Rijul Saini

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Skills

- **Interests and Key skills:** Data mining and analysis of complex data sets, Statistical analytics, Recommendation systems, Predictive analytics using machine learning, Natural language processing, Digital Twins, Large Language Models (LLMs), Software engineering, MLOps, Continuous integration, Leadership and training, Project management, Team incubation
- **Programming:** Python, SQL, Core Java, C++, HTML, CSS, JavaScript
- **Tools, Frameworks, and OS:** GIT, TensorFlow, PyTorch, AWS, Spark, Snowflake, SciPy, Pandas, NumPy, Django, Flask, Dash, Plotly, Spring Boot, REST APIs, React JS, Travis CI, Docker, Jupyter Notebooks, Linux, and Windows

Education

Applied Machine Learning in Software Engineering — *Ph.D.* **Sep 2017 - Dec 2022**
McGill University, Montréal, Canada GPA: 4.00

- **Relevant Coursework:** Natural Language Processing and Machine Learning Techniques for Software Engineering, Applied Machine Learning, Model-Driven Engineering, Advanced Language Software Engineering, Software Analytics, and Model-Based System Design and Simulation

Silver Medalist in the ACM Student Research Competition SRC – 2022
Graduate Research Enhancement and Travel Award (GREAT) – 2020/2022
Masters to Ph.D. Fast-Track Award – 2018, McGill Engineering Doctoral Award (MEDA) – 2019 to 2021
Google Summer of Code contributor for 2 consecutive years - 2019 to 2020

Computer Science and Engineering — *Bachelor of Technology* **Jul 2009 - May 2013**
Guru Gobind Singh Indraprastha University, India

- **Relevant Coursework:** Algorithm Analysis and Design, Software Engineering, Object-Oriented Programming, Computer Networks, and Database Management Systems

Work Experience

Data & Applied Scientist — *Bombardier Aerospace, Canada* **Mar 2023 - Current**

- Designed a production level tool (**DataProbe**) using AWS services to enable debugging of ML models and live data analysis.
- DataProbe saves more than 2 man hours in a day - **received an award in Recognition and Mobilization Program, 2023**.
- Developing multivariate variance-based ML solution (PMx) for anomaly detection using time-series data of aircraft sensors.
- PMx aims to increase the operational efficiency of aircraft and minimize return-to-service times through data-driven decisions.

Completed trainings - Architecting on AWS with AWS Jam; Snowflake Data Warehousing

Research Engineer AI (Intern) — *National Research Council (NRC), Canada* **Sep 2022 - Dec 2022**

- Performed research for applying deep learning to solve the problem of defect localization (authored NRC publication).
- Developed YOLO and Faster R-CNN models in PyTorch for classifying parts in vehicles (mAP $>$ 0.90).

Software Engineer AI (Intern) — *Bombardier Aerospace, Canada* **Jan 2021 - Sep 2022**

- Led an initiative to enable predictive analytics where I built a pipeline using Scikit-Learn to process 3D data and predict aero coefficients using classical Machine Learning models (>95% accuracy).
- Solved a business problem of optimizing conceptual designs of aircraft using optimization algorithms.
- Designed the architecture and built a prototypical tool with microservices using Django and React.

Second Place in the Case Competition "Bombardier Leaders of Tomorrow" – 2021

Software Engineer — *Accenture, India* **Dec 2013 - May 2017**

- Helped Portal and Finance consultants to solve critical issues using using ABAP programming.
- Enhanced the code of payroll interfaces that reduced the problem tickets to one-third.

Received the Outperform Award - 2016 for reducing problem tickets related to interfaces.

Technical Projects

Recommendation System — *AI-based Domain Modelling Bot* **Jan 2019 - Nov 2022**
Technologies Used: TensorFlow, SpaCy, Pandas, Scikit-Learn, Docker, Neo4j, Django, and RASA
- This research builds a recommendation system for assisting practitioners such as requirements engineers in quickly extracting domain models from informal requirements written in natural language.
- Applied Natural Language Processing techniques and Deep Learning models (BiLSTM neural networks).
- The system constructs queryable trace models in the form of knowledge graphs to explain decisions and facilitates system-user interactions for adapting the extracted models based on users' preferences.

Predictive Analytics — *AI-based Digital Twins for Personalized Workflows* **Sep 2023 - Current**
Technologies Used: AWS, Snowflake, LLMs, Python, PostgreSQL, and OpenModelica
- This project aims to build digital twins of application users using machine learning models to predict user's intent and preferences.
- Also, the project uses LLMs to generate personalized recommendations for given textual data and models' predictions for a user.

Selected International Publications

- **Paper Title:** Machine Learning-Based Incremental Learning in Interactive Domain Modelling DOI
  25th IEEE International Conference on Model-Driven Engineering Languages and Systems **(acceptance rate: 27%)**

- **Paper Title:** Automated Traceability for Domain Modelling Decisions Empowered by Artificial Intelligence DOI
  29th IEEE International Requirements Engineering Conference (RE), 2021, Research Paper **(acceptance rate: 27%)**

- **Paper Title:** Towards Queryable and Traceable Domain Models DOI
  28th IEEE International Requirements Engineering Conference (RE) - RE@NEXT! 2020 **(acceptance rate: 31%)**

- **Paper Title:** Hitchhiker's Guide to Model-Driven Engineering for Data-Centric Systems DOI
  IEEE Software, IEEE, 2020

- **Paper Title:** A Neural Network Based Approach to Domain Modelling Relationships and Patterns Recognition DOI
  28th IEEE International Requirements Engineering Conference (RE) - MoDRE 2020

Mentorship and Leadership Activities

Peer Mentor — *Mitacs and MasterCard* **Aug 2018 - Aug 2023**
- Assisted international students in making an easy transition to universities in Canada.
- Provided guidance on academics and life to scholars that eases their transition to universities and facilitates their success.

Team Mentor — *Bosch Future Mobility Challenge* **Nov 2021 - May 2022**
- Mentored undergraduate students in the Bosch Future Mobility challenge (2022) where the team developed autonomous driving and connectivity algorithms using deep learning and computer vision.
- The algorithms are supposed to execute on 1/10 scale vehicles to navigate in a simulated environment.

Team invited for the final competition in Romania in 2022

Location Lead — *Accenture's Corporate Citizenship (CSR), India* **Apr 2014 - Mar 2017**
- Organized more than 20 national volunteering events at Accenture partner NGOs from 2016 to 2017.
- Volunteered for more than 400 hours by conducting Skills to Succeed (S2S) sessions.

Received the Accenture Celebrates Excellence (ACE) award - 2015

Other Roles and Responsibilities
- General Chair of MoDRE'22 workshop at IEEE International Requirements Engineering Conference (RE).
- Program committee member of MODELS'22 IEEE conference, Model-Driven Engineering (MDE) Intelligence Workshop at MODELS'21, and reviewer of SoSyM (AI-enhanced MDE) journal papers in 2021.
- Evaluated the undergraduate research projects with the faculty of engineering in 2019, 2020, and 2021.
- Student volunteer at the flagship conferences – ICSE (2019), RE (2021), and MODELS (2019, 2020, 2021).

Personal Activities and Interests

- Hobbies – Learning new technologies, writing blogs, developing applications, painting, solving puzzles, and yoga.
- Music – Singing and playing flute, guitar, and congo.
- Activities and Sports – Skiing, Mountain Hiking, Badminton, and soccer.