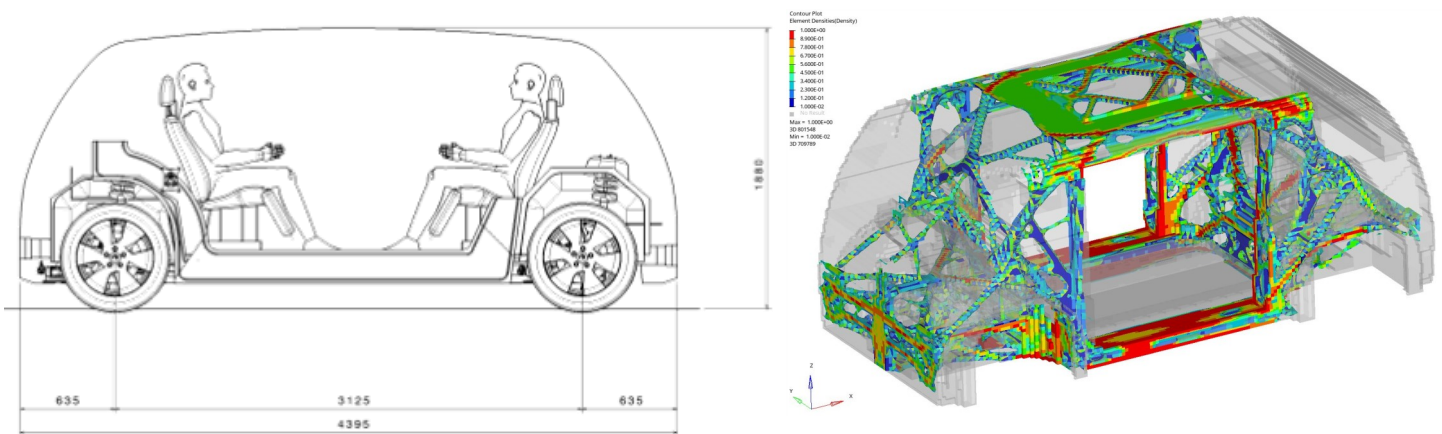# IIAS Indian Institute for Autonomous Systems

HANDS-ON WORKSHOP ON STRUCTURAL DESIGN & ANALYSIS

| Main structural system
Base/Floor system
Lateral/long. stability system
Structural materials
Structural pattern
Pre-sizing
Integration structure-architecture | ← | Improvements and alternatives (iterative process) | ← | Modelling the structure
Calculating the structure
Verifying the results of the calculation
Interpreting the results
Improvements and alternatives (iterative process) |

Workshop Details

Schedule and Type: Jan. 03 to Jan. 31, 2026; Instructor led interactive + demo + QA + hands-on practices

Workshop Duration: 50 Hours (10 hours online for foundation, 40 hours offline for hands-on practices), 1 month

Conduction Mode: Online: 5:00 PM-7:00 PM on all working days; flexible timing slot based on batch request

Attendee Background: Mech., Automotive, Aerospace and Robotics

Instructors: Dr. Prashanth Dalawai

Registration Link: www.iias-uv.in/services/training/workshops/

Registration Deadline: Jan. 03, 2026 and limited seats avalible

Workshop Objective

Structural play a critical role in the construction of buildings, bridges, vehicle frames and other structures. The structural analysis is the process of examining a structure to determine its strength, stability and overall safety under the loads that act on the system, such as unbalance, weight, payload, wind, earthquake and several other loads. Structural design, on the other hand, is the process of selecting materials, determining the size and shape of structural elements and specifying details such as connections and joints to withstand these loads using the knowledge of practical aspects such as basic mechanics, recent design codes, laws guidelines for the safe design. The structural analysis uses basic mathematics and physics knowledge about the behavior of structural elements in finding reactions, moments, resulting stress or strength using mathematical models and computer simulations.

IIAS training division offers an advanced training program and workshop by providing both theoretical, computational and hands-on testing foundations and real-world case studies on automotive, aerospace and heavy engineering and other rotating machinery. These programs concentrate more on the faster adaptation of technology to the respective industries and reduce the training curve. This workshop is carefully designed to give the essential fundamentals as well as practical implementation skills through the instructor, who has decades of experience in teaching this course, designing and analyzing a variety of structures in industry.

