



BRISTOL VISION INSTITUTE

BVI REFRESH – SPRING 2016

Keeping you up to date with the latest news from Bristol's vision community

EVENTS

Young Vision Researchers' Colloquium

This year, the annual BVI Young Vision Researchers' Colloquium will take place at Cardiff University on 23rd June 2016. This event brings together early-career vision researchers from all disciplines giving them invaluable opportunity to present their research.

Register your attendance via the [University of Bristol Online shop](#).

Seminar Series



Professor Marina Bloj, University of Bradford kicked off the first of the Bristol Vision Institute's seminar series in 2016 with a fascinating talk giving an insight to how we remember object colours. Professor Dave Bull gave the next talk on challenges for perceptual video compression.

More recently we welcomed Professor Jonathan Erichsen from Cardiff University who delivered a great talk on 'Dispatches from the avian front' showing results of recent investigations into the ways in which pigeons orient responses and movements to stabilise gaze. Professor Daniel Osorio, School of Life Sciences, visited from the University of Sussex on 6th May to enlighten us about the way cuttlefish view their 3-D world.

Future guest speakers in the series include:

- 20/05/16 Karin Kjærsmo, University of Bristol
- 27/05/16 Andrew Lawrie, University of Bristol
- 14/10/16 Colin Jackson, BBC Natural History Unit
- 28/10/16 Darren Cosker, Bath University

BVI's seminar series take place in the seminar room, Life Sciences Building, Tyndall Avenue, BS8 1TQ. Seminars are followed by an informal drinks reception

in the Life Sciences Atrium. For further information including session titles and abstracts, please visit the [BVI website](#).

VISUAL MOVERS AND SHAKERS

BVI on BBC's *The One Show*

In an episode of *The One Show* which aired on the 15th April, BVI contributed to an item demonstrating the dangers of texting while driving. Recent studies have indicated that reading and even writing text messages while behind the wheel is on the rise, especially amongst younger adults. After approaching the BVI for advice on the best way to communicate this to its audience, *The One Show* production team invited BVI researcher Dr Felix Mercer Moss onto an airfield just outside Bristol to help perform an experiment.

A BVI mobile eye tracker was used to discover that drivers navigating the makeshift course spent as many as two seconds looking away from the road while replying to a text. The same drivers then learnt that for subsequent laps a customised pair of 'black-out' goggles would be worn that simulated their inattention on previous laps. The 'black-out' goggles caused carnage on the airfield, and in doing so, provided viewers with a stark reminder to keep their phones in their pockets when on the road.

To watch, go to minute 13:44 on the link: <http://www.bbc.co.uk/iplayer/episode/b078wvcs/the-one-show-15042016>

David Bull to Chair IEEE ICIP 2020

The IEEE International Conference on Image Processing is the world's largest and most comprehensive technical conference focused on image and video processing and computer vision. A team led by Professor David Bull has recently been awarded the opportunity to host this prestigious

conference in 2020. David's team, including world leading academics and industrialists, bid on behalf of the UAE and the conference will be held in Abu Dhabi in November 2020. The conference will feature world-class speakers, tutorials, exhibits, and a vision technology showcase.

The future of perceptual video compression - the PROVISION project

It is estimated that around 70% to 90% of all neurons in the human brain are dedicated to vision. This demonstrates the importance of visual information for humans. Video technology has become an important part of everyday life, providing entertainment, knowledge, education and communication. Cisco predict that by 2020, the internet will be almost entirely dominated by video traffic. As more video content is transmitted, the demand for technical advances in video compression increases.

PROVISION is an Initial Training Network (within the framework of Marie Skłodowska-Curie Actions) of leading research organisations (University of Bristol, University of Nantes, HHI Fraunhofer Berlin and University of Aachen) and industrial organisations (BBC, Netflix, Technicolor, Vitec and YouTube).

Work within PROVISION is addressing the demand for more content over limited bandwidth networks through better exploitation of human perceptual processes. This is being achieved by using subjective tools, novel video analysis and synthesis models, and customized optimization methods.



