Aditya Jaishankar

aditya1642@gmail.com · (617)-721-9851 · http://aditya-jaishankar.github.io

EDUCATION

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, MA
Ph.D. in Mechanical Engineering, Minor in Mathematics — **June 2014**
Master of Science in Mechanical Engineering (MIT Presidential Fellowship Awardee) — **June 2011**

INDIAN INSTITUTE OF TECHNOLOGY MADRAS, Chennai, India.
Bachelor of Technology in Mechanical Engineering, Minor in Chemistry — **July 2009**

EXPERIENCE

EXXONMOBIL CORPORATE STRATEGIC RESEARCH, Annandale, NJ — **July 2014-Present**

Program Leader (July 2018 – Present):

- Led, and directed a multidisciplinary team of 8 PhD researchers on a fundamental research program in new ultra-high-strength polymers.
- Defined research goals and aligned the research program with business objectives while also progressing state-of-the-art basic science.
- Intellectual Property Strategy sub-team leader involving interactions across multiple business lines and functions across the discovery pipeline.

Senior Researcher (January 2017 – Present):

- Provided polymer science expertise on research program involving artificial neural networks for materials discovery and design.
- Computationally solved a coupled set of non-linear partial differential equations with simultaneous convection, diffusion, and chemical reactions for carbon capture applications using `numpy`, `numba`, `scipy`, `sympy`, and `scikit-learn`. This work led to new insights on increasing efficiency of carbon dioxide capture from air.

Advanced Researcher (July 2014 – January 2017):

- Performed experiments on the thermodynamics of self-assembled nanometer-thick monolayers and wrote detailed high-throughput experimental data cleaning, analysis, and model fitting routines using `numpy`, `pandas`, `scikit-learn, matplotlib`. Findings helped improve surface coatings for ultra-low friction surfaces and improved energy efficiency.
- Measured the solution properties of self-assembling aqueous polymers using a range of experimental techniques (UV and Fluorescence Spectroscopy, Dynamic Light Scattering, Infrared Spectroscopy). Wrote data analysis routines using `numpy, scipy, matplotlib`. Discoveries developed polymer solutions very stable to high stretching forces.

NON-NEWTONIAN FLUIDS LAB (MIT), Cambridge, MA — **August 2009- June 2014**

Graduate Research Assistant:

- Developed a mathematical framework using fractional differential equations to predict the mechanical response of materials with fractal-like arrangements of atoms. Wrote detailed model prediction codes in `Matlab` and `Mathematica`. This theory unified and connected many different models under one master framework.
- Performed polarization microscopy and extensional flow measurements on the lubrication fluid in knee joints of arthritis patients for rapid detection and diagnosis.
- Investigated the properties of self-assembled interfacial monolayers of protein-antibody solutions to discover new strategies for long-term shelf-stable bio-active solutions.
- Analyzed data using `Matlab` and `Mathematica` for flow property measurements of polymer melts performed under zero-gravity aboard the International Space Station. Discovered new fundamental findings about the behavior of particles suspended in polymer melts.

SELF-STUDY

Coursework: Certificates of completion and course notes available on personal website.

- Prof. David Silver's course on Reinforcement Learning (University College London) (http://www0.cs.ucl.ac.uk/staff/d.silver/web/Teaching.html)
- Machine learning with Python-From Linear Models to Deep Learning (MITx)
- Fundamentals of Statistics (MITx)
- Algorithmic Design and Techniques (UCSD)
- Probability – The Science and Uncertainty of Data (MITx)

- Prof. Lorena Barba's course on Python for Computation Fluid Dynamics (Boston University) (https://lorenabarba.com/blog/cfd-python-12-steps-to-navier-stokes/)
- Python for Data Science (UCSD)
- Reading peer reviewed journal publications in ML/AI for scientific discovery

Projects: All projects implemented from scratch. Jupyter notebooks available on personal website.

- Mushroom toxicity prediction using Naïve Bayes Classifier
- Titanic survival prediction using k-Nearest Neighbors algorithm
- MNIST digit classification using fully connected and convolutional neural networks
- Molecule solubility predictions using convolutional neural networks and feed forward neural networks from generated images of molecular polar charge density.
- Automatic SMILES string generation using recurrent neural networks
- Automatic scientific abstract text-generation using LSTMs

SKILLS

Scientific Python Universe:
`pytorch` (including use of `cudatoolkit`), `scikit-learn`, `numpy`, `scipy`, `pandas`, `sympy`, `numba`, `matplotlib`, basic familiarity with `rdkit` (python package for computational chemistry)

Computational Tools:
Various general interest python packages and tools, `Mathematica`, `Matlab`, `LaTeX`.

Experimental Techniques:
UV Spectroscopy, Fluorescence Spectroscopy, Infrared Spectroscopy, Dynamic Light Scattering, Rheometry, Optical, birefringence and polarization microscopy. Performed data cleaning, analysis and model fitting on all experiments as required using `python`, `Matlab` or `Mathematica`.

PUBLICATIONS

Detailed list is available on personal website.

- **14** peer-reviewed journal publications in diverse scientific areas ranging from material science to ultra-low friction surfaces.
- **5** US patent applications.
- **9** Scientific conference presentations.