StudentShapers Recruitment: Calling all students with an interest in Vertebrate Skeletons, Palaeontology, Coding, and Virtual Reality

ViRSE – BoneBuilder (an evolutionary vertebrate skeletal sandbox)

Bursary:

£365/week (8 full time weeks) for one student.

Who should apply:

Students with an aptitude for coding and enthusiasm for creating software, as well as an understanding of basic vertebrate anatomy (within a palaeontological context). We anticipate that students enrolled on programmes in the Department of Earth Science and Engineering 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.

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:

How did four limbed animals ('tetrapods') – a group that includes amphibians, reptiles (leading to dinosaurs and birds), and mammals – adapt to life on land? What anatomical changes were required as they transitioned away from their marine fish ancestors?

To answer these questions, we require an in depth understanding of 'comparative anatomy' – a method used to ascertain evolutionary trends by comparing similar anatomical structure in different taxa over time. This project aims to create a 3D virtual reality 'skeleton builder' (think Lego/Meccano but with bones!) allowing participants to virtually put together/dismantle different skeleton architectures, each representing key fossil vertebrates (e.g. early fish, dinosaurs, etc.) from the geological record. Though virtual manipulation and study of the bones comparisons can be made between different taxa and evolutionary trends can be identified. By visualizing these concepts in 3D, rather than relying on traditional 2D illustrations and diagrams, individuals will gain a more intimate understanding of the varying bone morphologies (e.g., size and shape) and how they correlate to the taxa being studied. These teaching aids will be deployed within the Department of Earth Science and Engineering's existing taught modules and may be adaptable to future outreach and engagement events.
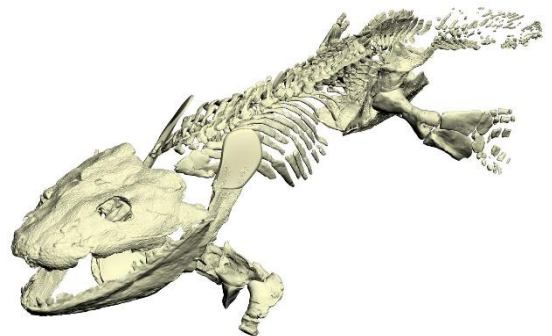

Figure 1 - A 3D skeletal reconstruction of the iconic Devonian Ichthyostega, a 360-million-year-old tetrapod. Imagine this as a box of bones to put back together. Image of 3D skeleton published in Nature (doi: 10.1038/nature11124).

The student undertaking this engagement will gain a deeper understanding life history on Earth that led to tetrapods colonizing the land and the changes in their skeletal anatomy, 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: *Dr Alan Spencer (Earth Science & Engineering), alan.spencer@ic.ac.uk, and Dr Mark Sutton (Earth Science & Engineering), m.sutton@ic.ac.uk for further information.*