Nikhil Prabhu

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Professional Summary

Eager to combine an interdisciplinary foundation with expertise in advanced characterization, data processing and analysis, multiscale and multiphysics materials modeling, and open-source scientific software development to build simulation tools and analyze product designs, while continuing to learn and collaborate across disciplines.

Overview of Skills

- **Interpersonal**: Public speaking, networking, cross-disciplinary teamwork & collaboration, mentoring.
- **Computational Materials Science**: Multiscale and multiphysics modeling, Finite elements and spectral methods.
- **High Performance Computing**: Slurm, GNU Parallel, shell scripting, HDF5, Multi-threading and processing.
- **Data Processing & Analysis**: Python libraries, statistical analysis, large-scale data processing.
- **Software Engineering**: Python & Fortran development, DAMASK Multiphysics and ImageD11 contributions; Git; CI/CD; CMake; unit testing; documentation and debugging.
- **Scientific Toolkits**: ANSYS, COMSOL Multiphysics, LS-DYNA, LS-OPT, CATIA V5.

Education

Doctor of Engineering Science in Materials Engineering

Jan 2021 – Oct 2025

Departments of Computer Science & Materials Engineering, KU Leuven, Belgium

- Thesis: **Micromechanical Modeling Strategies Toward High-Fidelity Digital Twins of Polycrystals**
  Enhanced mesoscale modeling approaches for integration into multiscale material digital twins, enabling accurate predictions for efficient design and development cycles. **DOI**: 10.5281/zenodo.17465716
- Gained fundamental understanding of crystalline material behavior across time and length scales, from dislocation mechanisms to macroscopic property evolution, strengthening expertise in **multiscale modeling**.
- Translated engineering problems into computational models by designing simulations, applying simplifications for tractability, and validating predictions against physical insights.
- Gained proficiency in **spectral methods** and **finite element analysis** for solving nonlinear ODEs, **crystal plasticity** modeling, and setting efficient computational workflows for large-scale simulations.
- Routinely used high-performance computing clusters, working with the **Slurm** job scheduler, **GNU parallel**, **Shell** scripting, virtual environments, **HDF5** data pipelines, and post-processing in **Python** & **ParaView**.
- Contributed to the development of the **DAMASK multiphysics** simulation toolkit by translating mathematical constitutive descriptions into modern **Fortran** modules, implementing and debugging solver routines and the **Python** pre- and post-processing tools.
- Gained experience with **software engineering** practices in a scientific codebase, including collaborative version control with **Git**, **CI** pipelines, **CMake**-based build configurations, unit testing, and structured documentation.
- Built strong skills in Python **data processing & analysis** through routine use of **NumPy**, **SciPy**, **Pandas**, **Matplotlib**, and **scikit-learn** for statistical analysis and insight extraction from large datasets.
- Assisted in teaching a *project course in mathematical engineering* and a course on *hot forming techniques*, guiding students and supporting course activities.
- Participated in multiple workshops organized by **Vlaams Supercomputer Centrum** on topics including **scientific software development**, **high-performance computing**, and **data analysis**.

Master of Science in Mechanical Engineering
Sep 2018 – Sep 2020

Linköping University, Sweden (Grade: 4.6 / 5, Pass with Distinction)

- Thesis: **Material Parameter Identification of a Thermoplastic using Full-Field Calibration**
  Developed a routine for elastoplastic and damage parameters identification using image-based full-field experimental data at **IKEA Components** (Älmhult, SE). **DiVA id**: diva2:1471392
- Built a strong foundation in the computational description of complex material behavior through coursework in **continuum mechanics**, **heat transfer**, and **numerical methods** (FEM, FDM).
- Applied computational techniques to practical engineering problems through projects involving multiphysics and material damage simulations using **ANSYS**, **COMSOL Multiphysics**, **LS-DYNA**, and **CATIA V5**.
- Completed a group project from **Siemens Energy** (Finspång, SE) involving simulation-driven design of an auxiliary liquid-fuel distribution system operating in a high-temperature multiphysics environment.

Bachelor of Engineering in Mechanical Engineering
Aug 2014 – June 2018

NMAM Institute of Technology, Karnataka, India (GPA: 8.49 / 10, Distinction)

- Thesis: **Design and Fabrication of tilting steering mechanism for Adapted Automobiles**
  Implemented a tiltingsteering mechanism on a two-wheeler vehicle to enable maneuvering through controlled body-weight shifting.

Experience

Postdoctoral Researcher
Oct 2025 – Present

Department of Computer Science, KU Leuven, Belgium

- Project: **Advanced modelling and characterization for power semiconductor materials and technologies**
  Multiscale and multiphysics modeling of damage nucleation in thick **Cu metallizations** of **SiC** and **GaN** power semiconductors during power cycles.
- Processed large-scale raw data from **scanning 3DXRD**, a state-of-the-art diffraction technique, using HPC clusters (at ESRF, Grenoble) and parallelization.
- Developing thermo-mechanical degradation simulations of Cu interconnects to validate against experiments.
- Contributing to open-source scientific software: **DAMASK Multiphysics** and **ImageD11**.

Master Thesis Student
Jan 2020 – Sep 2020

IKEA Components AB, Älmhult, Sweden

- Simulated thermoplastic material behavior using **LS-DYNA** and performed parameter identification with **LS-OPT**, supported by Python automation scripts.
- Completed specialized software training at **DYNAmore Nordic** (Linköping, SE) to strengthen simulation and optimization expertise.

Teaching and Lab Assistant (part time)
Sep 2019 – Jan 2020

Department of Management & Engineering, Linköping University, Sweden

- Assisted in the *Introduction to Computational Mechanics* masters course, supporting labs and exercise sessions; received recommendation from the instructor (Prof. Carl-Johan Thore).

Awards and Contributions

- Attended and presented research contributions at several conferences across Europe and North America, creating opportunities for scientific exchange and collaboration.
- Received a 50% tuition fee merit scholarship from Linköping University for excellence in academic performance during the masters programme.
- Awarded a merit scholarship during the bachelors programme, which included interpersonal skills and communication development workshops organized by the World Konkani Center, India.