PROVISION
Perceptually Optimised Video Compression

WARM WELCOMES

Professor Ioannis Pitas



Professor Ioannis Pitas, (IEEE Fellow, IEEE Distinguished Lecturer, EURASIP Fellow) joined the Department of Electrical and Electronic Engineering and the Visual Information Laboratory as a Professor in January 2016.

Ioannis received his Diploma and PhD degree in Electrical Engineering, from the Aristotle University of

Thessaloniki (AUTH), Greece and he has served as a Visiting Professor at several Universities. His current interests are in the areas of image/video processing, intelligent digital media, machine learning, human-centred interfaces, affective computing, computer vision, 3D imaging and biomedical imaging. He has published over 800 papers, contributed in 44 books in his areas of interest and edited or (co-) authored another 10 books. He has also been member of the program committee of many scientific conferences and workshops. In the past he served as Associate Editor or co-Editor of eight international journals and General or Technical Chair of four international conferences. He participated in 68 R&D projects, primarily funded by the European Union and is/was principal investigator/researcher in 40 such completed projects. He has 22,200+ citations to his work and h-index of over 70.

New people in CamoLab



**CAMO
LAB**

Last year, CamoLab welcomed seven new members: Karin Kjernsmo, Jo Hall and Henry Knowles

are postdocs, and Cara Doyle a research technician, on the BBSRC iridescence grant held by Heather Whitney, Innes Cuthill and Nick Scott-Samuel. John Fennell and Laszlo Talas are postdocs on the "Camouflage Machine" grant held by Nick Scott-Samuel, Roland Baddeley and Innes Cuthill.

Some names will be familiar to BVI old-timers: Jo Hall and John Fennell were both previously PhD students and then postdocs in Experimental Psychology; Laszlo Talas recently finished his PhD in Biological Sciences. Henry Knowles did both his MEng and PhD in Electronic Engineering at Bristol, then working in industry for BAe Systems and Smart Sensors Ltd. in Bath. Cara has lived in Bristol for a while but it's all new to Karin. Hailing originally from Norway, via an early life and first degree in Gothenburg, Sweden, Karin did her PhD and then a postdoc at the Abo University in Turku, Finland.

The final new member of the group is Sam Matchette. Sam started a Masters by Research in October with Nick Scott-Samuel and Innes Cuthill, having just graduated with the top First in Zoology from Bristol. However, an iCASE studentship (EPSRC plus industrial partner QinetiQ) appeared from nowhere and Sam grabbed it with both hands, so he is now doing a PhD on 'dazzle camouflage'.

RESEARCH NEWS

Crustacean Vision

Dr Martin How from the Ecology of Vision Lab in the School of Biological Sciences was awarded a £150,000 research grant from the Royal Society to fund a PhD studentship in crustacean vision. The four year project will look at how light adaptation

mechanisms interact with polarization vision in fiddler crabs, shore crabs, and mantis shrimps. Interested students please send queries to m.how@bristol.ac.uk

International Fellowship

Innes Cuthill (Biological Sciences) recently returned from four months as a Fellow of the Wissenschaftskolleg zu Berlin (Institute of Advanced Studies). While there he ate and drank fine food and wine, played devastating table-tennis and pondered the meaning of existence with 40 other scholars from around the world. Anyone else interested in the sort of intellectual freedom, research support and TIME that disappeared in British academia 40 years ago, should have a look at their fellowship schemes (www.wiko-berlin.de).

GLANCE: a new EPSRC funded project

GLANCE which stands for GLanceable Nuances for Contextual Events is a new EPSRC funded project that starts this month. The £806,994 project brings together BVI academics from Computer Science (Walterio Mayol-Cuevas and Dima Damen) and Experimental Psychology (Iain Gilchrist and Casimir Ludwig) and will support two postdocs and two PhD students over the next four years.

