

# PRANAV MILIND KHANOLKAR

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## EDUCATION

<b>Doctor of Philosophy: Mechanical and Industrial Engineering</b> University of Toronto, St. George Campus, Toronto, Canada	<b>Expected Graduation Year: December 2024</b> <b>GPA – 3.85 / 4</b>
<b>Master of Science: Industrial Engineering</b> The Pennsylvania State University, University Park Campus, PA, USA	<b>Graduation Year: May 2020</b> <b>GPA – 3.85 / 4</b>
<b>Bachelor of Engineering: Mechanical Engineering</b> University of Mumbai, Fr. Conceicao Rodrigues Institute of Technology, India	<b>Graduation Year: May 2017</b> <b>CGPA - 8.59 / 10</b>

## SKILLS

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

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

**Application Software:** SolidWorks, OnShape, AutoCAD, Autodesk Inventor, ANSYS Workbench, Abaqus, Power BI, Tableau, Minitab

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

## EXPERIENCE

**Graduate Researcher – Ready Lab, University of Toronto** **September 2020 – present**  
Toronto, Ontario, Canada

- Selected as a keynote panelist to present the potential of Digital Technologies and Product Lifecycle Management (PLM), specific to Canadian aerospace industry at the [DAIR To Innovate 2024](#).
- Presented roadmaps and best practice recommendations for SMEs to implement digital threads and the right AI-based methods that are catered specific to their product design processes, through case studies and post-hoc reviews of successful research-industry collaborations.
- Analyzed literature (108 peer-reviewed publications) to assess different AI 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 assess the prevalence of AI education in mechanical engineering curricula of accredited Canadian universities, highlighting the importance of AI education. [\[Link to publication\]](#) [\[Link to dataset\]](#)

**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, using sensitivity analysis and interviews with the company's engineering team.
- Developed automation programs for 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 this research project on improving the speed of finite element analysis without compromising the accuracy of the results.
- Developed Deep Learning algorithms for rapid prediction of 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](#) – Coursera
- [NLP - Natural Language Processing with Python](#) – Udemy
- [Python for Data Science and Machine Learning Bootcamp](#) – Udemy
- [Six Sigma and Lean: Quantitative Tools for Quality and Productivity Professional Certificate offered by TU Munich](#) – EDX
- Product Design and Analysis** – by CADD Centre Training Services Pvt. Ltd.

## 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.

## 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 student 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 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.