

PRANAV MILIND KHANOLKAR

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SKILLS

Programming Languages: Python, R, MATLAB, HTML, SQL

AI: Machine Learning & Deep Learning (Sckit Learn, Keras, PyTorch, TensorFlow), Natural Language Processing (NLTK)

Application: AWS, SolidWorks, Onshape, AutoCAD, Autodesk Inventor, ANSYS Workbench, Abaqus, Power BI, Tableau, Minitab

Research Skills: Statistical Analysis, Literature Review, Qualitative Coding and Analysis, Case Study Analysis, Grant Writing

EXPERIENCE

Graduate Researcher – Ready Lab, University of Toronto

September 2020 – December 2024

Toronto, Ontario, Canada

- Presented the potential role and growth of Digital Technologies and Product Lifecycle Management (PLM), specific to the Canadian aerospace industry at the [DAIR To Innovate 2024](#), as a keynote panelist.
- Proposed roadmaps and best practice recommendations for SMEs to implement digital threads and AI-based methods—leveraging effective cloud-based data management systems and virtual machines—that are catered specifically to their product design processes, through case studies of successful research-industry collaborations (*PhD Dissertation; successfully defended*).
- Qualitatively analyzed literature (108 peer-reviewed publications) to assess myriad AI-based methods that are specifically deployed in different stages of the engineering design process and demonstrated how these methods assist engineers. [[Link to publication](#)]
- Leveraged Natural Language Processing and web-scraping to extract and evaluate the limited prevalence of AI education in 2195 courses offered by 28 accredited 2023-2024 Canadian Mechanical Engineering programs. [[Link to publication](#)] [[Link to dataset](#)]
- Drafted and managed three project proposals totaling 375,250 CAD, submitted to NSERC, SSHRC, and MITACS, supporting industry-partnered research initiatives in product design, engineering education, and aerospace design systems.

Mitacs Accelerate Research Intern – University of Toronto & RPS Composites

September 2021 – August 2022

Toronto, Ontario, Canada

- Received Mitacs Accelerate Internship Award for the project, ‘A New Automated Approach for Engineering Design and Manufacturing Specification Generation’ in collaboration with industry partner – RPS Composites.
- Reviewed and reported the shortcomings of the industry’s traditional composite design process, software limitations, using sensitivity analysis and interviews with the company’s engineering team.
- Developed Python-based software programs for automating the design of composite-based products and their manufacturing specifications, bill of materials, and drawing-exchange-format (DXF) files for CNC machining.
- Deployed these automation programs which proved 10x faster than their traditional design processes. [[Link to publication](#)]

Graduate Researcher – THRED Lab, The Pennsylvania State University

June 2019 – May 2020

State College, Pennsylvania, US

- Researched and analyzed AI-based algorithms related to the research project on improving the speed of finite element analysis of material microstructures without compromising the accuracy of the results.
 - Formulated automation scripts in Abaqus FEA backend to generate 6,000 diverse microstructure designs and corresponding structural analyses—creating a labeled dataset to train deep learning-based image colorization algorithms.
 - Developed CNN-based image colorization algorithms for predicting structural strain fields in aluminum microstructures with 96% accuracy and 20x faster than the traditional finite element analysis software (Abaqus FEA). [[Link to publication](#)] [[Link to dataset](#)]
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CERTIFICATIONS

- [AWS Fundamentals Specialization](#) (Amazon Web Services–AWS, Cloud Computing, AWS Management Console)
 - [IBM AI Engineering Professional Certificate](#) (Tensorflow, PyTorch, Keras, Apache Spark, Deep Learning, Big Data)
 - [NLP - Natural Language Processing with Python](#) (Spacy, LDA, Word2Vec, NLTK, NER, Topic Modelling, Sentiment Analysis)
 - [Python for Data Science and Machine Learning Bootcamp](#) (Pandas, Seaborn, SciKit-Learn, NumPy, Matplotlib, Plotly)
 - [Lean Six Sigma Yellow Belt: Quantitative Tools for Quality and Productivity Professional Certificate](#) (DMAIC, Critical-to-Quality, Failure Modes & Effects, Root Cause Analysis, Heijunka, Kanban, Jidoka, Poka Yoke, Quality Control)
 - **Product Design and Analysis** – by CADD Centre Training Services Pvt. Ltd. (SolidWorks and ANSYS)
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EDUCATION

