

StudentShapers Recruitment: Calling all students with an interest in Engineering, Coding and Virtual Reality

Educational Platform for dynamic (modal) analysis of structures using Virtual Reality (ViRSE)

Bursary: £390/week (8 full time weeks), for two students - £3,120 in total per student.

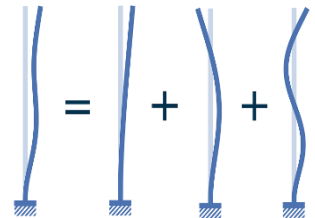
Who should apply:

Students with an aptitude for coding and enthusiasm for creating software, as well as a very good understanding of dynamics of structures, modal analysis and aircraft structures. We anticipate that students enrolled on programmes in the Department of Aeronautics will be best placed to meet these criteria, but all Imperial undergraduates are eligible. Preference will be given to students who are not in their final year. While training in ViRSE world development will be provided, students with experience of and proven aptitude of coding are strongly preferred. Experience with Blender and 3D modelling, and with object-oriented languages such as C# or C++ is also advantageous, as is experience with Unity or other game engines.

Campus/Location: South Kensington; some work can be done remotely, but on campus attendance will be expected for at least 50% of the project.

Project details:

This is an opportunity to develop a three-dimensional 'structural analysis simulator' for use in virtual-reality teaching within the Department of Aeronautics. You will be working in partnership with Professor Silvestre Pinho, Professor Laura Mainini and Dr Demetrios Venetsanos to design, code and test a system to model and visualise the mode shapes of free oscillating beams, as well as the free oscillations of an aircraft structure. With regards to the beams, the system will need to generate a parameterised real-world structure and to visualise the response of that structure under free oscillations. With regards to the aircraft structure, the system should be able to visualise the response of a simple virtual aircraft but with realistic features. The goal is for this system to form the core of an interactive virtual reality application in which students can experiment the free oscillations of structures, through direct three-dimensional observation of and interaction with 'setups' that can be manipulated at will. This project will develop a more powerful and flexible version of existing simplified approaches, which (versions) can be integrated into the ViRSE system for deployment in VR within Imperial. The overall aim of this project is to reinforce the learning experience of students in the dynamic analysis of structures. The first part of the project (i.e. free oscillations of beams) addresses the needs of lower year students on engineering courses, while the second part of the project (i.e. free oscillations of an aircraft) can be used for upper years, to include MSc courses. This project is the direct continuation of the StudentShaper project "Educational Platform for Beam and Truss Analysis using Virtual Reality – ViRSE", led by Professor S.T. Pinho and Dr D.T. Venetsanos (Department of Aeronautics) and completed in 2023.



Simplified visualisation of mode shapes of a column.
from https://www.linkedin.com/pulse/what-mode-shape-natural-frequency-eomys/?trk=organization-update-content_share-article

The student undertaking this engagement will gain a deeper understanding of dynamics of structures, as well as technical skills and experience in coding (in C#/Unity), and in three-dimensional visualisation. They will also gain experience in collaborative software-development as part of a professional team.

This engagement is part of the ViRSE (Virtual Reality Student Experience) project, which is developing a virtual reality platform to ease the development and deployment of 'multi-player' virtual reality into Imperial's teaching across a range of departments and subjects. ViRSE is built on the Unity game engine, and all ViRSE applications (including this project) are also built within Unity; code is written in the C# programming language. Students will not need to build a VR interface, write rendering code, or concern themselves with networking or administrative issues; these are handled by the ViRSE

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framework and the Unity engine. The development in this engagement will concentrate on the creation of a three-dimensional 'environment' specific to the project, and creating and testing the code necessary to make it function, and to interface with the ViRSE system.

All ViRSE student shaper engagements will commence with a two-week full time training course, which will provide the necessary grounding in the C# language, object-oriented programming, the Unity engine, the ViRSE platform, and 3D modelling tools. This course will take place on-campus July 1st-12th 2024. In subsequent six project weeks the ViRSE student partners will lead on the development of the particular applications within Unity, in collaboration with the academic lead, and with the ViRSE team providing technical support and advice. These six project-development weeks are flexible in precise timing, but should take place over summer 2024, before the start of Autumn term of the 24/25 academic year.

How to apply:



Applications (300-500 words) should be made via the 'Student Expression of Interest' form on the StudentShapers website ([here](#)) or accessed using the QR code. This will then be distributed directly to the appropriate staff partner.

Deadline: 22nd March 2024

Contact details: Contact Dr Demetrios Venetsanos (d.venetsanos@imperial.ac.uk) or Professor Silvestre Pinho (silvestre.pinho@imperial.ac.uk) or Professor Laura Mainini (l.mainini@imperial.ac.uk) for further information.