

CONTACT	Department of Engineering University of Cambridge Cambridge, United Kingdom, CB1 1PZ	mobile: +44 7498 667521 e-mail: <a href="mailto:jjc75@cam.ac.uk">jjc75@cam.ac.uk</a> website: <a href="http://www.jjcvision.com">http://www.jjcvision.com</a>
RESEARCH INTERESTS	<b>Computer vision, machine learning</b> , health applications, human-centric CV, 3D shape, tracking and detection, real-time systems.	
PROFESSIONAL EXPERIENCE	<b>University of Cambridge - <i>Senior Research Associate</i></b>	<i>Jan 2017 – present</i>
	<i>Neural full body human avatars and representations</i> Developing a system for recovering interpretable 3D representations of people with broad applications in tracking, re-identification and creation of personal avatars.	
	<i>Unsupervised 3D pose and shape estimation of cars</i> Developed an unsupervised system for Toyota on recovering the 3D pose, shape and appearance of cars from a single image using neural radiance fields (NeRFs), no labelled data necessary.	
	<i>Tracking in the wild from synthetic data</i> Funded by Toyota, I developed a real-time 3D car pose tracking system and a synthetic data generation engine to enable accurate and efficient processing using infrastructure cameras.	
	<i>People tracking and clothing</i> Developed a real-time clothing instance segmentation system for person tracking and re-identification for Toyota.	
	<i>Solving crime from video</i> Contributed to the SeeQuestor-funded "Deep Insight" project, developing efficient mobile phone capable deep learning methods for rapidly analyzing surveillance video to aid in crime prevention.	
	<i>Consultancy</i> Clothing segmentation for Metail. Real-time ECG analysis for Cambridge Heartware. Re-identification system for SeeQuestor. Due diligence for Blippar. 3D foot shape reconstruction and tracking for Trya. Digital meter reading for GlucoRX. Instance segmentation of strawberries for DogTooth. Full body scanning on mobile phone for the MRC Epidemiology Unit.	
	<i>Other managed projects</i> Food recognition, volume estimation and tracking, transcribing ECG from paper, 3D foot shape estimation, analogue meter reading, explainable anomaly detection, GAN based few shot learning, Diffusion based few shot learning, NeRFs for synthetic data, enhancing AR shoe try-on.	
	<b>Blueye Limited - <i>Director</i></b>	<i>Dec 2018 – present</i>
	Together with Prof. Roberto Cipolla, I co-founded Blueye Limited, an innovative company revolutionising the transfer of digital meter data into phones, see <a href="http://www.blueye.ai">http://www.blueye.ai</a> .	
	<b>University of Leeds - <i>Research Fellow</i></b>	<i>Aug 2016 – Oct 2016</i>
	<i>Human activity recognition with a mobile robot</i>	
	<i>Human-Computer Interaction &amp; avatar synthesis</i> Creating a Human-Computer Interaction system with realistic "talking avatars" of TV celebrities using ML, CV, speech analysis, and NLP, leveraging multi-modal data for language modeling and speech/video synthesis.	
	<i>Tracking, human pose estimation, gesture recognition &amp; deep learning</i> Authored more than 8 publications with Andrew Zisserman and partners from the University of Oxford on an EPSRC project supported by BBC. Developed novel computer vision methods for <b>real-time tracking, detection</b> and <b>gesture recognition</b> in long video sequences.	

*Tracking, 3D sensors and human pose estimation*

Introduced a powerful “off-label” use of the **Microsoft Kinect** to learn improved probabilistic human body shape models to be used for **human pose estimation** and **tracking** with a monocular camera.

**University of Bradford - Research Assistant***May 2010 – Dec 2010**Shape modeling and image/video content based retrieval*

Through mathematical modeling of shape and automated video surveillance methods, proposed innovations in the domains of eldercare and intelligent vehicle design. (Two EU Framework Programme 7 projects)

**Bangor University - PhD Research***Sep 2005 – Sep 2009*

Authored a thesis on novel computer vision and machine learning algorithms to aid the hydrocarbon industry in the search for oil and natural gas.

