

University of Exeter
Department of Computer Science
Exeter, UK, EX4 4QF

Imperial College London
Department of Computing
London, UK, SW7 2AZ

Anastasios Roussos

Curriculum Vitae (3 July 2018)

email: troussos@imperial.ac.uk
<http://www.doc.ic.ac.uk/~aroussos/>

Dr. Anastasios Roussos is a Lecturer (equivalent to Assistant Professor) in Computer Science at the University of Exeter, UK. He is also affiliated with the Department of Computing, Imperial College London. Prior to these positions, he has worked as a postdoctoral researcher at University College London (UCL) and Queen Mary, University of London. He has studied Electrical and Computer Engineering (PhD 2010, Dipl-Ing 2005) at the National Technical University of Athens (NTUA), Greece. Dr. Roussos has close collaborations with researchers from various universities and institutions worldwide, such as UCL, NTUA, EPFL, University of Surrey, University of Adelaide, Great Ormond Street Hospital, Royal Free Hospital and Science Museum, London. He has published 7 journal articles in top-tier international journals of Computer Vision, Machine Learning and Imaging Sciences (TPAMI, IJCV, JMLR, SIAM SIIMS) and 16 papers in peer-reviewed international conferences, including the top conferences of Computer Vision, Pattern Recognition and Augmented Reality (ICCV, CVPR, ISMAR). His work on anisotropic diffusion-projection PDEs for image interpolation has received several awards, including the Best Student Paper Award of the International Conference on Scale Space and Variational Methods in Computer Vision. He has more than 630 citations on his articles with an h-index of 13 and an i10-index of 16 (source: Google Scholar, 3 July 2018).

Professional experience

- 2017–present **Lecturer (equiv. to Assistant Professor) in Computer Science**, *University of Exeter, UK*, Department of Computer Science.
Duties: Leading the research on 3D Computer Vision. Supervision of PhD students. Attraction of external funding through applications of research grants. Teaching of undergraduate and postgraduate modules of Computer Science programmes.
- 2014–present **Research Associate**, *Imperial College London, UK*, Department of Computing.
Non-Medical Honorary Contract with Great Ormond Street Hospital for Children. Participation in the “GOSH 3DMM” grant. Also, participation in the EPSRC program grant “FACER2VM”.
Duties: Research on dense modelling and reconstruction of 3D facial shape and human body articulation. Writing proposals for British (EPSRC etc.) research grants.
- 2013–2014 **Research Associate**, *University College London, UK*, Department of Computer Science.
Participation in the European Research Council project *Human Motion Analysis from Image Sequences* (HUMANIS).
Duties: Research on dense dynamic 3D reconstruction of generic non-rigid scenes from a single camera.
- 2010–2013 **Research Associate**, *Queen Mary, University of London, UK*, School of Electronic Engineering & Computer Science.
Participation in the European Research Council project *Human Motion Analysis from Image Sequences* (HUMANIS).
Duties: Research on dense variational methods for multi-frame motion estimation and non-rigid structure from motion.

2005–2010 **Research Assistant**, *National Technical University of Athens, Greece*, School of Electrical & Computer Engineering.

Participation in the following European Union research projects:

- *Sign Language Recognition, Generation and Modelling with Application in Deaf Communication* (Dicta-Sign). *Duties*: Research on head and hands segmentation and tracking during continuous signing, with emphasis to occlusion handling. Statistical modelling of the shape, appearance and dynamics of signing gestures for hand tracking and feature extraction.
- *Audiovisual to Articulatory Speech Inversion (ASPI)*. *Duties*: Research on novel methods for denoising, deblurring and interpolation of biomedical image data of a subject's vocal tract during speech. Design of models for the tongue tracking in ultrasound images, 3D segmentation of the vocal tract in MRIs and image registration of different modalities.

Education

2005–2010 **PhD in Electrical & Computer Engineering**, *National Technical University of Athens, Greece*.

