ASHWANI KUMAR

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PROFESSIONAL SUMMARY

Research Engineer (PhD candidate, ETH Zürich – expected 2025) with over 4 years of research experience in finite element analysis, multiphysics, and multiscale modeling, machine learning, and high-performance scientific computing, complemented by 4+ years in R&D focused on structural, vibration, and durability testing. Proficient in FEA software (Abaqus, COMSOL, ANSYS) and skilled in Python and C++ for automation and post-processing.

PROFESSIONAL EXPERIENCE

ETH Zürich, Switzerland 2021 - Present
Research Scientist - Advanced Manufacturing Lab

- Developed & validated nonlinear thermo-mechanical FEM models of high-temperature process, improving prediction accuracy.
- Built direct FE^2 multiphysics frameworks linking micro- and macroscale behavior, enabling predictive modeling of complex material systems.
- Developed Python-based ML pipelines for surrogate model training, integrating with FEM solvers for efficient large-scale simulations.
- Implemented Python algorithms to automate meshing, dataset generation, and CAE pipeline integration, streamlining simulation workflows for scalability.
- Published in high-impact journals and presented at international conferences.

Skills: Nonlinear FEM, Multiphysics modeling, Transient FEM, Dynamic Process Simulation, Parameter Calibration, Abaqus, COMSOL, Python, Scientific Computing, Team work

Ruhr University Bochum, Germany 2019 - 2021
Research Assistant (HiWi) - Chair of Statics and Dynamics

- Optimized placement of Dog-Bone button for shoulder surgery using FEM, improving prediction of surgical outcomes.
- Developed homogenization-based bone material models, incorporating tissue- and collagen-level characteristics.
- Enhanced FEM solver (FEAPpv) by integrating parallel numerical libraries (PARDISO and MKL), improving stability and scalability.
- Assisted in developing FEM-based diffusion models to simulate fluid flow in fractured rock systems.
- Collaborated with medical and geological research teams on interdisciplinary projects

Skills: Nonlinear Material Modeling, Solver Development, Parallel Computing (PARDISO, MKL), Python, Matlab, C++, Open Source FEM Solver,

Hero MotoCorp Ltd, India 2014 - 2018
Deputy Manager - Chassis Simulation & Analysis

- Executed structural testing for new vehicle chassis and correlated FEM with experimental data, ensuring structural durability.
- Designed correlation experiments to validate FEM predictions, improving model accuracy and design confidence.
- Executed vibration, fatigue and modal analyses with Siemens LMS and HBM systems, guiding design improvements under tight timelines.
- Conducted durability studies by correlating proving-ground loads with lab simulators, optimizing testing protocols for efficiency.
- Automated data acquisition and reporting workflows, increasing test coverage and verification speed.
- Led a cross-functional team of six technicians and riders, translating test outcomes into market-ready design improvements.

Skills: Structural Testing, Fatigue & Vibration Analysis, nCode DesignLife, Siemens LMS, Data Acquisition & Correlation, Durability Studies, Team Leadership

EDUCATION

ETH Zurich, Switzerland 09/2021 - Present
Doctor of Science in Mechanical Engineering
– Thesis: Multiphysics modeling of SPS process

Ruhr University Bochum, Germany 10/2018 - 06/2021
Master of Science in Computational Engineering, *GPA: 0.8* (German scale)
– Thesis: Computational Modeling of crack propagation in 3D using strain injection technique

Dr B R Ambedkar National Institute of Technology, Jalandhar 07/2010 - 05/2014
Bachelor of Technology (B.Tech.) in Mechanical Engineering, *GPA: 8.6/10*
– Thesis: Experimental evaluation of damping behavior of fly ash filled fiber reinforced polymer composite

SKILLS

Simulation & Design Tools:	Abaqus, ANSYS, AutoCAD, CATIA, COMSOL, FEniCSx, OpenFOAM, ParaView, SolidWorks
Programming & Libraries:	Python, C++, Java, Matlab, PyTorch, TensorFlow, Git
Computing & Scaling:	HPC cluster (ETH), Familiar with AWS, OpenMP, MPI
Languages:	English (C2), German (B1 – progressing toward fluency), Hindi (Native)
Data Acquisition & Analysis:	LMS TestLab, Matlab, nCode DesignLife
Technical Skills:	Scientific Computing, Multiphysics & Multiscale Modeling, Machine Learning, Surrogate Modeling, Fatigue, Vibration

CERTIFICATIONS

- Training on 2D Data Acquisition Hardware & Software 2016
- Training on Vibration Analysis 2015
- Training on nCode Glyphwork 2015
- Training on Experimental Stress Analysis 2015

AWARDS & ACCOMPLISHMENTS

- DEUTSCHLANDSTIPENDIUM for excellence as international student at Ruhr University Bochum 2019
- Achiever Award 2017-18 for Exemplary Performance at Hero MotoCorp Ltd 2018
- Gold Medal (Roll of Honour 2014), First rank in college in B.Tech. Mechanical Engineering 2014

PUBLICATIONS

- Geometric precision and interface alignment in multimaterial spark plasma sintering: design insights from validated electro–thermo–mechanical process modeling *Submitted*
- Enhancing multiscale simulations for spark plasma sintering with a novel Direct FE framework, *Journal of Manufacturing Processes* 2025
- A two-stage approach for material parameters identification in spark plasma sintering, *Mechanics of Materials/Elsevier* 2024
- Bone tunnel placement influences shear stresses at the coracoid process after coracoclavicular ligament reconstruction: a finite element study and radiological analysis, *Archives of Orthopaedic and Trauma Surgery/Springer* 2023

REFERENCES

References will be shared upon request.