

PRANAV D

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Summary: Mechanical engineering grad passionate about the areas of *Bayesian analysis, human body modelling and passive safety*.

EDUCATION

Vellore Institute of Technology – Chennai Campus

Bachelor of Technology, Mechanical Engineering with spl. in E-Vehicles

Chennai, IN

May 2021 - Jul 2025

- CGPA: 9.44 | Gold Medallist
- Meritorious Award (4 consecutive years): Rank 1 (2025, 2024) & Rank 3 (2023, 2022)
- 100% Attendance Award recipient (2022)
- Served as Programme Representative & Student Council Member

EXPERIENCE

Indian Institute of Technology Madras

Project Associate

Chennai, IN

Jul 2025 - Present

- Building a robust standalone python framework to compute the deformed shape of slender rods under complex loading conditions.
- Employed mathematical formulations from CAD and Cosserat rod theory to simulate the behaviour of these slender structures.

VIT – Medical College of Wisconsin, US Joint Internship Program

Student Intern

Remote

Aug 2023 - Dec 2023

- Developed a *Smooth Particle Hydrodynamics (SPH)* model to simulate cervical spinal cord behaviour for precise clinical interventions.
- Validated results against primary metrics such as segmental rotation, disc pressure and ligament strain.

La Dassaault Systèmes Foundation – India

Engineering DESIGN Internship Program

Remote

May 2024 - May 2025

- Completed a 3-phase campus internship programme focused on the project “*Converting ‘FE model of cervical spine’ to 3D Digital bio-twin*”.
- Integrated concepts from biomechanics, FEA and 3D printing in the project workflow.

CORE COMPETENCIES

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|-----------------------------|-----------------------------|---------------------------|
| • Bayesian Analysis | • Probabilistic Programming | • Finite Element Analysis |
| • Exploratory Data Analysis | • Spine Biomechanics | • Computer Aided Design |

SELECTED PROJECTS

Comparison of Flexion-Extension Responses between Male and Female Cervical Spine Segments

- Modelled the segmental rotations of sub-axial cervical spine segments using *hierarchical Bayesian regression analysis*.
- Presented in IRCOBi Europe (2025) Conference, Vilnius, Lithuania.
- Received travel grant from Toyota, and Best Presentation in the *Spine Biomechanics and Injury* session.

Sensitivity analysis of a morphological finite element L3-L4 FSU

- Parameterized the L3-L4 FSU FE model for population study to simulate the anatomical variances using *ANSA, python and LS-Dyna*.
- Estimated the rotation angle from anatomical parameters using *Bayesian multiple linear regression*.
- Presented at IRCOBi Asia (2025) Conference, Chennai, India.

Computational Modelling of Li-ion Battery in LS-Dyna for crash applications

- Coupled mechanical, thermal and electrochemical solvers to simulate the impact and short-circuit scenarios of lithium-ion battery.
- Followed the Tshell elements with Randles equivalent circuit modelling approach.

Contribution to Bambi Example Gallery

- Refined the documentation to clarify Bayesian hierarchical modelling concepts and improve consistency between Bambi and PyMC implementations.
- Expanded the hierarchical linear regression example by including mathematical formulations, EDA, and posterior visualisations.

Analysis of Road Accident Fatalities in India (WIP)

- Analysing the trends in traffic accidents and fatalities classified by road, vehicles and time of occurrence.
- Developing a interactive data visualization dashboard to present key insights and temporal trends.

Effect of Helmet Fit & Orientation in Frontal and Lateral Impact (WIP)

- Studying the common misuse of helmets and analysing its effect on injury using finite element analysis.
- Identifying the most vulnerable orientation of the helmet using Bayesian analysis.

TOOLS & SOFTWARE

CAE Software

- ANSA pre-processor
- Solidworks
- LS-Dyna
- Hypermesh

Coding

- Python
- Git

Essentials

- MS-Office
- Quarto

WORKSHOPS & CERTIFICATIONS

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|--|---------------|
| • Injury Biomechanics for Road Safety <i>CODE, IITM</i> | (5D) Jun 2025 |
| • An Introduction to Injury Assessment using Human Body Models <i>CODE, IITM</i> | (2D) Jan 2025 |
| • Introduction to Vehicle Occupant Safety <i>CODE, IITM</i> | (5D) Sep 2024 |
| • HyperWorks Introduction v2022 <i>Altair Learning – Online</i> | Jan 2023 |
| • Python 3.4.3 Training <i>Spoken Tutorial Project, IITB</i> | Feb 2022 |

REFERENCE

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