## EDUCATION

**Bangor University**, Bangor, UK*PhD* in Computer Science and Mathematics*Sep 2005 – Oct 2009**MMath* in Mathematics, *First-Class Honours**Sep 2001 – Jul 2005*

## HONORS AND AWARDS

**Best Poster**, British Machine Vision Conference, 2014**Best Paper Honorable Mention**, British Machine Vision Conference, 2012**Best Video**, British Machine Vision Conference, 2012

The Royal Academy of Engineering Travel Grant, Bangor University, 2006

JH Gee Prize for Outstanding Performance in Mathematics, Bangor University, 2005

Drapers Company Awards Three Year Bursary, Bangor University, 2002

Scholarship for Mathematical Achievement, Bangor University, 2001

EESW Prize for Most Commercially Viable Device, Ysgol Syr Thomas Jones, 2000

## TEACHING AND ADMINISTRATION

**Senior Research Associate** - University of Cambridge*2017 – present*

Reviewer for main computer vision conferences and journals, e.g., CVPR, ICCV, PAMI, etc

Project supervisor to fourth year engineering Masters students

Co-supervisor PhD students with Prof. Roberto Cipolla

**Research Fellow** - University of Leeds*2011 – 2016*

Reviewer for main computer vision conferences and journals

Organizer of the Vision Group Journal Club.

**Research Assistant** - University of Bradford*May 2010 – Dec 2010*

Work package leader on EU Framework Programme 7 project HERMES and collaborator on a further EU project. Organized and presented research at international project meetings.

**Teaching Assistant** - Bangor University*2006 – 2008*

Held the Machine Learning lecture for undergraduate mathematicians and computer scientists.

Conducted practicals and assessments for the Mathematical Methods module.

**PhD researcher** - Bangor University*2005 – 2008*

Organized meetings and held presentations for collaborators from a multi-disciplinary team of mathematicians, engineers, computer scientists, geologists and company managers.

## COMPUTER SKILLS

**Python, Swift, Matlab, C, C++, C#, Java, Git, SQL, HTML5****Deep learning frameworks:** PyTorch and Tensorflow

Mobile app development for iOS and Android (CoreML, ARKit, ARCore, Tensorflow Lite).