Research field: Image Analysis and Computer Vision

Title: "Nonlinear diffusion in Computer Vision and statistical shape models, with applications in image analysis of articulators of voiced and signed speech"

Advisor: Prof. Petros Maragos

Postgraduate Courses Average Grade: 9.83/10

Postgraduate Courses: Theoretical Methods of Computer Vision (Geometry, Statistics, Physics), Human-Computer Interaction, Biomedical Optics, Artificial Neural Networks & Machine Learning, Stochastic Optimization, Nonlinear Partial Differential Equations.

2000–2005 **Diploma/MEng in Electrical & Computer Engineering**, *National Technical University of Athens, Greece*.

Final Grade: 8.42/10

Direction of specialization: Communications engineer

Course flows: Computer Software,
Signals, Automatic Control and Robotics,
Electromagnetic Waves and Telecommunications,
Telecommunication Systems and Computer Networks

Diploma Thesis: "Theory and Applications of Partial Differential Equations in Computer Vision" (*Advisor*: Prof. Petros Maragos). *Grade*: 10/10

Research interests

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|--------------------------|---|
| Theory | Variational methods and methods based on partial differential equations, nonlinear diffusion, convex and nonconvex optimisation, sparse representation, low-rank matrix approximation, 2D and 3D statistical shape models, dynamic modelling of object motion and deformation, deep learning, convolutional neural networks. |
| Computer Vision problems | 3D face modelling and analysis, dense 4D (3D+time) reconstruction of non-rigid scenes, scene flow, multi-frame optic flow, image restoration, object detection and tracking, shape feature extraction. |
| Applications | Sign language recognition, gesture recognition, human-computer interaction, markerless motion and performance capture, facial expression recognition, facial recognition/verification, craniofacial surgery, minimally invasive surgery, augmented reality, visual effects, biomedical image processing, computational photography. |

Scholarships and awards

- 2009 **Thomaidis Foundation, National Technical University of Athens, Greece**, Thomaidis Award for the Progress of Arts and Sciences, for the article: A. Roussos and P. Maragos, "Reversible interpolation of vectorial images by an anisotropic diffusion-projection PDE", *International Journal of Computer Vision*, 84(2), August 2009.
- 2007 **First International Conference on Scale Space and Variational Methods in Computer Vision (SSVM-2007)**, Best Student Paper Award of the conference for the paper: A. Roussos and P. Maragos, "Vector-Valued Image Interpolation by an Anisotropic Diffusion-Projection PDE".
- 2007 **First Panhellenic Conference of Electrical and Computer Engineering Students (SFHMMY-2007)**, Best Poster Award of the conference for the paper: A. Roussos and P. Maragos, "Vector-Valued Image Interpolation by an Anisotropic Diffusion-Projection PDE".
- 2007–2008 **National Technical University of Athens**, 1 year research scholarship for PhD studies.
- 2000 **Hellenic Physical Society**, Award in the Panhellenic Competition in Physics among High School Students.
- 1997 **Hellenic Mathematical Society**, 3rd Award in the 57th Panhellenic Competition in Mathematics among High School Students.

Teaching and supervision experience

- 2017–present **Teaching**, *Department of Computer Science*, University of Exeter.
- "Computer Graphics" (3rd year course).
 - "Computer Vision" (MSc course).
- 2017–present **PhD Supervision**, *Department of Computer Science*, University of Exeter.
- Mohammad Rami Koujan, Subject of Research: "3D Computer Vision for Facial Shape Modelling and Analysis", 2017-expected 2021.
- 2017–present **BSc and MSc Projects Supervision**, *Department of Computer Science*, University of Exeter.
- James Badham, "Monocular 3D Face Scanning", MSci Research Project, 2017-2018.
 - Ibukun Akande, "Video to 3D Facial Reenactment", BSc Final Year Project, 2017-2018.
 - Nikolai Dochev, "4D Face Reconstruction from a Single Camera", BSc Final Year Project, 2017-2018: *Winner of the Computer Science Final Year Project Prize, University of Exeter.*
- 2014–2017 **PhD co-supervisor**, *Department of Computing*, Imperial College London.
- Co-supervision of 3 PhD students of the Intelligent Behaviour Understanding Group (iBUG), conducting research in Computer Vision. Two of these students are recipients of the Qualcomm Innovation Fellowship, with one of them being the overall European Champion.
- 2016 **Postdoctoral Teaching Assistant**, *Department of Computing*, Imperial College London.
- "Advanced Statistical Machine learning and Pattern Recognition" (postgraduate and undergraduate course): Guest lecture: *Markov Random Fields.*
- 2015 **MEng co-supervisor**, *Department of Computing*, Imperial College London.
- Co-supervision of an MEng Computing student, working on 3D facial modelling for craniofacial surgery.

