

Allamaprabhu S Ani

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scholar.google.com/citations?user=dX3xKGsAAAAJ

SUMMARY

PhD researcher in computational mechanics and machine learning, building GPU native, differentiable physics simulators in PyTorch. Lead author of the 2026 *Engineering Fracture Mechanics* review on ML for fracture (with EPFL and University of Florida). Built `torch_pf_solver`, a PyTorch package with autograd through a staggered FEM solver, reproducible Slurm pipelines, and validation against five reference codes.

SKILLS

Programming: Python, PyTorch (autograd, CUDA), JAX, NumPy/SciPy, scikit-learn, pandas, MATLAB, C++ (read), Bash, Git.

Machine Learning: Neural operators (DeepONet, FNO), PINNs, differentiable simulation, inverse problems, L-BFGS, adjoint methods.

Scientific Computing: GPU acceleration, sparse linear algebra, finite element method, phase field fracture, mixed precision numerics.

Infrastructure and tools: Slurm HPC, Linux, packaging, Sphinx, GitHub Actions, Akantu, FEniCSx, COMSOL, MSC Nastran/Patran, Abaqus.

EXPERIENCE

Doctoral Researcher, Computational Mechanics and ML Jul 2023 – Jun 2026 (expected)
City, St George's, University of London & Queen Mary University of London

- Built `torch_pf_solver`: PyTorch native phase field fracture solver with end to end autograd through a staggered solver, scaling to 1M+ DOF on a single GPU.
- Implemented gradient based inverse problems for material parameter recovery, spatial field reconstruction, and defect localisation; benchmarked against finite difference and MCMC baselines.
- Achieved 10-20x sparse solve speedup over a C++ reference (Akantu) on quasi static benchmarks; cross validated dynamics on Kalthoff, SENT, Borden.
- Maintained reproducible Slurm pipelines on Hyperion2; local Mac CPU and WSL CUDA development.

Visiting Researcher, Computational Solid Mechanics 2025
LSMS Lab, EPFL (host: Prof. J.-F. Molinari)

- Co-authored *Engineering Fracture Mechanics 2026* review of ML for computational fracture; open access, growing citation count.

Founder and Tool Developer 2020 – 2021
Aeroknacks India Ltd

- Shipped a library of validated structural-analysis tools (BJSFM, Cozzone, lug strength, fastener load transfer, buckling, modal, ABD) to an aerospace engineering firm; built on Bruhn/Niu/ESDU references and cross validated in MSC Nastran/Patran.

EDUCATION

PhD, Mechanical Engineering, City, St George's, University of London (Jul 2023 – Jun 2026 exp.). Thesis: GPU native differentiable phase field fracture.

MTech, Design and Manufacturing, NIT Silchar (2021–2023). CGPA 9.88/10. Best Student Award.

BE, Mechanical Engineering, GM Institute of Technology, VTU (2016–2020). CGPA 8.47/10.

SELECTED PUBLICATIONS

Ani, A.S., Nakka, R., Subhash, G., Molinari, J.-F., Ponnusami, S.A. (2026). Machine learning for computational fracture and damage mechanics: Status and perspectives. *Engineering Fracture Mechanics* 332, 111778.

Ani, A.S., Deoghare, A.B. (2024). ML for fatigue life prediction in aluminium alloys. *Lecture Notes in Mechanical Engineering*, Springer.

PROJECTS

bjsfm – github.com/allamaprabhuani/bjsfm – anisotropic composite stress field in Python.

geometric-transformations – github.com/allamaprabhuani/geometric-transformations – 2D/3D affine transforms.

allamaprabhuani.github.io – research notes, ML tutorials, blog.

AWARDS

Yeoman & Travelling Scholarship (2026, 1 of 3 citywide). Dean's Award for Outstanding Teaching Support (2026). AFHEA (2024). Funded PhD Studentship (2023). Best Student Award, MTech NIT Silchar (2023).