Windows, Linux OS, Registered Nvidia GPU Developer, HPC use, LaTeX, MS Office

1. **Charles, J.**, Abbeloos, W., Reino, D. and Cipolla, R. Style2NeRF: An Unsupervised One-Shot NeRF for Semantic 3D Reconstruction. In Proc. British Machine Vision Conference (BMVC), 2022.
2. Boyne, O., **Charles, J.**, and Cipolla, R. FIND: An Unsupervised Implicit 3D Model of Articulated Human Feet. In Proc. British Machine Vision Conference (BMVC), 2022.
3. Szymanowicz, S., **Charles, J.**, and Cipolla, R. Discrete neural representations for explainable anomaly detection. In Proc. Winter Conference on Applications of Computer Vision (WACV), 2022
4. Szymanowicz, S., **Charles, J.**, and Cipolla, R. X-MAN: Explaining multiple sources of anomalies in video. CVPR Workshop on Fair, Data Efficient and Trusted Computer Vision, 2021.
5. Howells, B., **Charles, J.** and Cipolla, R. Real-time analogue gauge transcription on mobile phone. Mobile AI workshop in conjunction with CVPR, 2021.
6. **Charles, J.**, Bucciarelli, S. and Cipolla, R. Scaling digital screen reading with one-shot learning and re-identification. in Proc. Winter Conference on Applications of Computer Vision (WACV), 2021.
7. Kok, F., **Charles, J.** and Cipolla, R. FootNet: An Efficient Convolutional Network for Multiview 3D Foot Reconstruction. In Proc. Asian Conference on Computer Vision (ACCV), 2020.
8. Biggs, B., Boyne, O. **Charles, J.**, Fitzgibbon, A. and Cipolla, R. Who left the dogs out: 3D animal reconstruction with expectation maximization in the loop. In Proc. European Conference on Computer Vision (ECCV), 2020.
9. **Charles, J.**, Bucciarelli, S. and Cipolla, R. Real-time screen reading: reducing domain shift for one-shot learning. In Proc. British Machine Vision Conference (BMVC), 2020.
10. **Charles, J.**, Budvytis, I. and Cipolla, R. Real-time Factored ConvNets: Extracting the X factor in Human Parsing. In Proc. British Machine Vision Conference (BMVC), 2017.
11. Duckworth, P., Alomari, M., **Charles, J.**, Hogg, D. C. and Cohn, A. G. Latent Dirichlet Allocation for Unsupervised Activity Analysis on an Autonomous Mobile Robot. In Proc. Association for the Advancement of Artificial Intelligence (AAAI), 2017.
12. **Charles, J.**, Magee, D. and Hogg, D. Virtual Immortality: Reanimating characters from TV shows. In Proc. ECCV Workshop on Virtual/Augmented Reality for Visual Artificial Intelligence, 2016.
13. **Charles, J.**, Pfister, T., Magee, D., Hogg, D., and Zisserman A. Personalized Human Video Pose Estimation. In Proc. IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2016. —Oral
14. Pfister, T., **Charles, J.** and Zisserman A. Flowing ConvNets for Human Pose Estimation in Videos. In Proc. International Conference on Computer Vision (ICCV), 2015.
15. **Charles, J.**, Pfister, T., Everingham, M. and Zisserman A. Automatic and Efficient Human Pose Estimation for Sign Language Videos. International Journal of Computer Vision 110 (1), 70-90, 2014.
16. **Charles, J.**, Pfister, T., Magee, D., Hogg D. and Zisserman A. Upper Body Pose Estimation with Temporal Sequential Forests. In Proc. British Machine Vision Conference (BMVC), 2014.
17. Pfister, T., Simonyan, K., **Charles, J.** and Zisserman A. Deep Convolutional Neural Networks for Efficient Pose Estimation in Gesture Videos. In Proc. Asian Conference on Computer Vision (ACCV), 2014.
18. Pfister, T., **Charles, J.** and Zisserman A. Domain-adaptive Discriminative One-shot Learning of Gestures. In Proc. European Conference on Computer Vision (ECCV), 2014.
19. **Charles, J.**, Pfister, T., Magee, D., Hogg D. and Zisserman A. Domain Adaptation for Upper Body Pose Tracking in Signed TV Broadcasts. In Proc. British Machine Vision Conference (BMVC), 2013.
20. Pfister, T., **Charles, J.** and Zisserman A. Large-scale Learning of Sign Language by Watching TV (Using Co-occurrences). In Proc. British Machine Vision Conference (BMVC), 2013.
21. Pfister, T., **Charles, J.**, Everingham, M. and Zisserman A. Automatic and Efficient Long Term Arm and Hand Tracking for Continuous Sign Language TV Broadcasts. In Proc. British Machine Vision Conference (BMVC), 2012.
22. **Charles, J.** and Everingham, M. Learning shape models for monocular human pose estimation from the Microsoft Xbox Kinect. In Proc. IEEE Workshop on Consumer Depth Cameras for Computer Vision (CDC4CV), in conjunction with ICCV 2011.

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PUBLICATIONS  
(CONTINUED)

23. Jiang, J., **Charles, J.** and Demestichas, K. EcoGem: A European Framework-7 project towards cooperative and intelligent optimization of travel planning and energy saving for drivers of fully electric vehicles, *Vehicular Technology Magazine, IEEE* 6 (3), 22-26, 2011.
24. **Charles, J.** Automatic recognition of complete palynomorphs in digital images. *Machine Vision and Applications* 22 (1), 53-60, 2009.
25. **Charles, J.**, Kuncheva, L., Wells, B., and Lim, I. Stability of kerogen classification with regard to image segmentation. *Mathematical Geology* 41 (4), 475-486, 2009.
26. **Charles, J.**, Kuncheva, L., Wells, B., and Lim, I. Object segmentation within microscope images of palynofacies. *Computers & Geosciences* 34 (6), 688-698, 2008.
27. **Charles, J.**, Kuncheva, L., Wells, B., and Lim, I. Background segmentation in microscope images. In *Proc. International Conference on Computer Vision Theory and Applications (VISAPP)*, 2008.
28. Kuncheva, L., **Charles, J.**, Miles, N., Collins, A., Wells, B., and Lim, I. Automated kerogen classification in microscope images of dispersed kerogen preparation. *Mathematical Geology* 40 (6), 639-652, 2008.
29. **Charles, J.**, Kuncheva, L., Wells, B., and Lim, I. An evaluation measure of image segmentation based on object centres. *LNCS Image analysis and recognition* 4141, 283-294, 2006.