- 2013–2014 **Postdoctoral Teaching Assistant**, Department of Computer Science, University College London.
- “Artificial Intelligence and Neural Computing” (postgraduate and undergraduate course): Lab tutoring and help sessions.
 - “Computational Photography and Capture” (postgraduate and undergraduate course): Help sessions and lab exercises marking.
 - “Mathematical Methods Algorithms and Implementations” (postgraduate course of the M.Sc. program “Computer Graphics, Vision and Imaging”): Lab tutoring and development of novel lab materials.
 - M.Sc. projects: development of project proposals and students tutoring.
- 2010–2013 **PhD co-supervisor**, *School of Electronic Engineering & Computer Science*, Queen Mary, University of London.
- Co-supervision of a PhD student, Ravi Garg, working on dense motion capture of non-rigid objects from monocular video. The student completed successfully his PhD studies and now continues his scientific career as a postdoctoral researcher.
- 2005–2010 **Graduate Teaching Assistant**, School of Electrical & Computer Engineering, NTUA.
- “Computer Vision” (postgraduate and undergraduate course): Development of lab exercises and supplementary teaching material, computer lab tutoring, student homework and lab exercises marking. Guest lectures:
Partial Differential Equations - based methods for Computer Vision (2007, 2008 & 2010).
Image feature detection based on Mathematical Morphology (2008).

Invited talks and oral presentations

- 2017 **Dense 3D Modelling and Reconstruction of Non-rigid Objects (invited lecture)**, *Institute of Computer Science (ICS)*, Foundation for Research and Technology - Hellas (FORTH), Crete, Greece.
- 2017 **Dense 3D Modelling and Monocular Reconstruction of Deformable Objects**, *Department of Computer Science Research Seminars*, College of Engineering, Mathematics and Physical Sciences, University of Exeter, UK.
- 2016 **Dense 3D Reconstruction and Modelling of Faces: Addressing the Real-World Challenges**, *Department of Computing Research Associate Symposium*, Imperial College London, UK.
- 2016 **Dense 2D Tracking, 3D Reconstruction and Modelling of Non-rigid Objects with Variational Methods (invited talk)**, *Seminars of Centre for Vision, Speech and Signal Processing (CVSSP)*, University of Surrey, UK.
- 2015 **Dense Variational 3D Modelling and Reconstruction of Faces (invited talk)**, *Symposium on ‘The Computational Face - Automatic Face Analysis and Synthesis’*, Technical Meeting of The British Machine Vision Association and Society for Pattern Recognition (BMVA), London, UK.
- 2014 **3D Reconstruction of Deformable Surfaces from Monocular Sequences (invited lecture)**, *Hamlyn Winter School on Surgical Imaging and Vision*, Imperial College London, UK.
- 2014 **Dense Multi-Frame Optic Flow Using Subspace Constraints: Algorithms and Applications (invited talk)**, *Minisymposium on Multi-Frame Motion Estimation and Optical Flow Algorithms*, SIAM Conference on Imaging Science, Hong Kong.
- 2013 **Variational Methods for Video Registration and 3D Reconstruction from Medical Images (invited talk)**, *Symposium on Medical Imaging Meets Computer Vision*, The Rank Prize Funds, Grasmere, Cumbria, UK.
- 2013 **Dense 3D Reconstruction of Non-rigid Scenes from Monocular Sequences (invited talk)**, *Hamlyn Centre for Robotic Surgery*, Imperial College London, UK.

