



BRISTOL VISION INSTITUTE

BVI REFRESH – AUTUMN 2014

Welcome to the BVI newsletter – keeping you up to date with the latest BVI news.

EVENTS

Richard Gregory Lecture 2014: Nov 10th. NASA comes to BVI.



The 2014 Richard Gregory Lecture, held in memory of great interdisciplinary thinker, Professor Richard Gregory, will be presented by Andrew Watson, Chief Vision Scientist at NASA. The event takes place on 10th November at 6.00pm in The Chemistry Lecture Theatre, University of

Bristol. Andrew has been a pioneer in vision science enhancing our understanding of how we perceive our world and has applied this to film and television formats as well as to space exploration. Andrew will take you on a journey of understanding about our vision system and explain how, through this greater understanding, we can engineer better solutions to vision-related problems.

The event is free but you will need to register at: <http://andrewwatson.eventbrite.co.uk>

Brian Barsky from UC Berkeley visits VI-Lab

In September, Brian Barsky from the University of California, Berkeley visited the Visual Information Laboratory. Hosted by Dr. Dima Damen, Brian presented his work on simulating human vision and on vision correcting displays that compensate for the optical aberrations in the viewer's eyes. Examples were shown of simulations using data measured from individuals with high myopia, astigmatism, and keratoconus, as well as simulations based on measurements obtained before and after corneal refractive (LASIK) surgery. He also presented a vision correcting display that transforms an image that when viewed by an individual will appear in sharp focus. This could impact computer monitors, laptops, tablets, and mobile phones.

2014 Young Researchers Colloquium

In partnership with Cardiff University and the University of the West of England, the 2014 BVI Young Researchers Colloquium was hosted by the University of Bristol in June 2014 in the Merchant Venturers Building. This hugely popular annual event was again a great success with some 100 attendees interacting with 12 speakers and 20 posters. The keynote speaker was David Marr Medal winner Hannah Smithson.

BVI Seminars

This year's series of BVI Seminars kicks off on **Friday October 10th**. The first speaker will be Jeremy Wyatt from the Centre for Computational Neuroscience and Cognitive Robotics at the University of Birmingham.

The second seminar, on 24th October will be given by Juliet Biggs on the topic of 'Using satellite data to detect magma under volcanoes: towards global monitoring' and the following one on 31st October by Prof Andrew Glennerster from Reading University on 'How moving observers might represent space'.

Come along and join us in 2D1, 12A Priory Rd Social Sciences Complex, and afterwards for drinks and nibbles. For further details, see:

<http://www.bristol.ac.uk/vision-institute/events/>

Tom Daniels Science Faculty Colloquium

The next Faculty of Science Colloquium will be delivered by Prof Tom Daniel. Tom holds the Komen Endowed Chair at the University of Washington and is Co-Director of the University of Washington Institute of Neuroengineering and Director of the US Air Force Centre of Excellence on Nature Inspired Flight Technologies. Tom will speak about how living creatures acquire and process information from multiple sensory modalities to control their movement. Flying insects do so with incredible acuity, speed and accuracy, allowing complex and agile aerial maneuvers. Indeed, no existing robot is capable of such complex behavior, and the ways in which living systems accomplish movement can inspire

and guide new technologies. The talk draws on principles from engineering and neuroscience to explore how insects accomplish flight and flight control. From visual systems tuned for motion sensing to the function of natural gyroscopes we will explore the mechanisms that permit flight.

Venue: LT2 School of Chemistry, 15 October 2014, 4.00 PM

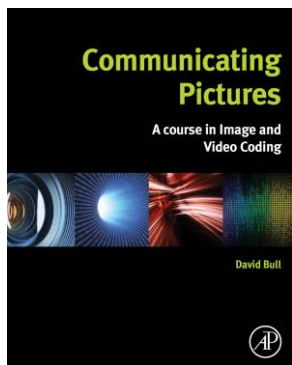
You can find details of all events [here](#)

VISUAL MOVERS AND SHAKERS

2014 Niko Tinbergen Lecture

Innes Cuthill will give the 2014 Niko Tinbergen Lecture of the Association for the Study of Animal Behaviour, at the winter meeting of the society in December [More info here](#)

Communicating Pictures



A new book has been published by David Bull. Entitled 'Communicating Pictures', the book presents a course in image and video coding, targeted at final year undergraduates, graduate students and practitioners. It provides the context of the role of images

in communications and then builds on this to explain the applications and requirements of a modern video communication system. It offers a grounding in visual perception, and demonstrates how modern image and video compression methods can be designed in order to meet the rate-quality performance levels demanded by today's applications, networks and users.

