Akash Pandey

Curriculum Vitae

PhD Candidate, Mechanical Engineering
Northwestern University, Illinois 60208
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My Webpage
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Education

2021–present **PhD, Mechanical Engineering**, *Northwestern University*, Illinois, USA.
Studying proteins using Machine Learning (ML)

Advisor : Dr. Sinan Keten and Dr. Wei Chen

CGPA : 3.977/4

2014–2017 : **Masters (*by research*), Applied Mechanics**, *Indian Institute of Technology (IIT) Madras*, India.
Study of the fatigue behavior of piezoelectric composite material

CGPA : 9.4/10

2010–2014 : **Bachelor of Engineering, Automobile Engineering**, *Madras Institute of Technology, Anna University*, India.

CGPA : 8.78/10

Skills

Programming Languages: Python, LaTeX

Technologies: Pytorch, Tensorflow, Sklearn, Pandas, Jupyter Notebook

Software: ABAQUS, NX, MATLAB, LAMMPS

Research Area: ML for proteins, Transformers, Explainable AI methods, Gaussian Process, Bayesian Optimization, Finite Element Analysis, Continuum Mechanics

Professional Experience

Capital One: Data Science PhD Intern
Worked on permutation and masking-based methods to estimate the importance of input features in Transformer-based models. Additionally, applied self-attention and gradient-based methods to determine the significance of different time points in the sequential data.

Infosys Ltd: Engineering Lead & Rolls Royce: Advanced Engineer

- Performed stress analysis, and fatigue life assessment of Nickel and Titanium alloy discs in XWB engines.
- Developed algorithms to track the fatigue life consumption of the disc continuously in service.
- Assumed the role of technical reviewer in the team.

Rolls Royce: Global Engineering Graduate

- As an engineering graduate, I worked in four different teams to get a breadth of aero-engine design, analysis, manufacturing, and testing.
- At the end of the graduate program, I was selected for the accelerated leadership program at Rolls Royce.

Research Experience: Northwestern University

Northwestern University

- Developing an interpretable deep-learning model to estimate the importance of each position in a sequence of amino acids.

- Developed an interpretable deep learning framework to predict the properties of spider silk under a data-constraint setting.
- Developed an LSTM-based model to predict the dynamic properties of the proteins.
- As a part of an ACM Multimedia challenge, developed a large language model-based emotion prediction model.
- As a part of an ICASSP'23 challenge, developed a wav2vec-based deep learning model to predict the person identification based on their biosignals and secured 3rd place in it.

IIT Madras

- Developed an experimental setup to study the fatigue behavior of piezoelectric composite material under mechanical, electrical, and thermal load.
- Developed a Finite Element Method based model to predict the fatigue failure in the material.

Publications and Conferences (* indicates equal contribution)

2024 Akash Pandey, Wei Chen, and Sinan Keten. Sequence-based data-constrained deep learning framework to predict spider dragline mechanical properties. *Communications Materials*, volume 5, page 83. Nature Publishing Group UK London, 2024.

2023 Akash Pandey, Elaine Liu, Jacob Graham, Wei Chen, and Sinan Keten. B-factor prediction in proteins using a sequence-based deep learning model. *Patterns*, volume 4. Elsevier, 2023.

2023 Payal Mohapatra*, Akash Pandey*, Yueyuan Sui*, and Qi Zhu. Effect of attention and self-supervised speech embeddings on non-semantic speech tasks. In *Proceedings of the 31st ACM International Conference on Multimedia*, pages 9511–9515, 2023.

2023 Payal Mohapatra*, Akash Pandey*, Sinan Keten, Wei Chen, and Qi Zhu. Person identification with wearable sensing using missing feature encoding and multi-stage modality fusion. In *ICASSP 2023 - 2023 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pages 1–2, 2023.

2022 Payal Mohapatra, Akash Pandey, Bashima Islam, and Qi Zhu. Speech disfluency detection with contextual representation and data distillation. In *Proceedings of the 1st ACM International Workshop on Intelligent Acoustic Systems and Applications*, IASA '22, page 19–24, 2022.

2017 Akash Pandey and A. Arockiarajan. Performance studies on macro fiber composite (mfc) under thermal condition using kirchhoff and mindlin plate theories. *International Journal of Mechanical Sciences*, volume 130, pages 416–425, 2017.

2017 Akash Pandey and A. Arockiarajan. Fatigue study on the sensor performance of macro fiber composite (mfc): Theoretical and experimental approach. *Composite Structures*, volume 174, pages 301–318, 2017.

2017 Akash Pandey and A Arockiarajan. Fatigue study on the actuation performance of macro fiber composite (mfc): theoretical and experimental approach. *Smart Materials and Structures*, volume 26, page 035018. IOP Publishing, feb 2017.

2017 Akash Pandey and A. Arockiarajan. An experimental and theoretical fatigue study on macro fiber composite (mfc) under thermo-mechanical loadings. *European Journal of Mechanics - A/Solids*, volume 66, pages 26–44, 2017.

2016 Akash Pandey and A. Arockiarajan. Actuation performance of macro-fiber composite (mfc): Modeling and experimental studies. *Sensors and Actuators A: Physical*, volume 248, pages 114–129, 2016.

Teaching Assistantship

Spring, 2022: **Introduction to Aerospace Engineering**, Northwestern University.

Winter, 2016: **Finite Element Analysis**, IIT Madras.

Fellowships & Awards

Sept 2023	Recipient of Predictive Science and Engineering Design (PSED) fellowship
Sept,2021 - June, 2022	Walter P.Murphy Fellowship at Northwestern University
July,2014 - April,2017	Awarded Research Fellowship by Govt. of India