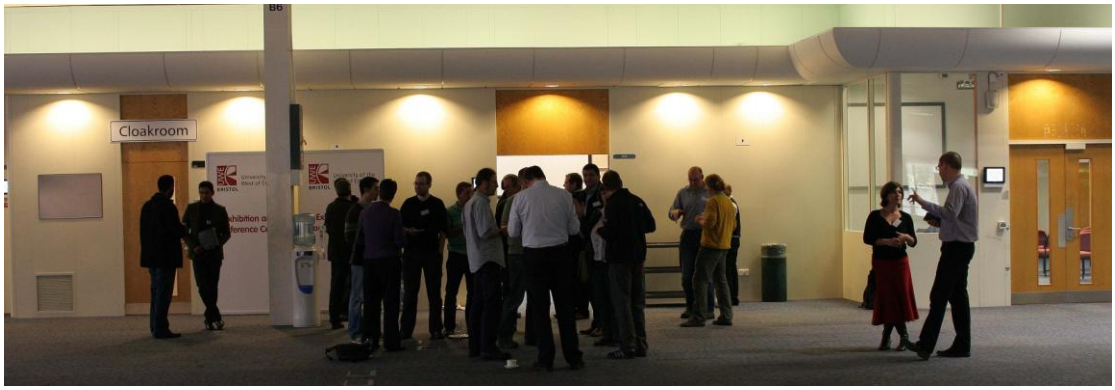
Bristol 2010 - Imaging: Challenges and Solutions for Automated Analysis and Interpretation.

by Dr Craig Platt MBChB FRCPath with photographs by Roisin Armstrong

There was plenty to talk about at the Biomedical Imaging: Challenges and Solutions for automated analysis workshop held at the UWE Exhibition and Conference Centre on Monday 18th October 2010. This was a chance for experts from the Bristol Vision Institute, University of Bristol and the Institute of Bio-Sensing Technology, University of the West of England to get together with colleagues from around the United Kingdom. The workshop attracted some 85 delegates from around the UK.
Many of the scientists at this conference were tackling the challenge of developing diagnostic and research tools at the cutting edge of automated image analysis using the full range of the electromagnetic spectrum; from radar to x-rays.
The lectures covered the imaging of objects ranging in size from the whole body or parts of the body to tiny subcellular particles no more than several nanometers in size, the latter using Green Fluorescent Protein Technology (GFP Technology) or Electron Miscoscopy.

Following an introduction by Professor David Bull, Director of BVI, the conference kicked off with a talk from Dr Diane Crawford, Director of Medical Physics and Bioengineering, University Hospital Bristol NHS Foundation Trust and Co-Director of CRIC Bristol, the Clinical Research and Imaging Centre, based at St Michael's Hospital. Facilities will include a 3 Tesla MRI scanner, a two-room sleep laboratory and access to high-performance computational facilities
Professor Roy Jones, RICE, Royal United Hospital Bath NHS Trust then gave a talk about imaging in dementia a condition which affects about 800,000 people in the UK. The lecture discussed the use of CT and MRI scanning in dementia, SPECT scanning, DAT scanning and PET.

