

# MARK R. P. THOMAS

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## Current Positions

**Board Member**  
[Imperial College Foundation](#), CA, USA. 02/2021 – present

**Senior Staff Researcher**  
[Dolby Laboratories Inc.](#), CA, USA. 01/2019 – present

Primary responsibilities: leading a small R&D team specializing in soundfield capture and acoustic scene analysis; design, implementation, and calibration of novel microphone arrays for Higher Order Ambisonics capture; spatial audio coding; acoustic signal processing for cinema; psychacoustics of spatial audio.

## Previous Positions

**Staff Researcher** 10/2015 – 12/2018  
[Dolby Laboratories Inc.](#), CA, USA.

**Associate Researcher** 10/2011 – 10/2015  
[Audio and Acoustics Research Group](#), Microsoft Research Redmond, USA.

**Research Associate** 02/2010 – 10/2011  
[Speech and Audio Processing Group](#), EEE Dept., Imperial College London, UK.  
European Commission Future and Emerging Technologies (FET) FP7 project:  
Self-Configuring ENvironment-aware Intelligent aCoustic sensing (SCENIC).

**Teaching Assistant, Imperial College London** 04/2007 – 10/2011  
Real-Time DSP. MSc and MEng (part IV).  
Digital Signal Processing. BEng/MEng (part III).  
Digital Electronics. BEng/MEng (part I).

**Pre-University & Vacation Trainee** 09/2001 – 09/2006  
BBC Research and Development Department.

**Education**  
**PhD in Speech Processing** 10/2006 – 03/2010  
EEE Dept., Imperial College London, UK.  
Thesis (supervised by Dr. Patrick A. Naylor): "[Glottal-Synchronous Speech Processing](#)".

**MEng in Electrical and Electronic Engineering** 09/2002 – 09/2006  
(1<sup>st</sup> Class Hons.) EEE Dept., Imperial College London, UK.  
Significant courses: Digital Signal Processing, Speech Processing, Communications, Digital System Design.

Significant coursework: iECG Portable 12-channel ECG device.  
Thesis (supervised by Dr. Patrick A. Naylor): "[A Novel Loudspeaker Equalizer](#)".

### Research Interests

I am interested in many areas of signal processing for speech, audio and acoustics. I enjoy working with both theoretical and practical problems in:

**Spatial audio capture and reproduction:** cylindrical and spherical microphone arrays, Fourier acoustics, Ambisonics, beamforming, reproduction via head related transfer functions and loudspeaker arrays.

**Multichannel Acoustic Signal Processing:** Adaptive and closed-form microphone array processing including robust optimal beamforming, acoustic echo cancellation, supervised/unsupervised system identification, robust system equalization, and geometric inference.

**Glottal-Synchronous Speech Processing:** detection of glottal closing and opening instants from speech and EGG signals, data-driven models of speech and applications of glottal-synchronous methods to speech processing.

### Products and Projects

<a href="#">Microsoft Windows 10</a> : Support for generic microphone array geometry.	2015
<a href="#">Microsoft HoloLens</a> : Voice and spatial audio capture, rendering engine.	2015
<a href="#">Cities Unlocked</a> : Spatial audio rendering engine.	2014
<a href="#">Microsoft Surface Pro 3</a> : Microphone array acoustic design.	2014
<a href="#">Kinect for Xbox One</a> : Microphone array acoustic design.	2014

### Awards and Honors

Royal Academy of Engineering International Travel Grant.	07/2009
IDEA League Grant for Research Collaboration.	11/2008
UK Engineering and Physical Sciences Research Council (EPSRC) Doctoral Training Award.	10/2006 – 04/2010
Schlumberger MEng Group Project Prize.	06/2005
BBC R&D University Sponsorship.	09/2002 – 06/2006
Innovation Award, Surrey SATRO Festival of Engineering & Science.	07/1999

### Invited Talks

Marie-Curie Seasonal School on Distributed Signal Processing and Optimization for Service-Oriented, Ubiquitous, Network-Driven Sound (SOUNDS): Amplitude Panning and Bass Management	09/2022
Guest Speaker, Real Industry: Inside the Music & Video Technology Industry	01/2019
Practical Open-Concentric Spherical Microphone Array Design ASA Fall 2018 Annual Meeting	11/2018
<a href="#">Acoustic Channel Equalization for Speech Dereverberation</a> CCRMA Research Colloquium, Stanford University, USA	02/2016
<a href="#">Application of Measured Directivity Patterns to Acoustic Array Processing</a> AES UK Monthly Lecture, Imperial College London, UK	05/2014
<a href="#">Microphone Array Signal Processing: Beyond the Beamformer</a> Candidate Talk, Microsoft Research, Redmond, USA	08/2011
Voice Source Estimation for Artificial Bandwidth Extension of Telephone Speech IND Annual Research Colloquium, RWTH Aachen, Germany	07/2009