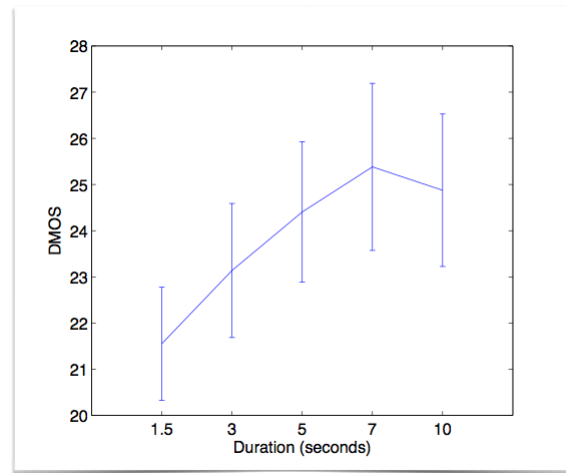
This project will develop and validate exciting novel ways in which people can interact with the world via cognitive wearables - intelligent on-body computing systems that aim to understand the user, the context, and importantly, are prompt-less and useful. The team will focus on the automatic production and display of what they are calling *glanceable guidance*. Rather than using traditional augmented reality approaches, *glanceable guidance* will use short film snippets to provide assistance but only when the user needs them.

There are two key research challenges, the first is to be able to mine information from long, raw and unscripted wearable video taken from real user-object interactions in order to generate the glanceable supports. Another challenge is how to automatically detect user's moments of uncertainty during which support should be provided without the user's explicit prompt. The team can address these challenges because it is a collaboration between Computer Science: to develop a novel data mining and computer vision algorithms and Behavioral Science: to understand when and how users need support.

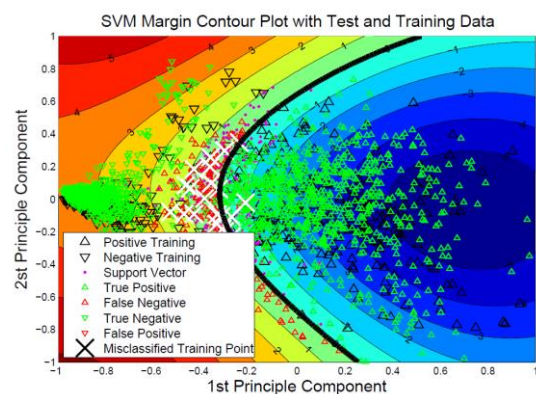
Optimal Presentation Duration for Subjective Video Quality Assessment

Subjective quality assessment is an essential component of modern image and video processing, both for the validation of objective metrics and for the comparison of coding methods. However, the

standard procedures used to collect data can be prohibitively time-consuming. A recent important paper by Felix Mercer Moss, Ke Wang, Fan Zhang, Roland Baddeley and David Bull, has been accepted for publication in IEEE Transactions on Circuits and Systems for Video Technology on this topic. In this paper, the authors explored the impact of reducing sequence length upon perceptual accuracy when identifying compression artefacts, showing that short 3 or 5 second sequences could be successfully employed for subjective video quality assessment studies, without any impact on Mean Opinion Scores. This has the potential to significantly reduce testing times.



Improved detection of seabed mines



A project led by Tilo Burghardt in VI-Lab has developed operator-assurance capabilities for the effective and practical use of Automated Target Recognition (ATR) in seabed mine detection. The work, funded by DSTL in collaboration with the University of Cambridge, was undertaken by our RA Michael Devereaux, and delivered a practical proof of concept viable across different operating environments. The key novelty resided in the combination of context-aware classifier validation with synthesized sample imagery for dense training sets.

What's in a CSF?

The Contrast Sensitivity Function (CSF) is a representation of how sensitive the human visual system is to any given frequency. Conventionally CSFs have been based on windowed Sinusoidal or Gabor gratings to generate thresholds of detection across a range of frequencies. These CSFs indicate a maximum at between two and five spatial cycles per subtended degree, and are frequently employed to compensate for visual responses in image processing algorithms. However, common image processing analysis tools do not use such functions. Current research by Paul Hill Alin Achim and David Bull has focused on revisiting the definition of the CSF for better compatibility with commonly used multiscale spatial-frequency transforms for image processing (including the Dual Tree Complex Wavelet Transform (DT-CWT), the Steerable Pyramid and Curvelets). Their work, recently accepted for publication in IEEE Transactions on Image Processing has shown that significant benefits can be obtained when these modified CSFs are used instead of the conventional versions.