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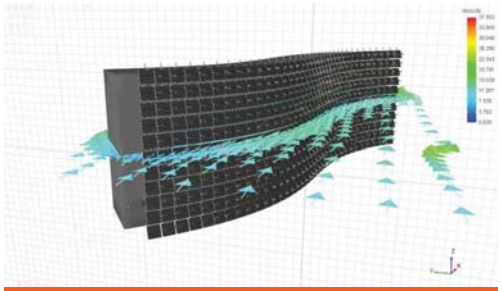
VEIV is the EPSRC Doctoral Training Centre in Virtual Environments, Imaging and Visualisation. VEIV projects advance the science and engineering of computational capture, rendering and simulation in a diverse range of applications. VEIV runs an engineering doctorate (equivalent to a PhD), through which research engineers (REs) are fully co-funded to devise solutions relating to visualisation and imaging in engineering and design. The EngD is four years in duration and includes an intensive MRes taught course in the first year, with optional technical and business training at a high level in subsequent years. The EngD is targeted at outstanding students and engineers who want to direct research in industry, or want to maintain significant links with industry in an academic career.



Applying Component Micro-Wind-Behaviour to Macro-Structures: Towards a Machine-Learning Approach to Parametric Computational Fluid Dynamics in Architecture

The use of Computational Fluid Dynamics (CFD) for wind simulation and subsequent façade component optimisation can be computationally inefficient process, requiring lengthy simulations of many iterations of the entire building under various wind conditions. We propose a method for learning the behaviour of individual components at a small scale to then apply to large scale structures. Bentley Generative Components is used to model the component parametrically, NextLimit XFlow is used to simulate the wind environment and Matlab is used to correlate the training set and implement a k-nearest neighbour search for the application test. A number of application tests are conducted in order to explore the inherent issues and possibilities of using such an approach.

One of the potential benefits of this method is reduced batch-simulation time for a later generative design stage detailed optimisation. The possibility of learning local component behaviour and mapping this to larger structures is shown to have more effective success for certain applications over others and shows a strong need for further research.

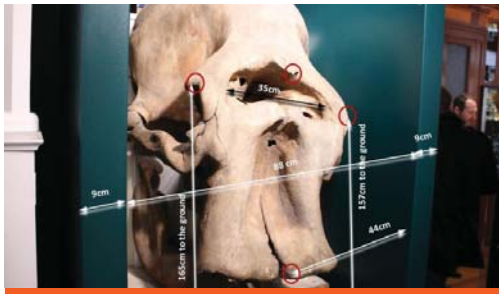
User Friendly Energy Visualisation
David Hawkins, Ian Henderson, Greig Paterson, Joe Williams

A 'user friendly energy visualisation' study was carried out in a London house to test three different methods of displaying real-time electricity use. The visualisation themes – functional, emotional and alert – were selected to test research theories on home energy monitoring systems. Each visualisation was assessed in terms of its impact on the occupants' energy awareness and energy-using behaviour. A monitoring display facility, accessed by tapping the visualisation on a touch screen monitor, displayed daily budgets, current electricity use and electricity use history graphs It was found that user interrogation of the system increased during periods of high electricity use. The family stated that the system had helped to improve awareness of their electricity use and that their household energy efficiency had improved. They expressed a preference for the alert-themed visualisation – a weather scene – and found the daily budget facility particularly useful.

The exercise was successful in delivering a technical framework for testing energy use visualisation methods and the findings provided useful recommendations for similar future investigations. The family stated that the system had helped to improve awareness of their electricity use and that their household energy efficiency had improved.

Photo-realistic rendering of human skin
Tim Scully EngD project, sponsored by P&G

As a translucent, heterogeneous material, skin features a rich spectrum of subtle light effects, caused by the light undergoing multiple scattering and absorption effects while travelling through the different layers of skin. This project is focused on the development of a digital skin model that should be capable of expressing, to the highest degree of reality possible, the visual appearance of human skin, which depends upon a variety of anatomical, physiological and external parameters. The model should be based on in-vivo and in-vitro measurements of skin and should allow for interactive change of model parameters with rapid visual feedback, enabling the exploration of different skin appearances in an interactive session. Applications for such a model might be in the entertainment and cosmetics industries. In addition to natural appearance factors, we further want to explore the possibility of simulating appearance changes due to application of selected skin products, such as make-up.



Micro-Augmentation for Museums
Tiphaine Bardon, Andrew Barnes, Ciro Bevilacqua, Gianfranco Gliozzo, Julian Hodgson, Dane Virk

Micro-augmentations in museums have been proposed as a novel method to enhance visitors' experience. These would be in the form of a subtle and short auditory or visual stimulus, related to an exhibition is provided to the visitor. The group were given the task of designing a technological system to produce micro-augmentations in the Grant Museum of Zoology. Two types of augmentations were proposed, an audio and a visual. Audio was implemented with a directional audio speaker, which was triggered by an ultrasonic sensor. The visual stimulus was delivered via a mobile application that would augment the objects of the exhibition. The augmentation system successfully delivered a peripheral AR platform within a dynamic museum environment.

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