

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

ViRSE – ExploVR

Bursary:

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

Who should apply:

Students with an aptitude for coding and enthusiasm for creating software, familiarity with the layout of typical process plant and an enthusiasm for process safety. We anticipate that students enrolled on programmes in the Department of Chemical 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 project time.

Project details:

This is an opportunity to develop a three-dimensional virtual representation of a chemical production plant, then set off explosions and fires from small to huge scale, for use in process safety teaching within the Department Chemical Engineering. You will be working in partnership with Dr Chris Tighe (Chemical Engineering) to design, code and test a system to visualise and explore process units, equipment and buildings such as reactors, furnaces, heat exchangers, separators, distillation columns, pumps, flare stack, storage tanks, control room etc. You will then define a variety of fire and explosion scenarios around the plant e.g. pool/flash/jet fire, vapour cloud explosion or boiling liquid expanding vapour explosion (BLEVE) at various scales, determining the effects of thermal radiation and blast overpressure vs. distance using consequence models published in the literature. Finally, you will design and implement systems, which allow these scenarios to play out in real time on the virtual plant. The goal of this project is to provide students with an immersive experience, giving them a sense of the scale of process plant, to visualise the impact of an explosion or fire on the plant, and how the layout of the plant can help limit the consequences of such an event in terms of e.g. damage to neighbouring units, access for emergency response and routes for evacuation.

The student undertaking this engagement will gain a deeper understanding of process plant layout and the modelling of fires and explosions, 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



Explosion at an oil refinery in Philadelphia, USA captured during live broadcast by NBC. (No significant injuries were reported.)

from <https://www.csb.gov/philadelphia-energy-solutions-pes-refinery-fire-and-explosions/>

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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 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 Chris Tighe (Chemical Engineering), c.tighe@imperial.ac.uk for further information