MOEEZE HASSAN

Doctoral Researcher
Computational Mechanics & AI



Contact

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Links

/moeeze-hassan
/FammasMaz

Technical Skills

COMSOL, ANSYS, CREO, SolidWorks, MATLAB, LaTeX
Python, C, C++, Fortran
Transformers, GANs, Diffusion Models, DeepONets, CNNs
Linux Kernel, HPC, Git, CI/CD

Languages

English: C2 *(IELTS 8.5/9.0)*
French: B2
Urdu: Native

Awards

ERASMUS Mundus Scholarship
Awarded (declined), WAVES EMJMD, 2022

IDEX Scholarship
CentraleSupélec, Paris-Saclay, 2021

Merit Scholarships
Govt. of Pakistan, 2017 & 2021

Dean's List
PIEAS, 2020 & 2021

About

Doctoral researcher at Université Aix-Marseille and SNCF, with a specialization in computational mechanics and extensive experience with AI. My current work focuses on using Generative AI and Graph Networks to accelerate rail ballast stress predictions. Background in Mechanical Engineering, Vibration Analysis, and Deep Learning. Vast experience with HPC, scientific computing and dedication to open-source development.

Professional Experience

SNCF, France — Feb 2024 – Present
Doctoral Researcher (CIFRE) — Paris

- Built a novel Generative-AI pipeline to rapidly create large assemblies of railway ballast.
- Developing a prediction model to estimate stress states in ballast as trains pass on tracks.

CentraleSupélec, France — 2024 – 2025
Visiting Lecturer (Vacataire) — Gif-sur-Yvette

- Taught tutorial sessions (TD) for Multiphysics Couplings (COMSOL), Dept. of Mechanical Engineering & Energy.

SNCF, France — Mar – Sept 2023
M2 Research Intern — Paris

- Investigated impact of viscoelastic rail-pads on rail dynamic forces across pad types.

Sensors Lab – NILOP, Pakistan — Jun 2020 – Jun 2021
Research Intern — Islamabad

- 6-DOF motion detection at 50 nm precision (5% uncertainty) via custom Stewart Platform.
- MATLAB-based micro-thrust measurement with custom electromagnetic thruster.

PINSTECH, Pakistan — Jun – Jul 2019
Intern Engineer — Islamabad

- Nuclear reactor HVAC study; design and fabrication of test equipment for the reactor; topology optimization

Education

Université Aix-Marseille & SNCF, France — Feb 2024 – Present
PhD: Vibrations near ballasted railway tracks & ANNs for stress prediction in granular media

CentraleSupélec, France — Sept 2022 – Sept 2023
M2 Modélisation et Simulation en Mécanique des Structures

- Grade: 17.24/20, Mention: Très Bien
- Model Reduction, Modal Analysis, XFEM, Advanced Structural Dynamics

CentraleSupélec, France — Sept 2021 – May 2022
M1 Mechanics – International Track

- Structural Dynamics, Continuum Mechanics, Non-Linear Materials, Optimization
- Project: Earthquake simulations via ML conditioned by seismic metadata

PIEAS, Pakistan — Sept 2017 – July 2021
BSc Mechanical Engineering (GPA: 3.76/4.0)

- Thesis: Design and Fabrication of a 6-DOF AI-Driven Motion Sensor

DeepLearning.AI — Sept 2020 – Sept 2022
NLP, GANs, and Deep Learning Specialization

Publications

Fast 3D diffusion for scalable discrete granular media synthesis

M. M. Hassan, R. Cottereau, F. Gatti, P. Dec

Computers and Geotechnics, vol. 198, art. 108336, 2026

sciencedirect.com

Conference

DTE AICOMAS 2025
International Conference, Paris
17–21 February 2025

Generation of Samples of Granular Material Using Diffusion Models

M. M. Hassan, R. Cottereau, F. Gatti, P. Dec

Conference link

Hobby Projects

Linux Kernel Bringup
First 4.14/4.19 kernel on a Xiaomi phone – GitHub

OpenCore Bootloader
macOS on Dell Vostro 3468 – GitHub

InteractSeg
Video segmentation tool based based on Meta's SAM – GitHub

MaterialChat
A universal AI chat app based on latest Android APIs – GitHub

Projects

Spectrometer Casing – CentraleSupélec & ESA Jan 2022

- Topology-optimized spectrometer casing for a Martian-orbit satellite, designed for additive manufacturing and standard vibration/thermal/structural tests.

6-DOF Parallel Manipulator Robot – PIEAS Jan 2021

- Designed and fabricated a parallel manipulator with precise small-range motions in all six axes and a virtual feedback loop.

Vibration Analysis: Punching Press – PIEAS Sept 2020

- Multi-domain vibration analysis on a high-speed servo-driven punching press; developed a control method.

Motion Detection via Diffraction & AI – PIEAS Jan 2020

- CNN-based technique using light diffraction to detect small-scale motions from electromagnetic thrusts.

Simplified 3D Building Models – CentraleSupélec Dec 2021

Custom Wheel Rim Design & FEM Analysis – PIEAS Jan 2021