- 2012 **Dense multibody motion estimation and reconstruction from a handheld camera (oral presentation)**, *IEEE International Symposium on Mixed and Augmented Reality (ISMAR)*, Atlanta, Georgia, USA.
- 2009 **Diffusion Partial Differential Equations for Image Enhancement (invited talk)**, *Workshop on Novel Methods for Transmission, Reception and Analysis of Space-Satellite Signals and Images*, National Technical University of Athens, Greece.
- 2007 **Vector-Valued Image Interpolation by an Anisotropic Diffusion-Projection PDE (oral presentation)**, *First International Conference on Scale Space and Variational Methods in Computer Vision (SSVM)*, Ischia, Italy.

Academic activities

Conference organisation

- 2017 **General Chair**, *Multilearn 2017: Multimodal processing, modeling and learning approaches for human-computer/robot interaction*, Workshop of the 25th European Signal Processing Conference (EUSIPCO'17), Island of Kos, Greece.
- 2017 **General Chair**, *300 3D Facial-Videos in-the-Wild Challenge (300-3DVW)*, Workshop of the International Conference on Computer Vision (ICCV'17), Venice, Italy.
- 2017 **Local Chair**, *British Machine Vision Conference (BMVC) 2017*, Imperial College London, UK.

Journal papers reviewer

- 2016–present **IEEE Transactions on Pattern Analysis and Machine Intelligence.**
- 2016–present **IEEE Transactions on Cybernetics.**
- 2015–present **Journal of Mathematical Imaging and Vision.**
- 2013–present **Computer Vision and Image Understanding.**
- 2012–present **EURASIP Journal on Image and Video Processing.**
- 2012–present **Image and Vision Computing.**
- 2011–present **Journal of Machine Learning Research.**
- 2009–present **IEEE Transactions on Image Processing.**
- 2008–present **International Journal of Computer Vision.**
- 2007–present **IEEE Signal Processing Letters.**

Professional memberships

- Institute of Electrical and Electronics Engineers (IEEE).**
- The British Machine Vision Association (BMVA).**
- Technical Chamber of Greece (TEE).**

Professional development

- 2018 **Academic Development**, University of Exeter.
 Attended the following academic development workshop:
 - "Doctoral Supervision: An Exploratory Workshop".

2015–2016 **Postdoc Development Centre**, Imperial College London.

Attended the following postdoctoral development courses:

- "Preparing Successful Fellowship Applications",
- "Aiming for a Lectureship",
- "Consultancy - Making your knowledge work for you",
- "Pathways to Impact".

2015 **Teaching training and support**, Faculty of Engineering, Imperial College London.

Attended the "Training programme for Graduate Teaching Assistants".

Scientific publications

Google Scholar Profile

<https://scholar.google.co.uk/citations?user=Baj1CKYAAAAJ&hl=en>.

