

Dr. Darren Cosker, BSc (Hons), PhD.

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School of Computer Science
University of Bath
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Research Experience

Royal Academy of Engineering/EPSRC Postdoctoral Research Fellow, Bath University, UK.

July 2007 – Present.

- Project title: “Exploiting 4D Facial Dynamics for Creating Next Generation Facial Modeling and Animation Techniques”. (Independently acquired funding ~£460K).
- Developing dynamic 3D models for animation. Capture and non-linear modeling of real time 3D video data. Dense feature point tracking (AAMs/Optical flow). Development of advanced performance mapping and non-linear blend shape based techniques.
- Expert knowledge of the Facial Action Coding System (FACS). Collaboration with leading FACS experts (Psych, Comp. Sci. and Industry). Acquisition of dynamic 3D FACS database.

Senior Visiting Research Fellow - Centre for Vision, Speech and Signal Processing (CVSSP), University of Surrey, UK. October 2007 – Present

- On-going collaboration with Prof. Adrian Hilton and Dr James Edge on dynamic 3D facial modeling, performance driven animation and speech driven animation

Doctor Of Philosophy, Thesis Title: Animation of a Hierarchical Image Based Facial Model and Perceptual Analysis of Visual Speech, October 2001 – September 2005(viva), Graduation February 2006, School of Computer Science, Cardiff University, UK.

Major Contributions:

- A hierarchical appearance model for animation,
- Signal prediction algorithms for calculating visual signals from audio signals using Hidden Markov Models,
- Perceptual evaluation of visual-speech synthesis using the McGurk effect.

Software Engineer/ Research Assistant, School of Computer Science, Cardiff University, UK, Summer 2000

- Designed and developed an expert system for multi-criteria decision making using Dempster-Shafer theory. Implemented using Java.
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VFX Experience

R&D Consultant, Double Negative Visual Effects, London.

November 2009 – Present

- Motion-capture research and development for ‘John Carter of Mars’ (Disney, Release 2012)
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Education (pre-PhD)

Bachelor of Science in Computer Science, 1st Class (with honours), July 2001

School of Computer Science, Cardiff University, UK. (*Graduated with Best Overall Performance*)

Subjects include:

- Graphics, Image Processing, Analytical/Discrete Math, Internet Computing, Java Programming, Artificial Intelligence, System Design, Data Structures/Algorithms, Group Project

Prizes:

- **SGI Prize for Best Final Year Exam Performance**,
- **IBM Prize for Best Group Project**.

BTEC OND Electrical and Electronic Engineering, Distinction, July 1998
Neath Port Talbot Technical College, Neath, UK. (*Graduated with Best Overall Performance*)

Subjects include:

- Advanced Engineering Mathematics, Digital/Analogue Electronics

General Certificate of Secondary Education (GCSE), May 1993, St. Josephs R.C. Comprehensive School, Port Talbot, UK.

Teaching Experience

Associate Lecturer, School of Computer Science, Cardiff University, UK,
Part time: October 2004 – March 2007

- Lecturing (Image Processing, HCI, Multimedia, Internet Computing)
- Grant writing
- Conducting research related to:
 - Speech driven animation of 2D and 3D facial models
 - The application of facial stimuli to psychological experimentation
 - The application of image based facial models to video realistic animation
- Dissemination of research in journals and conference proceedings

Degree Student Part Time Lecturer and Tutor, School of Computer Science, Cardiff University, UK,
October 2001 – June 2004.

