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

Educational Platform for Beam and Truss Analysis using Virtual Reality (ViRSE)

**Bursary:** £365/week (8 full time weeks) – for 3 students

Who should apply:

Students with an aptitude for coding and enthusiasm for creating software, as well as a very good understanding of mechanics of structures, structural analysis and terminology. 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. There is no restriction on year of study, although preference will be given to continuing students (i.e. not those in their final year). While training in ViRSE world development will be provided, students with experience of and proven aptitude for 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 and Dr Demetrios Venetsanos to design, code and test a system to model and visualise the mechanical response of simple structures (e.g. truss, simply supported beam). The system will need to generate the real-world structure, to include cross sections and joints, and be capable of visualising the response of the structure under parameterised topology, size, loads and supports. The goal is for this system to form the core of an interactive virtual reality application in which students can experiment with and become familiar with the ways in which three-dimensional structural design interacts with structural analysis, through direct three-dimensional observation of and interaction with structural 'setups' that can be manipulated at will. The existing solutions provide simplified visualisations, where slender structural members are represented by their central line, as shown in the picture. This project will develop a more powerful and flexible approach, that can be integrated into the Imperial College ViRSE system for deployment.
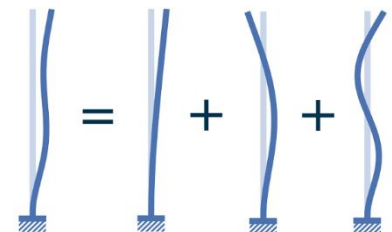
Simplified visualisation of mode shapes of a column.
from https://www.linkedin.com/pulse/what-mode-shape-natural-frequency-eomys/?trk=organization-update-content_share-article

The student undertaking this engagement will gain a deeper understanding of mechanics of materials and structural analysis, as well as gaining 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 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 3rd-14th 2023. 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 2023, before the start of Autumn term of the 23/24 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 above QR code. This will then be distributed directly to the appropriate staff partner.

Deadline: *31st March 2023*

Contact details: *Contact Dr Demetrios Venetsanos (d.venetsanos@imperial.ac.uk) or Professor Silvestre Pinho (silvestre.pinho@imperial.ac.uk), (Department of Aeronautics) for further information.*