG. 2019  
- DEC. 2019
- Michigan State University*, Teaching Assistantship for Heat Transfer
- Assisted with teaching materials and student evaluation for 120 students.
- AUG. 2018  
- MAY 2019
- Michigan State University*, Teaching Assistantship for Vibrations Lab
- Instructor for vibrations and controls lab for 12-20 students.
- AUG. 2013  
- MAY 2018
- Grand Rapids Community College*, Professional Physical Sciences Tutor
- Provided tutoring in calculus, differential equations, physics, and chemistry.
  - Tutoring in lab, individual, and group settings (2-5 students).

## INDUSTRY EXPERIENCE

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- MAY 2021  
- CURRENT
- Pacific Northwest National Laboratory*, PhD Intern
- Research intern for the Mathematics of Data Science Group.
  - Developed method for topological data analysis to study temporal hypergraph structure through zigzag persistence.
- MAY 2021  
- CURRENT
- Pacific Northwest National Laboratory*, PhD Intern
- Research intern for the computer vision and artificial intelligence group.
  - Developed a deep convolution neural network for object detection.
  - Implemented novel synthetic data set for training neural network.
- MAY 2016  
- DEC. 2017
- Hutchinson Antivibration Systems Inc.*, Mechanical Engineering Intern
- Part of development team for a mechatronic active mass damper designed for an automobile to automatically counter vibrations caused by an engine imbalance.
  - Developed Python and VBA program to automate testing process, data analysis, and report generation for engine mount characterization.
  - Worked in the research and development department for concept validation and testing.

## AWARDS AND FELLOWSHIPS

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- Awarded Michigan State University's GAANN fellowship - 2021
- Awarded for the Fitch Beach award from Michigan State University's department of mechanical engineering - 2020.
- Third place award for best student paper of the American Society of Mechanical Engineers International Design Engineering Technical Conference - 2020.
- Graduate Office Fellowship awarded by Michigan State University - 2020 and 2021.

## SERVICE

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- Graduate adviser for the engineering honors society Tau Beta Pi at Michigan State University.
- President of the Michigan Lambda chapter of the engineering honors society, Tau Beta Pi, during undergraduate education at Grand Valley State University.
- Organized and participated in fundraiser group to cycle from Mexico to Canada for pancreatic cancer research (PanCan).

- Designed positioner system with to be used by the electromagnetic compatibility research center at Grand Valley State University.

## PROGRAMMING AND SOFTWARE EXPERTISE

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- **Programming Languages:** Python, MATLAB, Julia, Mathematica, C++, Arduino C, and VBA.
- **Engineering Software:** MMDetection, SolidWorks, PFV (High Speed Camera Software), Simulink, and LabView.