Other Employment

Web Site Developer, TrustMark Consultants, Newport, UK, Summer 2001

- Responsible for design and development of a website for a local school. MS FrontPage/VB Script utilizing an MS Access Database. Responsible for promotion of a WSDL/SOAP web service website.
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Research Interests

2D and 3D Motion Tracking, Image and surface registration, Statistical modeling of behaviour and motion, 3D acquisition and reconstruction, Speech processing, 2D and 3D animation, Psychophysical evaluation of animation and motion

Journal Articles

(In preparation – several papers on dynamic 3D data modeling and animation)

D. Cosker, E. Krumhuber and A. Hilton, "Perception of Linear and Nonlinear Motion Properties using a FACS Validated 3D Facial Model", ACM Transactions on Applied Perception (in preparation)

Y. Zheng, Y. Hicks, D. Cosker, D. Marshall, "Generating Human Interactive Behaviours using the Windowed Viterbi Algorithm", Lecture Notes in Communications in Computer and Information Science, Springer-Verlag, Accepted, 2009.

E. Krumhuber, A. Manstead, D. Cosker, D. Marshall and P. L. Rosin, "Effects of Dynamic Attributes of Smiles in Human and Synthetic Faces: A Simulated Job Interview Setting", Journal of Non-Verbal Behaviour, 2009.

L. Benedikt, D. Cosker, P. L. Rosin and D. Marshall, "Assessing the Uniqueness and Permanence of Facial Gestures for Use in Biometric Applications", IEEE Systems, Man and Cybernetics, 2009 (in press).

H. Popat, S. Richmond, R. Playle, S. Marshall, P. L. Rosin, D. Cosker, "Three-Dimensional Motion Analysis - An Exploratory Study. Part 1: Assessment of Facial Movement", Journal of Orthodontics and Craniofacial Research, 2008.

H. Popat, S. Richmond, R. Playle, S. Marshall, P. L. Rosin, D. Cosker, "Three-Dimensional Motion Analysis - An Exploratory Study. Part 2: Reproducibility of Facial Movement", Journal of Orthodontics and Craniofacial Research, 2008.

D. Cosker, R. Borkett, D. Marshall, and P. L. Rosin, "Towards Automatic Performance Driven Animation Between Multiple Types of Facial Model", IET Computer Vision, 2008.

E. Krumhuber, A. Manstead, D. Cosker, P.L.Rosin and A.D. Marshall, "Effects of Facial Dynamics in Trustworthiness and Cooperative Behavior", Emotion, 2007.

D. Cosker, D. Marshall, P. Rosin, S. Paddock, S. Rushton, "Towards Perceptually Realistic Talking Heads: Models, Metrics and McGurk", ACM Transactions on Applied Perception, vol. 2, no. 3, 2005.

D. Cosker, D. Marshall, P. Rosin, Y.A. Hicks, "Speech Driven Facial Animation using a Hierarchical Model", IEE Vision, Image and Signal Processing, August 2004.

M. Beynon, D. Cosker, D. Marshall, "An Expert System for Multi-Criteria Decision Making using Dempster Shafer Theory", Expert Systems with Applications, Vol. 20, No 4, June 2001

Conference Proceedings and Contributions

D.Cosker, E. Krumhuber and A. Hilton, "Perception of Linear and Nonlinear Motion Properties using a FACS Validated 3D Facial Model", In Proc. of ACM Symposium on Applied Perception in Graphics and Visualisation (APGV), 2010 (to appear)

C. Charron, Y. A. Hicks, P. Hall and D. Cosker, "Incremental Learning of Dynamical Models of Faces", In Proc. BMVC 2009

D. Cosker and J. Edge, "Laughing, Crying, Sneezing and Yawning: Automatic Voice Driven Animation of Non-Speech Articulations", In Proc. of Computer Animation and Social Agents (CASA), 2009.

L. Benedikt, D. Cosker, D. Marshall and P. L. Rosin, "Facial Dynamics in Biometric Identification", Proc of BMVC, 2008.

D. Cosker, C. Holt, D. Mason, G. Whatling, D. Marshall and P. L. Rosin, "Automatic Audio Driven Animation of Non-Verbal Articulations", Proc of CMBBE 2008.
(Also appeared as an article on New Scientist.com 2008).

