Akhilesh Sanjay Somani

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Education

University of Illinois at Urbana-Champaign (UIUC) May 2021
Master of Science in Mechanical Engineering **GPA: 4.0/4.0**
(*Recipient of the prestigious **Stoyke Fellow Match** & **Kenametal Fellowship***)

Indian Institute of Technology Bombay (IIT Bombay) Aug 2019
Bachelor of Technology in Mechanical Engineering; Minor in **Computer Science & Engineering** **GPA: 9.16/10**

Relevant Skills

Python, MATLAB, Jupyter Notebook, Data Science and Analytics, Statistics, Machine Learning, SQL, MS Excel

Technical Experience

- **Data Scientist**, *University of Illinois at Urbana-Champaign* **Jan 2020 - May 2020**

  Autonomous Vehicle Safety Analysis:
  - Analyzed data for autonomous vehicle (AV) testings to gain insights into AI-control of AVs
  - Performed **Hypothesis testings and Kolmogorov-Smirnov tests** to compare AVs' performance results with human drivers, predicting an accident probability of 213 times higher, implying AVs not yet ready for large-scale deployments
  - Developed **Naive Bayes Model** to predict, with over 80% accuracy, the cause of AV failure under different conditions

  Unsupervised Stool Sample Analysis in Hepatic Encephalopathy:
  - Studied stool sample data for liver cirrhosis patients to analyze & predict the microbes responsible for brain damage
  - Refined and cleaned the raw data by coding and implementing **Bayesian Networks** on multiple data-sets
  - Implemented Kolmogorov-Smirnov tests to perform statistical analysis on microbe abundance data
  - Performed **dimensionality reduction** using PCA & clustering using KMeans, GMM, Hierarchical clustering, etc. to successfully identify & study taxonomical relations between 20 microbes (from 150) with altered abundance levels

  Data Analytics in High-Performance Computing Security:
  - Parsed the raw data from network packets into analysis-friendly format by using Pyshark
  - Identified attacker & legitimate user and DNS servers to study the origins and progression of the multi-stage attacks
  - Implemented **Hidden Markov Models** & **Factor Graphs** to predict the likely state of attacks

  Feature Generation and Portfolio Diversification of Stock Market:
  - Performing Feature Engineering analysis for sector-identification & portfolio diversification for S&P 500 Index stocks

- **Computational Modeler**, *University of Illinois at Urbana-Champaign* **Jan 2020 - May 2020**
  - Used Python to code & implement **Genetic Algorithm** and **Covariance Matrix Adaptation Evolution Strategy** to optimize multi-minima functions like Griewank, Bohachevsky, Rastrigin
  - Working on modeling the physics, and simulating & visualizing optimized motion of a slithering snake in Python

- **Summer Intern**, *University of California at Berkeley* **May 2017 - Jul 2017**

  Data Analysis of Nanoscale Thermal Protrusions on Hard-Disk Drives:
  - Used MATLAB to clean and process the data (captured from the nanoscale protrusions (~10 nm) of control resistors on hard disk drives) by performing operations like transformations and noise filtering
  - Analyzed the data and derived a linear relation between the protrusions and power input of the resistor

Key Projects

Rubik's Cube Solver Robot, *IIT Bombay* May 2016 - Jun 2016
- Designed and fabricated a robot capable of solving any scrambled $3 \times 3 \times 3$ Rubik's cube within **3 seconds**
- Incorporated Thistlethwaite's algorithm in MATLAB to generate solution steps, & controlled stepper motors using Arduino code to rotate appropriate faces as desired

Finite Element Analysis (FEA) of Bimetallic Strip, *UIUC* Nov 2019 - Dec 2019
- Coded a MATLAB Finite Element Solver and compared results with ABAQUS, achieving errors less than 3 percent