Royal Society Meeting Chair



Innes Cuthill co-hosted a Royal Society Theo Murphy international scientific meeting on the 4/5th September: "When senses take

flight: the evolution, development, mechanisms and function of avian senses."

IEEE Technical Committee appointment

Alin Achim has been nominated and elected to serve as member of the Bio Imaging and Signal Processing Technical Committee of the IEEE Signal Processing Society. He has also been

recently invited to become Affiliate Member of the same society's Signal Processing Theory and Methods Technical Committee.

BVI has strategic advisory role with EPSRC

From July 2014, Professor David Bull has been appointed as a member of the EPSRC Strategic Advisory Network. The EPSRC SAN is a "small number of prominent and highly regarded individuals from EPSRC's stakeholder groupings ... providing the EPSRC Executive and Council with strategic advice".

BVI Welcomes....

Andrew Watson, Chief Vision Scientist at NASA Ames research laboratory has been appointed as a Benjamin Meaker Visiting Professor during his visit to Bristol. As well as delivering the 2014 Richard Gregory Lecture, Andrew will be touring the BVI Labs to meet our staff and see our work..

Felix Mercer Moss has joined the EPSRC COMPPACT project (Bull, Baddeley and Agrafiotis) as an RA to work on visual quality metrics. He joins existing RAs, Aaron Zhang and Richard Vigars.

Bahareh Shakiba and Miltiadis Papadopoulos have joined the Marie Curie PROVISION project as Early Stage Researchers.

RESEARCH NEWS

Vision for the Future: A Platform for vision research at the University of Bristol

Researchers from Bristol Vision Institute (David Bull, Jeremy Burn, Nishan Canagarajah, Innes Cuthill, Iain Gilchrist, Casimir Ludwig and Nicholas Roberts) have recently been awarded a prestigious £1.4M research grant from the Engineering and Physical Sciences Research Council. The project entitled 'Vision for the Future' has been funded under EPSRC's Platform Grant Scheme which is focused on "providing flexible support that underpins adventurous research in world-leading research groups". Platform grants are rare and only awarded to groups that have a proven international track record and a substantial current portfolio of research council funding.

Professor David Bull, Director of Bristol Vision Institute and Principle Investigator on the grant commented, "This is a major award for BVI and the University of Bristol. It will enable us to take a strategic and long term view of our research, retain key staff and engage in international networking." The collaborating organisations include The Academy of Motion Picture Arts and Sciences, Aardman Animations, Max Plank Institute (Tuebingen), camera manufacturer

ARRI, BBC R&D, QinetiQ and Thales, together with international university collaborators Rochester, Lund, Austin, UWA, Purdue and UWE.

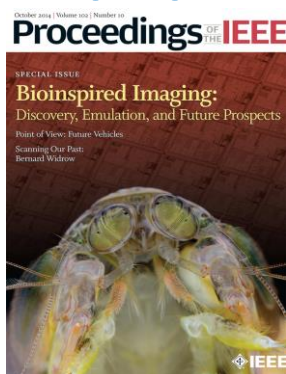
Deceptive Iridescence

Heather Whitney (Biological Sciences), Innes Cuthill (Biological Sciences) and Nick Scott-Samuel (Experimental Psychology) have been awarded £768k from the BBSRC for a 3-year grant investigation 'Deceptive Iridescence'. Colour is an integral, and striking, feature of many organisms, from the pigments that allow photosynthesis in plants to the vivid displays of birds. However, the function of one sort of colour, iridescence, is not yet fully understood. The striking feature of iridescence is that the colour changes with changing angle of viewing. This can make objects more conspicuous, but the changing patterns also have the potential to deceive and confuse. It is the latter that the new BBSRC grant will investigate, across birds, bees and humans.

Trusting image classifiers

Tilo Burghard and David Bull from BVI's Visual Information Laboratory have recently secured funding of £84k from DSTL for a 1 year project to produce trusted image classifiers. Focusing on important applications such as mine detection, the work will exploit enhanced contextual information to enable more reliable identification of such devices.

Seeing things differently



The Ecology of Vision Group from the School of Biological Sciences have recently published several new findings on biologically inspired ways of image processing that cross several areas of vision research. A recent paper in the Proceedings of the IEEE demonstrates the translation of forms of animal vision directly to camera technologies. A second study in the same journal future scans visual adaptations in animals to suggest new targeted areas for biologically principled applications. A third paper in the Journal Experimental Biology further reveals why some animals use polarization as a form of information in visual communication.