Refereed Journal Articles

- [1] J. Deng, A. Roussos, G. Chrysos, E. Ververas, I. Kotsia, J. Shen, and S. Zafeiriou. The Menpo Benchmark for Multi-pose 2D and 3D Facial Landmark Localisation and Tracking. *International Journal of Computer Vision (IJCV)* (impact factor: 8.222), accepted with minor revisions.
- [2] J. Booth, A. Roussos, E. Ververas, E. Antonakos, S. Ploumpis, Y. Panagakis, and S. Zafeiriou. 3D Reconstruction of "In-the-Wild" Faces in Images and Videos. *Transactions on Pattern Analysis and Machine Intelligence (T-PAMI)* (impact factor: 8.329), accepted for publication.
- [3] J. Booth, A. Roussos, D. Dunaway, A. Ponniah, and S. Zafeiriou. Large scale 3D Morphable Models. *International Journal of Computer Vision (IJCV)* (impact factor: 8.222), Volume 126, Issue 2–4, pp 233–254, April 2018.
- [4] S. Lefkimmiatis*, A. Roussos*, P. Maragos and M. Unser. (*joint first authorship). Structure tensor total variation. *Society for Industrial and Applied Mathematics Journal on Imaging Sciences (SIIMS)*.
- [5] R. Garg, A. Roussos, and L. Agapito. A variational approach to video registration with subspace constraints. *International Journal of Computer Vision (IJCV)* (impact factor: 8.222), 104(3):286–314, September 2013.
- [6] A. Roussos, S. Theodorakis, V. Pitsikalis, and P. Maragos. Dynamic affine-invariant shape-appearance handshape features and classification in sign language videos. *Journal of Machine Learning Research (JMLR)*, 14:1627–163, June 2013.
- [7] A. Roussos and P. Maragos. Reversible interpolation of vectorial images by an anisotropic diffusion-projection PDE. *International Journal of Computer Vision (IJCV)* (impact factor: 8.222), 84(2):130–145, August 2009.

Refereed Conference Publications

- [1] S. Zafeiriou*, G. Chrysos*, A. Roussos*, E. Ververas, J. Deng, and G. Trigeorgis (*joint first authorship). The 3D Menpo facial landmark tracking challenge. In *International Conference on Computer Vision 3D Menpo Facial Landmark Tracking Challenge Workshop (ICCV-W 2017)*, Venice, Italy, October 2017.
- [2] J. Booth, A. Roussos, S. Zafeiriou, A. Ponniah, and D. Dunaway. A 3D Morphable Model learnt from 10,000 faces. In *International Conference on Computer Vision and Pattern Recognition (CVPR 2016)* (spotlight oral 9.7% acceptance rate), Las Vegas, Nevada, USA, June 2016 .
- [3] Y. Zhou, E. Antonakos, J. Alabort-i-Medina, A. Roussos, and S. Zafeiriou. Estimating Correspondences of Deformable Objects "In-the-wild". In *International Conference on Computer Vision and Pattern Recognition (CVPR 2016)*, Las Vegas, Nevada, USA, June 2016 .
- [4] P. Snape, A. Roussos, Y. Panagakis, and S. Zafeiriou. Face Flow. In *International Conference on Computer Vision (ICCV 2015)*, Santiago, Chile, December 2015 .