After attending, the participant will learn about how to design, mesh and simulate complex designs using the leading and latest PTC Creo software to virtually create and test the structures. It also serves as a preparation exercise to step into the fracture and fatigue area. The fresh engineers can get ready for the industry and take career assistance support.

Workshop Content

Fundamentals of Structural Design and Analysis: Duration (Hrs.):10

Sl.	Topic	Date
1	**Introduction:** Types of stresses, material constants, state of stresses, structural design and analysis, theories for failure, structural design optimization, Stresses and deformation in simple and composite bars and FEM fundamentals. Demonstrations.	Jan. 03
2	**Stresses and deflection in beams:** Types of beams and loads - shear force and bending moment diagrams. Shear stress distribution in beams of different sections. Methods to calculate slope and deflection in beams. Demonstrations.	Jan. 05
3	**Torsion of shafts and columns:** Torsion of circular shafts and composite shafts. Columns and struts: Member subjected to combined bending and axial loads. Demonstrations.	Jan. 06
4	**Stresses and deflection in plates and shells:** Bending of plates, membrane analysis for shells. Demonstrations.	Jan. 07
5	**Structural durability and fracture:** Structural life estimation techniques, characteristics and mechanisms of fatigue cracks initiation and propagation, stress intensity factors	Jan. 08

Hands on Structural Design and Analysis Exercises: Duration (Hrs.):40

Sl.	Topic	Date
1	Structural design capabilities of commercial software's: NASTRAN, ANSYS, CATIA, PTC Creo Simulation, and Python structural analysis anaStruct and PyNite. Demonstration	Jan. 09
2	Introduction to structural design using PTC Creo 12.4.1.0: Capabilities, creating assemblies, simulating stress deformation, various elements, and analyses types, playback results and hands on structural analysis examples	Jan. 10
3	The direct stiffness method example	Jan. 12
4	Truss elements in two-dimensional spaces example	Jan. 13
5	2D trusses in MS Excel and the truss solver example	Jan. 14
6	Creo Simulate two-Dimensional truss analysis example	Jan. 15
7	Three-Dimensional truss analysis example	Jan. 16
8	Basic beam analysis example	Jan. 17
9	Beam analysis tools example	Jan. 19
10	Statically Indeterminate Structures example	Jan. 20
11	Two dimensional solid elements example	Jan. 21
12	Three dimensional solid elements example	Jan. 22
13	Axisymmetric and Thin shell elements example	Jan. 23
14	Dynamic modal analysis example	Jan. 24
15	Simulate parts and assemblies example	Jan. 26
16	Bars, Beams, masses and springs example	Jan. 27
17	Shells, plates, solids, and composite example	Jan. 28
18	Design optimization example	Jan. 29
19	Bar, beam, shaft and column analysis of foundation class demonstrations	Jan. 30
20	Plate, shell and solid analysis of foundation class demonstrations	Jan. 31

Slots are flexible based on the batch request and resource availability.

Workshop Closure

Sl.	Topic	Date
1	Assessment and feedback, issuing of certificates and concluding the workshop.	Jan. 31

About IIAS

IIAS (Indian Institute for Autonomous Systems) is set up primarily to fill the gap between academia and industry in the development of machines, unmanned vehicles and autonomous systems, allied technologies, and to create a related skilled workforce. IIAS have personnel with extensive expertise in serving the leading industries and academia in the cutting-edge technologies. IIAS is located in the heart of the city with modern teaching aids, facilities, and resources for both creating and deploying design, analysis and control solutions for the machinery and vehicles.

About Instructor

Dr. Prashanth Dalawai has 30 years of experience in the R&D sectors of leading Indian and multinational companies and in a few of the oldest institutes in India. He holds a B.E. in mechanical from Karnatak University, M.Tech., and a Ph.D. in mechanics and design stream from IIT Kanpur in NVH techniques for controlling vehicle and engine health (IVHM).

He is serving as the founding director of IIAS. He served the leading MNCs such as AVL List GmbH, Cummins Inc., General Electric and Indian OEM in different roles, as well as automotive, aerospace and heavy engineering clients. He also served as the UGC approved faculty in the mechanical department and founding head of the aerospace engineering.

He has taught the Design and Structural Mechanics course to the undergraduates for six successive years. In his industrial and academic research career, he has extensively designed and analyzed a variety of machine structures, such as frames, housings, brackets, isolators, shafts, and synthesized the required strength and rigidity requirements.

Contact Us

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