EPSRC Vacation Bursary project title

Digital Model Interaction: Towards a virtual reality toolbox for BIM data interaction

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<th>Start date: 21 July 2014</th>
<th>End date: 26 September 2014</th>
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<tbody>
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<td>Bursary Payment: £2200 for the 10 weeks, funded through Engineering and Physical Sciences Research Council (EPSRC)</td>
<td>Eligibility: Students in the middle years of undergraduate studies, expected to gain at least a 2:1 degree classification, been ‘ordinarily resident’ in the UK for three years (not for education)</td>
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What tasks will you undertake?

For this project, you help develop a suite of virtual reality tools to help users interacting with real-time Building Information Modelling (BIM) simulations. This work directly links with the University of Reading’s CAVE facility, which will be used to demonstrate the suitability of your solution. The main tasks include:

- Create a user interface, e.g. a pop-up menu, to enable users of all computer skill level to use the toolbox.
- Test dynamic tools for object manipulation within VR simulations, such as; move, rotate, render, hide, group, as well as designing and testing interaction tools to perform tasks such as data take-off and measurement of models.
- Interface with user tracking software/hardware to perform gesture analysis to drive functionality such as real-time lighting and effects and work as part of a team to add functionality to existing simulations of real-life projects in the University’s immersive visualization facilities, particularly the CAVE and Powerwall.
- Feedback and discuss the techniques and processes used with members of the Design Innovation Research Centre team and industry partners.

What skills / knowledge / experience will you need?

- Basic familiarity and knowledge of standard CAD packages used in the industry.
- Good knowledge of object orientated programming with experience in C#, Java, .NET or similar language.
- An ability to rapidly learn new software, standards and processes used in 3D modelling work promoted by the government BIM strategy.
- An ability to manipulate digital models and to connect the challenges and issues faced in maintaining and upgrading buildings with these digital models.
- The presentation skills to feedback and discuss the techniques and processes used in the modelling work with academic and professional audiences.
- Prior knowledge of games creation and/or Unity is not essential, but would be an advantage.

Where will the project be undertaken?

The project will be located in the Design Innovation Research Centre; and also involve access to the School BIM Lounge and the University’s visualization facilities, the CAVE and Powerwall.

Brief description of the project

As datasets used within in BIM (Building Information Modelling) become larger and more complex, there is a growing need to efficiently interact with and visualise data in ways a user can assimilate quickly. Current research into the use of fully immersive visualisation facilities, such as the CAVE Automatic Virtual Environment, at the University of Reading has shown that users understand complex asset data better when they are stood within a 1:1 scale representation of a model rather than trying to engage with a spreadsheet of data.

On joining our team you will work with our researchers to create new interfaces, to enable users to better interact with 3D models and their associated datasets, whilst inside a fully immersive 3D simulation. You will be given access to live model data from current projects within the construction sector and will have hands on experience...
with advanced visualisation technology not normally accessible by undergraduates.

There are many different tools for data manipulation but very few allow native work within 3D simulations, thus a toolbox needs to be developed such that a user has simple and quick access to relevant tools for the tasks they are trying to perform within a 3D simulation. You will be responsible for developing an openly accessible software toolbox that is natively integrated into the Unity Game Engine, used to run the fully immersive visualisation environment, at the University of Reading and other institutions around the world.

The toolbox will be built with future expandability in mind and be based on the common C# .NET language; You must be strong at writing coding with good knowledge of object orientate languages and an understanding of threading on a Windows based operating system. This work will contribute towards cross-discipline research and will feedback directly to our industrial partners, who have expressed frustration with the current limitations of visualisation tools to analyse the digital data developed in different projects.

Existing models held by the research team include models of King’s Cross Station; ICMA and Business School and the University Library. Further models will be sourced from the Estates and Facilities Department and from the Centre’s industrial collaborators, including members of the advisory board.

The EPSRC Vacation Bursary project will look in particular at such techniques for visualising pre-existing models as a means to inform Building Information Modelling strategy, taking advantage of opportunities to view the outputs of the modelling work and other models in fully-immersive large scale stereo displays and through augmented reality. At the end of the project a short video and the final PowerPoint to summarise highlights of the research will be put onto the website.

Will the Vacation Bursary project contribute to a wider research project? If so, how

Yes. This project will contribute to achieving EPSRC-funded research on ‘playful engineering’ as part of theme 2 of the Design Innovation Research Centre (www.reading.ac.uk/designinnovation). This broader theme brings learning from leading engineering practice into the laboratory to ‘play’ with the use of emerging technologies off-line from the critical path of delivery on major building and infrastructure projects.

Will the Vacation Bursary project involve links with industrial partners? If so, please give details

There will be a range of interactions with industrial partners. The main partners for the project will be members of the Design Innovation Research Centre advisory board, including Arup, Crossrail, Vinci and TfL, which will provide models and seek feedback on the analysis and use of these models.

How will the project be supervised?

The supervisors are Professor Jennifer Whyte, Dr Max Parfitt, and Dr Dragana Nikolic. There will be a kick off meeting with supervisors to agree the project schedule and ensure the student understands their role and project and the support available to them in the project work. Day-to-day interaction will be as part of the main supervisor’s team; and there will also be weekly progress meetings with one or more supervisors, and continuity of these meetings through the summer; to keep the project work on track to a successful completion and feedback. Toward the end of the project, the student will take part in activities run for UROP (Undergraduate Research Opportunities Program) students, including a poster presentation, as well as giving a presentation to the supervisors and key industry partners in the final week.

How to apply

Send a letter of application and CV via email to designinnovation@reading.ac.uk by Friday 23rd May 2014, stating your suitability to the role.

If you have questions about the post or need further information to make your application you can contact Dr Maxwell Parfitt directly at m.r.parfitt@reading.ac.uk

Only applications sent to the designinnovation@reading.ac.uk email account before the deadline will be considered.

If successful, you will be required for interview in the week starting 26th May 2014.

You will be notified of the outcome by Thursday 2nd June 2014.

The successful applicant will then need to fill in a student details form to complete the application.