Doctor of Philosophy: Mechanical and Industrial Engineering

December 2024

University of Toronto, Canada

GPA – 3.85 / 4

Master of Science: Industrial Engineering

May 2020

The Pennsylvania State University, US

GPA – 3.85 / 4

Bachelor of Engineering: Mechanical Engineering

May 2017

University of Mumbai, India

CGPA - 8.59 / 10

PROJECTS

Comparative Analysis of Self-Supervised Learners

December 2021

- Reviewed and documented five self-supervised learning (SSL) algorithms (MoCo, SimCLR, BYOL, SwAV, Barlow Twins).
- Performed qualitative analysis using T-SNE plots and on these five SSL algorithms using the CIFAR10 dataset and their comparison with supervised learning method for classification.
- Facilitated quantitative analysis of these self-supervised learning (SSL) algorithms by evaluating their models' transfer learning ability using out-of-distribution testing for image classification.
- Developed an ensemble of these five SSL methods and supervised learning methods to assess the improvement in image classification compared to the individual methods.

Statistical analyses of the BRFSS for effective monitoring of weight-related concerns

December 2020

- Analyzed the Behavioral Risk Factor Surveillance System (BRFSS) dataset, containing information of 276 variables that include interview information, location, demographics, health, and medical information of 437436 respondents.
- Processed K-means clustering to observe the patterns based on the US state population and Body Mass Index (BMI).
- Created logistic regression models in R-programming to predict Heart Attack Diagnosis, Cancer Diagnosis, and Diabetes Diagnosis, with Drinking and Smoking as the predictors.
- Executed logistic regression tests to analyze if adding BMI score to the prediction models with only Drinking and Smoking as the predictors of such disease diagnoses will render the model a better fit.

Design Improvement of Debris Subsystem for Tennant Floor Scrubbers – Designing Product Families

December 2019

- Led a team of seven graduate students to assess the product platforms for Tennant Floor Scrubber models T300, T500 and T600.
- Evaluated and established the current commonality between the three scrubbers' components/modules that can be platformed for improved efficiency in manufacturing system.
- Calculated the commonality assessment using Product Commonality Index (PCI) for the debris subsystem.
- Implemented a variety assessment using Generational Variety Index (GVI) by mapping consumer needs to engineering requirements and current components of the scrubbers.
- Performed a Commonality-Variety Tradeoff for design assessment and changes to be recommended.
- Constructed a Design Structure Matrix (DSM) to analyze the interface between components to assess the propagation, risk and impact due to design-changes and documented a report highlighting the recommendations for improving design and platforming.

Remote Order Taking – Discrete Event Simulation

May 2019

- For a given dataset, processed and optimized the number of servers required for a drive-through restaurant-chain in the area to improve efficiency according to desired performance standards using discrete event simulations in Python.
- Conducted sensitivity analysis to observe the change in the required number of operators if more branches were added.
- Quantified the uncertainty based on input distribution models fitted according to given data.

Non-Destructive Testing of Thin Plates using Ultrasonic Guided Waves (Undergraduate Thesis)

March 2017

- Developed two new algorithms using MATLAB, for damage detection, localization, and refinement in thin plate structures.
- Documented the entire project in a technical paper 'Development of a Lamb Wave Based Algorithm for Detecting a Damage in Thin Plate Structures', and presented it in ISSS International Conference on Smart Materials, Structures and Systems July 5-7, 2017, Bangalore, India. [[Link to publication](#)]

OTHER EXPERIENCE

Teaching Assistant – MIE258 Engineering Economics & Accounting – University of Toronto *Toronto, Ontario, Canada*

Fall 2024, Fall 2023, Fall 2022

- Taught the following topics: Cash Flow Analysis, Financial Comparison Methods, Financial Accounting, Replacement Decisions, Taxes, Inflation, Dealing with Risk and Uncertainty, Emission Policy, and Business Plans.
- Led weekly tutorials and Q&A sessions for approx. 50 students on concepts of engineering economics and accounting.
- Supervised and graded midterm and final exams—providing detailed feedback on how students can improve their understanding on concepts of engineering economics and accounting.

Teaching Assistant – APS100 Orientation to Engineering – University of Toronto *Toronto, Ontario, Canada*

Term: Fall 2024, Fall 2023

- Facilitated active online learning activities and sessions for classes of 300-325 students to assist them in early engineering management skills such as time management and engineering ethics.

Section Editor, Engineering – The Canadian Science Fair Journal *Toronto, Ontario, Canada*

July 2022 – June 2024

- Led a team of team of five graduate students and researchers across different universities in Canada to review and publish research projects conducted by high-school students (aged 12-18 years).
- Reviewed and published research articles by mentoring young authors through the process of writing their first scientific paper.

LANGUAGES

- English, Hindi, Marathi, German (Level A1, A2; Goethe Institute certified)
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