Intelligent cameras

David Gibson and colleagues, Neill Campbell and David Bull from VI-Lab have introduced the concept of selective and intelligent vision processing partially inspired by biological vision systems. By exploiting the low-level programmability of the latest generation of image

sensors a major shift in the state-of-the-art for vision capture and processing has been achieved. The architecture focuses processing on the 'interesting' parts of an image sequence, thus reducing bandwidth while increasing frame rate and accuracy. The proposed concepts have attracted interest from industry and is being developed in collaboration with University of Bristol spin-off, XMOS Ltd. It has already received significant funding from DSTL to develop the prototype. The architecture supports on-sensor foveation, dynamic exposure control, variable spatio-temporal resolutions and statistical analysis, all intimately linked to the image sensor.

For further details contact David Gibson (dave.gibson@bristol.ac.uk)

Enhancing Vision for Biped Robots

The EPSRC Bioinspired Vision project (Burn Gilchrist, Bull and Mayol-Cuevas) has published new work on Enhanced Terrain Classification from Body-mounted Cameras during Human Locomotion. A novel algorithm for terrain type classification based on monocular video captured from the viewpoint of human locomotion has been developed taking account of the characteristics of human locomotion. The proposed method outperforms existing methods by up to 16%, and also provides improved robustness. It has particular application to legged robots and as an aid for visually impaired people.

Innovate UK funds vision research in autonomous robots.



Resulting from a Innovate UK funded research on Autonomous Robots, Dr Walterio Mayol-Cuevas and Dr Jose Martinez-Carranza (of the Visual Information

Laboratory, in collaboration with Blue Bear Systems Research, have introduced a new concept that automates unmanned air vehicle flight for use in challenging conditions. Dubbed Smart Boomerang, the system comprises two cameras and a mobile phone-derived computer that enables UAVs to learn a route and be able to automatically retrace its path. In certain conditions – such as when GPS is lost, when the UAV is indoors or where minimal operator control is required, the system provides a retraceable route for the UAV so it can return safely.

Marie Curie Research Network in Video Compression

A new 4M Euro Marie Curie Network ITN has been established by BVI in partnership with Fraunhofer HHI Berlin, University of Nantes, University of

Aachen, BBC, Microsoft Asia, Cisco, Purdue University and Technicolor. Motivated by the challenge to deliver higher volumes of more immersive content over congested band-limited channels, BVI will deliver world-leading technical innovation in the area of video compression.

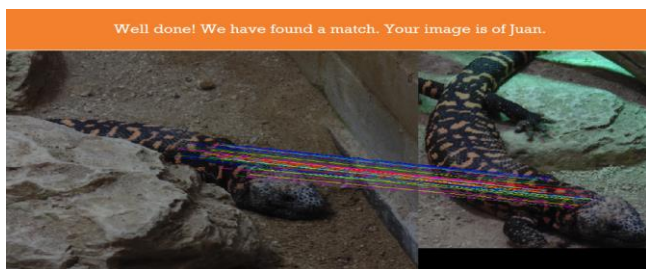
For further details contact David Bull dave.bull@bristol.ac.uk

Geoff Boyle creates High Dynamic Range video content at the Encounters Festival.

World renowned cinematographer, Geoff Boyle (Wallander etc.) joined Terry Flaxton, and other BVI staff at the recent Encounters Festival to explore workflows for producing HDR content.

Two ARRI Amira cameras were mounted on a mirror rig to shoot test charts across 20 stops. Two artistic pieces were also created that exploited the HDR Image format and shown publicly to around 100 people at the Encounters Festival.

Arkive in Your Pocket: Trials at Bristol Zoo



Arkive in Your Pocket (AIYP) is a TSB funded collaboration between UoB (BVI) (Bull, Cuthill, Burghard), BBC, ARKIVE, 3CRL, Mubaloo, ProVision Communications and Toshiba. Its aim is to enhance the consumer experience and



public events and in public spaces, exploiting wireless video technology and informative user interfaces. The trial system at Bristol Zoo (Wild-i) has allowed visitors to get up close and

personal with various species, including video biometrics to recognise species and individuals, and a close up camera looking into an ant colony.

RESEARCH OPPORTUNITIES

Marie Curie Research Network in Video Compression

The Marie Curie PROVISION project is appointing an Experienced Researcher (Post doctoral RA) on a 2 year appointment. Special conditions apply regarding experience and residency (please see <http://www.hhi.fraunhofer.de/en/fields-of-competence/image-processing/research-groups/image-video-coding/projects/provision.html> for further details).

DSTL 1 year project in image classification

A 1 year postdoctoral research assistantship is offered. Candidates should have experience in image processing and classifier design. For further details contact Tilo Burghard (tilo@cs.bris.ac.uk)