

Pranav Milind Khanolkar

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Toronto, Ontario, Canada

EDUCATION

Doctor of Philosophy: Mechanical and Industrial Engineering
University of Toronto, Canada

Graduation Year: December 2024
GPA – 3.85 / 4

Master of Science: Industrial Engineering
The Pennsylvania State University, US

Graduation Year: May 2020
GPA – 3.85 / 4

Bachelor of Engineering: Mechanical Engineering
University of Mumbai, India

Graduation Year: May 2017
CGPA - 8.59 / 10

SKILLS

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

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

Application: 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
Toronto, Ontario, Canada

September 2020 – present

- Presented the potential role and growth of Digital Technologies and Product Lifecycle Management (PLM), specific to 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—through effective cloud-based data management systems and virtual machines—that are catered specific to their product design processes, through case studies of successful research-industry collaborations (*PhD Dissertation; successfully defended*).
- Analyzed literature (108 peer-reviewed publications) to assess different 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 highlight the limited prevalence of AI education in 2769 courses offered by 28 accredited Canadian Mechanical Engineering programs. [\[Link to publication\]](#) [\[Link to dataset\]](#)

Mitacs Accelerate Research Intern – University of Toronto & RPS Composites
Toronto, Ontario, Canada

September 2021 – August 2022

- 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 automation-based software programs for 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
State College, Pennsylvania, US

June 2019 – May 2020

- Researched and analyzed AI-based algorithms related to this research project on improving the speed of finite element analysis of material microstructures without compromising the accuracy of the results.
- Developed Deep Learning algorithms for prediction of structural strain fields in aluminum microstructures with 96% accuracy and 20x faster than the traditional finite element analysis software. [\[Link to publication\]](#) [\[Link to dataset\]](#)

CERTIFICATIONS

- [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, and Poka Yoke, Quality Control)
- Product Design and Analysis** – by CADD Centre Training Services Pvt. Ltd. (SolidWorks and ANSYS)

ACADEMIC 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](#)]

TEACHING EXPERIENCE

TA – MIE258 Engineering Economics and Accounting

Terms: Fall 2024, Fall 2023, Fall 2022

University of Toronto

- 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.

TA – APS100 Orientation to Engineering

Term: Fall 2024, Fall 2023

University of Toronto

- 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.

OTHER EXPERIENCE

Section Editor, Engineering – The Canadian Science Fair Journal

July 2022 – June 2024

- Led a 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.