

# Pranav Milind Khanolkar

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Toronto, Ontario, Canada

## EDUCATION

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

*Expected 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*).
- 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, predicting 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

- 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 team of five graduate students and researchers across different universities in Canada and connect them to high-school students (aged 12-18 years).
- Assigned engineering research articles submitted to the engineering editors for review and mentorship.
- Reviewed and published research articles by mentoring young authors through the process of writing their first scientific paper.
- Provided detailed suggestions/revisions to student to help them develop their scientific writing and literacy skills.