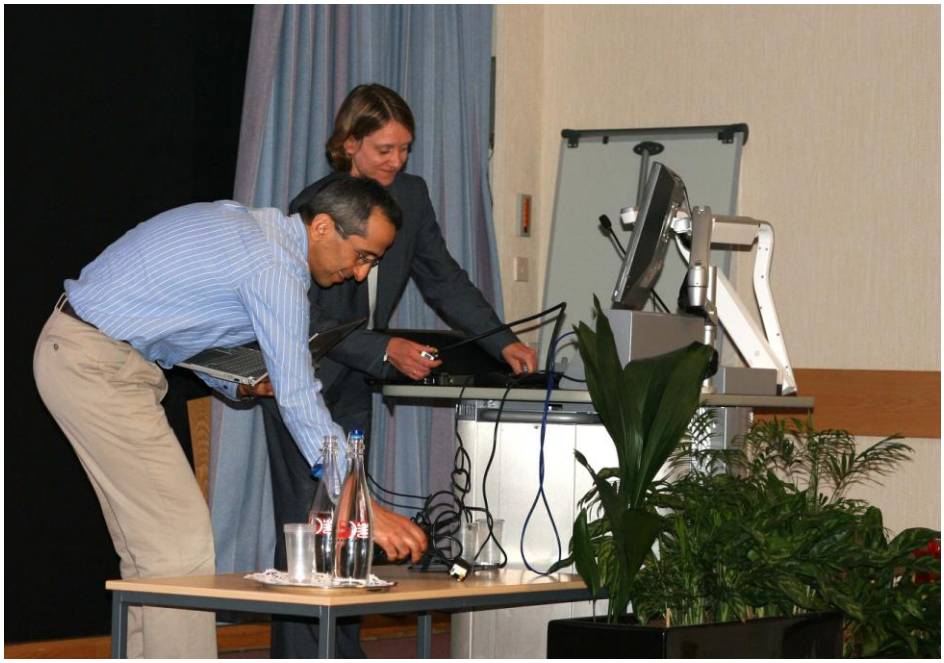


Professor David Stephens and Dr Paul Verderkade, Department of Biochemistry, University of Bristol lectured on the use of light microscopy and electron microscopy in cell biology. Dr Stephens gave an account of the use of Jelly fish derived Green Fluorescent Protein Technology in biochemistry research and discussed the limitation and technical challenges of quantitative measurement and interpretation in 3D. Paul Verderkade discussed unfixed electron microscopy work and the challenges of extracting data from EM work.

Boluminescent and autofluorescent proteins are frequently found in organisms of the salt-water world. Sea water shows almost complete absorption of longer wavelength light and this has resulted in a preponderance of light-making proteins that fluoresce or bioluminesce in wavelengths of blue or blue green (450-480 nm). A notable exception is the firefly that glows in the dark due to bioluminescence from the protein called luciferase. Fluorescent proteins are generating fresh insight into cell functions by providing new opportunities to visualize structural and dynamic events in live cells

Sarah Code, Department of medical Physics, Royal United Hospital Bath NHS Trust gave an account of Nuclear Medicine images and techniques for improving image quality, including some of her original research. She illustrated the use and technical challenges of hydbrid systems that combined nuclear medicine techniques with X-ray CT images.

Robin Holmes of the Department of medical Physics & Bioengineering, UBHT gave an account of the use of flow SPECT imaging in dementia.



Professor Alison Noble and Professor Majid Mirmehdi – Photographs by Roisin Armstrong

Professor Alison Noble, Institute for Biomedical Engineering, University of Oxford discussed ultrasound imaging and analysis. Professor Majid Mirmehdi from the Department of Computational Science, Univeristy of Bristol reviewed active contour (snake) models and their use in medical image analysis. Snake codes detect a feature in an image and wrap themselves to this feature and allow for fast automation of mapping complex shapes.
Professor Mike Davies, School of Engineering and Electronics, University of Edinburgh lectured on Magnetic Resonance Imaging and velocity encoded imaging.
Dr Lyndon Smith, Machine Vision Laboratory, UWE talk about innovative low cost imaging solutions with healthcare application such as their work in assisting in the diagnosis of pigmented skin lesions and in assessing plagiocephaly. He introduced high definition 3D and 4D data.
Finally, Professor Ian Craddock, Department of Electrical & Electronic Engineering, University of Bristol introduced the audience to Radar imaging, a well established detection technology in the defence field. Reductions in the costs of high frequency electronics and advances in computational techniques have allowed groups including his own to begin investigating this new modality in the field of medical imaging. His team has been examing this technology in relation to the detection of breast tumours.

As a Perinatal Pathologist I found this a hugely interesting conference. I have had some experience with the challenge of trying to help clinicians see with the eyes of a pathologist. One venture into this arena was an attempt some years ago at using "Snakes" to automatically map the contours of chorionic villi from images of placenta H&E slides. A more recent challenge has been rendering placenta discs into a 3D image. I also have an interest in the language of signalling and the use of terms such as 'signal transduction' or 'signalling pathways' in molecular and developmental biology.
So if you are wanting to image a particular feature in medicine there is almost certainly someone in Bristol with the technology to assist. The scientific community in Bristol has many teams that are working at the cutting edge of imaging technology.