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

ViRSE – Human-Robot Interaction in Virtual Reality for teaching Applied Robotics

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 a basic understanding of robotics and robot-related terminology. We anticipate that students enrolled on programmes in the Department of Computing or Dyson School of Design 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:

This is an opportunity to develop a 3D robot simulation for use in virtual-reality teaching within the Applied Robotics module ([here](#)) at the Dyson School of Design Engineering. The goal is to design, code and test a virtual reality system for teaching robotics-related concepts to 3rd year undergraduate students. You will be working in partnership with Dr Petar Kormushev who is teaching the Applied Robotics module and leads the Robot Intelligence Lab (https://www.imperial.ac.uk/robot-intelligence/). Many of the robots in this lab, such as Robot DE NIRO, are capable of human-robot interaction and basic manipulation and locomotion skills.

This project will create digital clones of a few of these robots, so that they can be used simultaneously by the large cohort of students taking the Applied Robotics module. This will allow more than 90 undergraduate students unprecedented access to state-of-the-art research-grade robots which they would otherwise be unable to access due to restrictions on numbers and cost. It would also allow a safe environment for the students to learn fundamental robotics concepts such as robot kinematics and dynamics within an interactive human-robot VR space. Some examples of potential robots to use can be found [here](#).

The underlying technology is based on ROS (the Robot Operating System) running on Linux in a VMware Virtual Machine. The robot

Robot **DE NIRO** engaging in Human-Robot Interaction. Below – a 3D simulation of the same robot:

https://www.imperial.ac.uk/robot-intelligence/
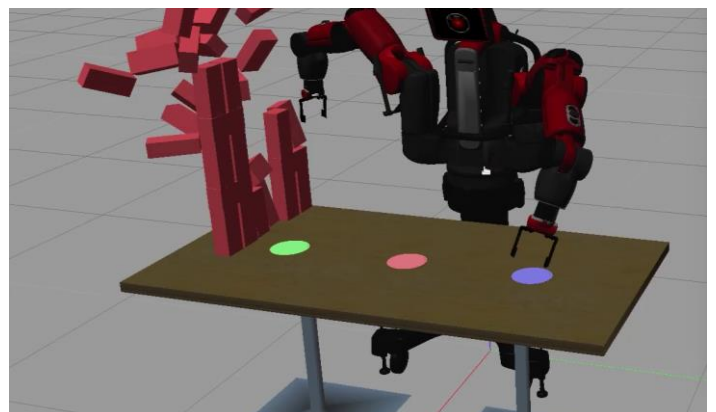
simulation will be based on existing physics engines – most likely Unity and Gazebo. The main purpose of the virtual-reality environment will be to enable more interactive way of teaching robotics-related concepts, including robot dynamics, robot control, robot perception and robot motion planning.

The developed robot simulator in this project will be integrated into our ViRSE system for deployment in VR within Imperial.

The student undertaking this engagement will gain a deeper understanding of robotics and human-robot interaction, as well as gaining technical skills and experience in coding (in C#/Unity/Python), 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 (https://forms.office.com/r/MYJNST1uEJ) 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 Petar Kormushev (Dyson School of Design Engineering) quoting "ViRSE" at:* p.kormushev@imperial.ac.uk *for further information.*