**Other Skills**      *Spoken Languages:* English (native), French (advanced), German (beginner), Slovak (beginner), Hungarian (beginner).  
*Programming:* MATLAB, C/C++, Python, Java, Pascal, HTML, PHP/MySQL,  $\LaTeX$ , Assembler, Unix shells, OpenGL  
*Hardware:* CAD (Altium, Xilinx VHDL, SolidWorks, Fusion 360), CNC milling and turning, SM soldering, MIG/TIG/arc/gas welding.  
*Music:* Grade 7 Pianoforte (Hons.) 07/1999

### Professional Memberships

Senior Member, Institute of Electrical & Electronics Engineers.      Since 09/2006  
Member, Audio Engineering Society.      Since 10/2013  
Member, Acoustical Society of America.      Since 10/2013

### Panels, Committees, Collaborations

Finance Chair, [WASPAA 2019](#).      10/2019  
Principal Investigator, [Spatial Sound Control for Testing Multi-channel Audio Devices, Dolby/ANU ARC Linkage Project LP160100379](#)      08/2019 – present  
Track Chair, Spatial Audio Capture and Reproduction, [ICASSP 2018](#)      05/2019  
Member, [IEEE Audio and Acoustics Technical Committee](#)      11/2017 – present  
Finance Chair, [HSCMA 2017](#)      03/2017  
Events and Technical Officer, Imperial College Choir.      09/2003 – 08/2006

### Peer Review

IEEE Transactions on Audio, Speech and Language Processing, IEEE Journal on Selected Topics in Signal Processing, IEEE Signal Processing Letters, Speech Communication, IEEE International Conference on Audio, Speech, and Signal Processing (ICASSP), IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA), IEEE Wireless Communications and Networking Conference (WCNC), IEEE Conference on Sensor Signal Processing for Defence (SSPD), IEEE Global Conference on Signal and Information Processing (GlobalSIP), European Signal Processing Conference (EUSIPCO), International Conference on Information, Communications and Signal Processing (ICIS), International Workshop on Acoustic Signal Enhancement (IWAENC), Hands-free Speech Communication and Microphone Arrays (HSCMA).

### Student Supervision

J-H. Hanschke, "Sound Field Analysis using a Novel Multi-Radius Microphone Array," *Dolby Laboratories / TU Berlin Master's Thesis*, Grade 1.0, Jan. 2019.

### Journal Publications

F. Antonacci, J. Filos, M. R. P. Thomas, E. A. P. Habets, A. Sarti, P. A. Naylor and S. Tubaro, "[Inference of Room Geometry from Acoustic Impulse Responses](#)," in *IEEE Trans. Audio, Speech, Lang. Process.*, vol. 20, no. 10, pp. 2683–2695, Dec. 2012.

D. P. Jarrett, E. A. P. Habets, M. R. P. Thomas and P. A. Naylor, "[Rigid Sphere Room Impulse Response Simulation: Algorithm and Applications](#)," in *J. Acoust Soc. Am.*, vol. 132, no. 3, pp. 1462–1472, Sep. 2012.

T. Drugman, M. R. P. Thomas, J. Gudnason, T. Dutoit and P. A. Naylor, "[Detection of Glottal Closing instants from Voiced Speech: A Quantitative Review](#)," in *IEEE Trans. Audio, Speech, Lang. Process.*, vol. 20, no. 3, pp. 994–1006, Mar. 2012.

M. R. P. Thomas, J. Gudnason and P. A. Naylor, "Estimation of Glottal Closing and Opening Instants in Voiced Speech using the YAGA Algorithm," in *IEEE Trans. Audio, Speech, Lang. Process.*, vol. 20, no. 1, pp. 82–91, Jan. 2012

J. Gudnason, M. R. P. Thomas, D. P. W. Ellis and P. A. Naylor, "Data-Driven Voice Source Waveform Analysis and Synthesis," in *Speech Communication*, vol. 54, no. 2, pp. 199–211, Feb. 2011.

M. R. P. Thomas and P. A. Naylor. "The SIGMA Algorithm: A Glottal Activity Detector for Electrolottographic Signals," *IEEE Trans. Audio, Speech, Lang. Process.* vol. 17, no. 8 pp. 1557–1566, Nov. 2009.

### Conference Publications

N. Akbar, G. N. Dickins, M. R. P. Thomas, P. Samarasinghe, T. Abhayapala, [Reducing Modal Error Propagation through Correcting Mismatched Microphone Gains Using Rapid](#)," in *Proc. International Conf. Acoustics, Speech, and Signal Process. (ICASSP)*, Jun. 2021.