- [5] E. Antonakos*, A. Roussos*, and S. Zafeiriou* (**joint first authorship*). A Survey on Mouth Modeling and Analysis for Sign Language Recognition. In *IEEE International Conference on Automatic Face and Gesture Recognition (FG 2015)* (oral), Ljubljana, Slovenia, May 2015.
- [6] R. Garg, A. Roussos, and L. Agapito. Dense variational reconstruction of non-rigid surfaces from monocular video. In *International Conference on Computer Vision and Pattern Recognition (CVPR 2013)* (oral 3% acceptance rate), Portland, Oregon, USA, June 2013.
- [7] S. Lefkimmiatis*, A. Roussos*, M. Unser, and P. Maragos (**joint first authorship*). Convex generalizations of total variation based on the structure tensor with applications to inverse problems. In *International Conference on Scale Space and Variational Methods in Computer Vision (SSVM 2013)*, Schloss Seggau, Graz region, Austria, June 2013.
- [8] A. Roussos, C. Russell, R. Garg, and L. Agapito. Dense multibody motion estimation and reconstruction from a handheld camera. In *IEEE International Symposium on Mixed and Augmented Reality (ISMAR 2012)* (oral 18% acceptance rate), Atlanta, Georgia, USA, November 2012.
- [9] R. Garg, A. Roussos, and L. Agapito. Robust trajectory-space TV-L1 optical flow for non-rigid sequences. In *International Conference on Energy Minimization Methods in Computer Vision and Pattern Recognition (EMMCVPR 2011)* (oral), Saint Petersburg, Russia, July 2011.
- [10] A. Roussos and P. Maragos. Tensor-based image diffusions derived from generalizations of the total variation and Beltrami functionals. In *IEEE International Conference on Image Processing (ICIP 2010)* (oral), Hong Kong, September 2010.
- [11] A. Roussos, S. Theodorakis, V. Pitsikalis, and P. Maragos. Affine-invariant modeling of shape-appearance images applied on sign language handshape classification. In *IEEE International Conference on Image Processing (ICIP 2010)*, Hong Kong, September 2010.
- [12] A. Roussos, S. Theodorakis, V. Pitsikalis, and P. Maragos. Hand tracking and affine shape-appearance handshape sub-units in continuous sign language recognition. In *Workshop on Sign, Gesture and Activity, European Conference on Computer Vision (ECCV-W 2010)*, Crete, Greece, September 2010.
- [13] A. Roussos, A. Katsamanis, and P. Maragos. Tongue tracking in ultrasound images with active appearance models. In *IEEE International Conference on Image Processing (ICIP 2009)*, Cairo, Egypt, November 2009.
- [14] A. Katsamanis, A. Roussos, P. Maragos, M. Aron, and M.-O. Berger. Inversion from audiovisual speech to articulatory information by exploiting multimodal data. In *International Seminar on Speech Production (ISSP 2008)* (oral), Strasbourg, France, December 2008.
- [15] M. Aron, A. Roussos, M.-O. Berger, E. Kerrien, and P. Maragos. Multimodality Acquisition of Articulatory Data and Processing. In *European Signal Processing Conference (EUSIPCO 2008)* (oral), Lausanne, Switzerland, August 2008.
- [16] A. Roussos and P. Maragos. Vector-valued image interpolation by an anisotropic diffusion-projection PDE. In *International Conference on Scale Space and Variational Methods in Computer Vision (SSVM 2007)* (oral, Best Student Paper Award), Ischia, Italy, May-June 2007.

Book chapters

- [1] A. Roussos, S. Theodorakis, V. Pitsikalis, and P. Maragos. Dynamic affine-invariant shape-appearance handshape features and classification in sign language videos. In S. Escalera, I. Guyon, and V. Athitsos, editors, *Gesture Recognition*, pages 231–271. Springer International Publishing, Cham, 2017.

Technical reports (public)

- [1] P. Maragos, V. Pitsikalis, S. Theodorakis, A. Roussos, and I. Rodomagoulakis. Deliverable D2.2, Progress Report on Multimodal Fusion. Technical report, EU FP7 programme "Sign Language Recognition, Generation and Modelling with Application in Deaf Communication" (Dicta-Sign), February 2011.
- [2] P. Maragos, V. Pitsikalis, S. Theodorakis, and A. Roussos. Deliverable D2.1, Initial Report on HMM Model Training and Temporal Sign Segmentation. Technical report, EU FP7 programme "Sign Language Recognition, Generation and Modelling with Application in Deaf Communication" (Dicta-Sign), January 2010.

- [3] Y. Laprie, P. Maragos, A. Roussos, M.-O. Berger, E. Kerrien, and M. Aron. Deliverable D3.2, Final report on design, acquisition and processing of articulatory data. Technical report, EU FET programme "Audiovisual to Articulatory Speech Inversion" (ASPI), January 2009.
- [4] P. Maragos, O. Engwall, Y. Laprie, S. Maeda, J. Schoentgen, A. Katsamanis, and A. Roussos. Deliverable D2.2, Final report on speech inversion methods. Technical report, EU FET programme "Audiovisual to Articulatory Speech Inversion" (ASPI), January 2009.

Theses

- [1] A. Roussos. *Nonlinear diffusion in Computer Vision and statistical shape models, with applications in image analysis of articulators of voiced and signed speech*. PhD thesis, Nat. Tech. Univ. of Athens, School of Elec. and Comp. Engin., October 2010. In greek.
- [2] A. Roussos. *Theory and applications of Partial Differential Equations in Computer Vision*. Diploma thesis, Nat. Tech. Univ. of Athens, School of Elec. and Comp. Engin., October 2005. In greek.