

SINAPSE
PhD Project Proposal Template for PhDs with Industry starting in 2010

PROJECT

Title:

INTERACT: Medical imaging accessibility project

Planned start date (month/year):

October 2010

SINAPSE Centre (i.e. primary university to which this studentship will be attached):

Dundee

University first supervisor: contact details

Name: Prof Graeme Houston
Department: Clinical Radiology
Address: Ninewells Hospital and Medical School, Dundee DD1 9SY
Email: ghouston@nhs.net
Phone: 01382 632651

Name: Dr John McGhee
Department: Duncan of Jordanstone College of Art & Design
University of Dundee
Address: Perth Road, Dundee
Email: j.mcghee@dundee.ac.uk
Phone: 01382 385604

Second academic supervisor/ other university or other people in primary university involved with project

To be confirmed

Industry

3D computer visualisation and education

Industry main contact details

Phil Lavery
Digital Learning Foundation
4 Carlung House
West Kilbride
KA23 9PU

Key Other Industry people involved with Project including Industry Supervisor (if different to Industry main contact above)

Likely background of suitable student (e.g. Neuroscience, MR Physics, Chemistry, Engineering, Informatics, Psychology) and essential skills required prior to starting this PhD:

The likely background would be Creative Media with essential skills in computer graphics, preferably with:

- Worked knowledge of 3-D computer animation package such as Autodesk Maya
- Understanding of volume visualisation and stereoscopic projection
- Real-time 3D computer graphics
- Some programming experience

Summary of proposed project (approximately 200 words):

The aim of this studentship is to explore 3D computer visualisation and stereoscopic projection (4D) as a means of widening access for patients to understand diagnostic imaging data. The volume visualisation toolkit (OSG) developed as Part of the Joint Medical Visualisation Project of the Digital Learning Foundation, in conjunction with Aberdeen University, would allow extension of previous work in medical student education for patient benefit. Clinical diagnostic MR imagery in 2D cross-sectional or 3D volume image formats is difficult to navigate to the untrained eye, primarily being designed for the experienced radiologist or clinical scientist. There is evidence to suggest patients are not well informed about disease or their diagnostic scans. Imagery has been shown to improve information retention and adherence.

In digital filmmaking and video games development we see the emergence and proliferation of stereoscopic projection as a means of engaging audiences in complex narrative. This studentship will explore computer based visualisation techniques to enhance clinical MR data. The project will investigate visual approaches and methods of segmenting the data as a means of delineating complex MR imagery. This will involve an exploration of colour, texture, and interactivity as means of improving diagnostic MRI as a tool for interaction between health professionals and patient.

The key aims of the studentship will be to:

- a) Research segmentation options, with pros & cons with regard to obtaining the level of control and visual quality required for patient understanding - this is likely to be very different from that required for clinical diagnoses.
- b) Program (with assistance and guidance) the above segmentation tool within the OSG.
- c) Research and develop the Graphic User Interface elements required for the above toolkit.

The expected outcome of this studentship would be a series of recommendations and a prototype software interface for use by health professionals. This will be used in the discussion of diagnosis and treatment of patients with cardiovascular disease and stroke. This work would inform further commercial development of a full 3D stereoscopic viewer used in patient interaction, by providing the tool and process of validating this visualization approach.

Key references (up to five):

CHESSON, R. A., MCKENZIE, G. A. & MATHERS, S. A. (2002) What Do Patients Know About Ultrasound, CT and MRI? *Clinical Radiology*, 57, 477.

HOUTS, P. S., DOAK, C. C., DOAK, L. G. & LOSCALZO, M. J. (2006) The role of pictures in improving health communication: A review of research on attention, comprehension, recall and adherence. *Patient Education and Counseling*, 61, 173-190.

MCGHEE, J. (2010) 3-D Visualisation and animation technologies in anatomical imaging. *Journal of Anatomy*, 216, pp264-270