D. Cosker, "Creating Realistic Facial Stimuli for Psychological Experimentation", 12th European Conference on Facial Expressions, 2008.

Y. Zheng, Y. Hicks, D. Marshall and D. Cosker, "Generating Human Interactive Behaviours using the Windowed Viterbi Algorithm", 3rd International Conference on Computer Graphics Theory and Applications (GRAPP), 2008.

L. Benedikt, D. Cosker, D. Marshall and P. L. Rosin, "3D Facial Gestures in Biometrics: from Feasibility Study to Application", In Proc. of IEEE International Conference on Biometrics Theory, Applications and Systems, 2008. **Best student paper prize.**

L. Benedikt, E. Krumhuber, A. Calvert, D. Cosker, P. Rosin and D. Marshall, "Construction and Perceptual Evaluation of a 3D Head Model", SIGGRAPH 2007 (Poster – also appeared at Eurographics/SIGGRAPH Symposium on Computer Animation).

D. Hubball, M. Chen, P. W. Grant and D. Cosker, "Evolutionary Morphing for Facial Aging Simulation", International Crime Science Conference (ICSC) 2007.

D. Cosker, S. Roy, P. L. Rosin, D. Marshall, Remapping Animation Parameters between Multiple Types of Facial Model, Lecture Notes in Computer Science (LNCS), Proc. Of Mirage 2007, Springer. **(Oral Presentation)**

D. Cosker, K. Sidorov, E. Krumhuber, A. D. Marshall, P. L. Rosin, A. Manstead Discovering Realistic Facial Dynamic for Animation, IET CVMP 2006

Z.Zheng, Y. A. Hicks, D. Cosker, D. Marshall and J. A. Chambers, Generating 3D Interactive Behaviours, IET CVMP 2006

Z.Zheng, Y. A. Hicks, D. Cosker, D. Marshall and J. A. Chambers, "Virtual Friend: Tracking and Generating Natural Interactive Behaviours in Real Video", In Proc. of IEEE International Conference on Signal Processing (ICSP), Gullin, China, 2006.

D. Cosker, D. Marshall, P.L. Rosin and Y. Hicks, "Speech and Expression Driven Animation of a Video-Realistic Appearance Based Hierarchical Facial Model", IEEE Computer Vision and Pattern Recognition (CVPR) workshop on Learning, representation and context for human sensing in video, 2006.

Krumhuber, E., Manstead, Cosker, D., A., Marshall, D., and Rosin, P.L., "Smile Authenticity and trustworthiness in a one-shot trust game". 2nd European Conference on emotion, Louvain-La-Neuve,, Belgium, May 2006

H. Popat, S. Richmond, D. Marshall, Paul Rosin, F. Hartles, D. Cosker, C. H. Keu and A. Zhurov, "Quantifying Facial Movement During Speech Using Three-Dimensional Facial Imaging". Computer Methods in Biomechanics and Biomedical Engineering (CMBBE) 2006, Antibes, France.

W. Wang, D. Cosker, Y. Hicks, S. Sanei, and J. A. Chambers, "Video Assisted Speech Source Separation", In Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) 2005 Philadelphia, USA.

Krumhuber, E., Cosker, D., Manstead, A., Marshall, D., and Rosin, P.L., "Synthetic humans for the study of subtle temporal aspects in facial displays", IXth Conference of the International Society for Research on Emotions, Bari, Italy (July 2005).

Krumhuber, E., Cosker, D., Manstead, A., Marshall, D., and Rosin, P.L. "Temporal dynamics of smiling: Human versus synthetic faces", IXth Conference of the International Society for Research on Emotions, Bari, Italy (July 2005).

Krumhuber, E., Cosker, D., Manstead, A., Marshall, D., and Rosin, P.L. "Temporal aspects of smiles influence employment decisions: A comparison of human and synthetic faces", 11th European Conference Facial Expressions: Measurement and Meaning, Durham, United Kingdom (September 2005).

