NIDADAVOLU KAPIL CHANDRA

Indian Institute of Technology Madras

kapilchandra81@gmail.com
https://nkc-137.github.io/

EDUCATION

- **Indian Institute of Technology Madras** — Chennai, India
  Dual Degree in Metallurgical and Materials Engineering; **CGPA**: 8.80/10 — 2014 – 2019
  - Dual Degree Class Rank: 4
  - Minor: **Foundation in Physics**

SCHOLASTIC ACHIEVEMENTS

- **One among 400 candidates** all over India to be selected for the SRFP[1], 2017 to pursue a research internship in Indian Institute of Science, Bengaluru
- Achieved **All India Rank - 3384** in Joint Entrance Examination - 2014 (98th percentile)
- Maintained a consistent Grade Point Average (GPA) of over 9.0 over the last two semesters

PROJECTS

⋆ RESEARCH PROJECTS

Development of Atomistic Potentials for Ag Nanoclusters using ML

- *Master's Thesis, IIT Madras* — Aug '18 – Oct'18
  Guide: Dr. Satyesh Yadav
  - Performed first principle calculations for Ag nanoclusters using **VASP** over **OpenMPI framework**
  - Developed a complete pipeline involving unsupervised and supervised learning techniques using **scikit-learn**, implementing fingerprint-based **Kernel Ridge Regression** to fit the force fields of Ag
  - Currently working on developing models to fit force fields for Ag clusters

Structure-Property linkages using Machine Learning

- *Research intern at ICAMS Lab, Germany* — May '18 – July '18
  Guides: Prof. Alexander Hartmaier, Dr. Napat Vajragupta
  - Developed machine learning models to replace a non-local crystal plasticity model
  - Achieved an **accuracy of 98.3%** on grain size distribution predictions from flow curve data
  - Analyzed data using **unsupervised learning** and performed **feature engineering** to improve the performance of the model and deployed **meta ensembling techniques** to enhance the performance
  - Generated RVEs[2] in **LAMMPS** and carried out crystal plasticity finite element simulations using **UMAT subroutine in ABAQUS**
  - Currently working on developing a wholesome ML pipeline to replace an advanced analytical initial yield function like **Barlat YLD 2004-18p** for predicting the yield surface

Development of memory efficient phase field model [Link]

- *Research Intern at Indian Institute of Science, Bengaluru* — May '17 – July '17
  Guide: Prof. Abhik Choudhury
  - Implemented a phase field model for grain growth during recrystallization based on the paper Computer simulations of 2-D and 3-D ideal grain growth by Kim, Kim and Suzuki, in C
  - Developed a memory efficient code by using **dynamic memory allocation** and **linked lists** which reduced the space complexity of algorithm from $\mathcal{O}(no.of grains \times x \times y)$ to $\mathcal{O}(1 \times x \times y)$

Numerical Modeling of Diffusion in Processes [Link]

- *Research project, IIT Madras* — June '16 – Aug'16
  Guide: Dr. Kanjarla Anand Krishna
  - Developed code to implement **Alternate Direction Implicit** scheme for Finite Difference to solve 2-D partial differential equations
  - Employed **Spectral Methods** using Fourier transform for better convergence and accuracy

[1] Summer Research Fellowship Program
[2] Representative Volume Elements

⋆ COURSE PROJECTS

Machine Learning for Engineering and Scientific Applications

- *Course Project, IIT Madras* Jan '18 – April '18

  Instructors: Dr. Balaji Srinivasan, Dr. Ganapathy Krishnamurthi
  - Implemented CNN[3] in **TensorFlow** to classify MNIST dataset and obtained an accuracy of **98.4%**
  - Developed codes for Linear Regression, Logistic Regression and ANN[4] from scratch in Python without using already available frameworks
  - Implemented high performance gradient descent optimization algorithms like **Adam**, **Adagrad** and **RMSprop** from scratch in Python

Computational Materials Engineering Lab

- *Course Project, IIT Madras* Aug '17 – Dec '17

  Instructors: Dr. G Phanikumar, Dr. Kanjarla Anand Krishna, Dr. Parasuraman Swaminathan
  - Implemented **isotropic and anisotropic dendritic growth** model based on the paper "Modeling and numerical simulations of dendritic crystal growth" by Ryo Kobayashi, in **Matlab**
  - Devised algorithms for image processing tools like Object Counting and Edge Detection in MATLAB
  - Implemented algorithms for solving ordinary partial differential equations in MATLAB

Numerical Modeling of Melt Spinning

- *Course project, IIT Madras* April '16 – May '16

  Instructor: Dr. Gandham Phanikumar
  - Identified the effects of change in different parameters on the melt puddle during melt spinning
  - Thoroughly studied a numerical model for the process which led to a term paper formatted in LaTeX

⋆ SELF MOTIVATED PROJECTS

- **Online Automation Tools [Link]**

  Python Script
  - Developed scripts in Python which can automatically book train tickets online
  - Developed automatic mass SMS sender using **Selenium** and **Beautiful Soup** module in Python

TEACHING ASSISTANTSHIP

- **Computational Materials Engineering Lab**

  Guides: Dr. G Phanikumar, Dr. Kanjarla Anand, Dr. Parasuraman Swaminathan Aug '18 – Dec '18
  - Assisted undergraduate students to understand concepts and clarified their doubts inside and outside the class

TECHNOLOGY SUMMARY

- **Programming & Scripting Languages:** C, Python, Fortran, BASH Shell, HTML + CSS
- **Machine Learning Frameworks:** Tensorflow, Keras, Theano, Scikit-Learn
- **Modelling tools:** VASP, Quantum ESPRESSO, LAMMPS, Abaqus
- **Miscellaneous Tools:** Git, MATLAB, LaTeX

RELEVANT COURSEWORK

- **Materials Science & Physics:** Computational Materials Engineering Lab, Atomistic Modeling of Materials, X-Ray Diffraction Techniques, Quantum Physics, Physics of Materials, Phase transformation, Materials for Energy Technologies, Transport Phenomena
- **Algorithms & Computing:** Data Structures and Algorithms, Graph Theory and its applications, Fundamentals of Operations Research
- **Machine Learning and Deep Learning:** Machine Learning, Neural Networks and Deep Learning, Improving Deep Neural Networks, Introduction to Data Science In Python

[3] Convolutional Neural Networks
[4] Artificial Neural Networks