D. Cosker, D. Marshall, P. Rosin, S. Paddock, S. Rushton, "Towards Perceptually Realistic Talking Heads: Models, Metrics and McGurk", ACM SIGGRAPH Symposium on Applied Perception in Graphics and Visualization (APGV), August 2004, California, USA **(Oral Presentation)**

D. Cosker, D. Marshall, P. Rosin, Y.A. Hicks, "Speech Driven Facial Animation using a Hidden Markov Co-articulation Model", In Proc. of IEEE International Conference on Pattern Recognition (ICPR) 2004, Cambridge, August 2004. **(Oral Presentation)**

A Framework for Producing Realistic 2D Image Based Facial Animation from Speech. Vision, Video and Graphics (VVG), BMVA Symposium, Royal Statistical Society, London, UK, 2004. **(Oral Presentation)**

D. Cosker, D. Marshall, P. Rosin, Y.A. Hicks, "Speaker-Independent Speech-Driven Facial Animation Using a Hierarchical Facial Model", In Proc. IEE Visual Information Engineering (VIE) 2003 July 7-9, University of Surrey, 2003. **(Oral Presentation)**

D. Cosker, D. Marshall, P. Rosin, Y.A. Hicks, "Video Realistic Talking Heads using hierarchical Non-Linear Speech-Appearance Models", Proc. of Mirage 2003, INRIA Rocquencourt, France, 2003. **(Oral Presentation)**

D. Cosker, "Voice Animated Video Realistic Faces for Multimedia Applications", Image Processing and Optical Technology (IPOT), Birmingham NEC, 2003.

D. Cosker, "Speech Driven Video-Realistic Talking Heads", EPSRC-BMVA Summer School on Computer Vision 2002.

Technical Skills

Languages: Expert in Matlab, Extensive knowledge of Java (inc. Java 3D/SWING/AWT), LaTeX, HTML, Java Script, Perl, PHP; Moderate knowledge of LISP, C/C++, Pascal, Assembler, VB Script, SMILE, PROLOG.

HW: Familiar with Dynamic 3D Data Capture (3DMD), Phasespace/Motion-Star/Vicon Motion-Capture

Other Specialist Software: Familiar with 3D Studio Max, Poser, Photoshop

Research Funding Awards

Exploiting 4D Data for Creating Next Generation Facial Modelling and Animation Techniques, Royal Academy of Engineering/ EPSRC Research Fellowship, 2007-2012 (**£460,350 FEC**)

A Video-Realistic Animated Three-Dimensional Computer Generated Talking Human Face, Nuffield Foundation Undergraduate Research Bursary, 2006 (**£1240**)

BMVA Student Bursary for Travel to an International Conference, 2004 (**£500**)

PhD Studentship, School of Computer Science, Cardiff University, 2001-2004 (**£8000 - £9500 per year**)

Professional Activities

Co-Chair – ACM Workshop on Facial Analysis and Animation (FAA), Edinburgh 2010. 2009

- <http://www.cstr.ed.ac.uk/faa2009/>

Steering Committee – EPSRC Vision & Language Network

- <http://www.vlnet.org.uk/>

Programme Committees

- Eurographics TPCG 2010
- IET European Conference on Visual Media Production (CVMP) 2007, 2008, 2009, 2010
- AVSP 2009
- ACII 2009,
- IEEE Workshop on Statistical Signal Processing, 2009

Reviewer

- ACM SIGGRAPH
- ACM Transactions on Applied Perception
- IEEE Computer Graphics & Applications
- EUROGRAPHICS
- Journal of Virtual Reality
- IET CVMP
- Pacific Graphics
- IEEE Workshop on Statistical Signal Processing
- Pattern Recognition (Elsevier)
- IEEE Systems, Man and Cybernetics, Part A.
- Computer Graphics Interface
- Computer Vision and Image Understanding (Elsevier)