N. Akbar, G. N. Dickins, M. R. P. Thomas, [A Practical Approach for Microphone Array Calibration in Augmented and Virtual Reality Applications](#)," in *Proc. International Conf. on 3D Immersion (IC3D)*, Dec. 2020.

N. Akbar, G. N. Dickins, M. R. P. Thomas, P. Samarasinghe, T. Abhayapala, [A Novel Method for Obtaining Diffuse Field Measurements for Microphone Calibration](#)," in *Proc. International Conf. Acoustics, Speech, and Signal Process. (ICASSP)*, Barcelona, Spain, May 2020.

M. R. P. Thomas, [Practical Concentric Open Sphere Cardioid Microphone Array Design for Higher Order Sound Field Capture](#)," in *Proc. International Conf. Acoustics, Speech, and Signal Process. (ICASSP)*, Brighton, UK, May 2019.

M. R. P. Thomas and C. Q. Robinson, "Amplitude Panning and the Interior Pan" in *Proc. Tonmeistertagung 30*, Cologne, Germany, November 2018.

M. R. P. Thomas and C. Q. Robinson, [Amplitude Panning and the Interior Pan](#)" in *Proc. Audio Engineering Soc. Conv*, New York, USA, October 2017.

M. R. P. Thomas, [Fast Computation of Cubature Formulae for the Sphere](#)," in *Proc. Workshop on Hands-Free Speech Communication and Microphone Arrays (HSCMA)*, San Francisco, CA, USA, March 2017.

H. Gamper, M. R. P. Thomas, L. Corbin and I. J. Tashev, [Synthesis of Device-Independent Noise Corpora for Realistic ASR Evaluation](#)," in *Proc. Interspeech Conf.*, San Francisco, CA, Sep. 2016.

M. R. P. Thomas, H. Gamper and I. J. Tashev, [BFGUI: An Interactive Tool for the Synthesis and Analysis of Microphone Array Beamformers](#)," in *Proc. International Conf. Acoustics, Speech, and Signal Process. (ICASSP)*, Shanghai, China, Mar. 2016.

A. Politis, M. R. P. Thomas, H. Gamper and I. J. Tashev, [Application of 3D Spherical Transforms To Personalization Of Head-Related Transfer Functions](#)," in *Proc. International Conf. Acoustics, Speech, and Signal Process. (ICASSP)*, Shanghai, China, Mar. 2016.

H. Gamper, M. R. P. Thomas and I. J. Tashev [Anthropometric Parameterisation of a Spherical Scatterer ITD Model with Arbitrary Ear Angles](#)," in *Proc. Workshop*

on *App. of Signal Processing to Audio and Acoust. (WASPAA)*, New Paltz, New York, Oct. 2015.

F. Lim, M. R. P. Thomas, P. A. Naylor and I. J. Tashev "[Acoustic Blur Kernel with Sliding Window for Blind Estimation of Reverberation Time](#)," in *Proc. Workshop on App. of Signal Processing to Audio and Acoust. (WASPAA)*, New Paltz, New York, Oct. 2015.

M. R. P. Thomas, H. Gamper and I. J. Tashev, "[Dereverberation Sweet Spot Dilation with Combined Channel Equalization and Beamforming](#)," in *Proc. International Conf. Acoustics, Speech, and Signal Process. (ICASSP)*, Brisbane, Australia, Apr. 2015.

H. Gamper, M. R. P. Thomas and I. J. Tashev, "[Estimation of Multipath Propagation Delays and Interaural Time Differences from 3-D Head Scans](#)," in *Proc. International Conf. Acoustics, Speech, and Signal Process. (ICASSP)*, Brisbane, Australia, Apr. 2015.

F. Lim, M. R. P. Thomas and I. J. Tashev, "[Blur Kernel Estimation Approach to Blind Reverberation Time Estimation](#)," in *Proc. International Conf. Acoustics, Speech, and Signal Process. (ICASSP)*, Brisbane, Australia, Apr. 2015.

M. R. P. Thomas, F. Lim, I. J. Tashev and P. A. Naylor, "[Optimal Beamforming as a Time Domain Equalization Problem with Applications to Room Acoustics](#)," in *Proc. Intl. Workshop Acoust. Signal Enhancement (IWAENC)*, Juan Les Pins, France, Sep. 2014.

M. R. P. Thomas, J. Ahrens and I. J. Tashev, "[A Method for Converting Between Cylindrical and Spherical Representations of Sound Fields](#)," in *Proc. International Conf. Acoustics, Speech, and Signal Process. (ICASSP)*, Florence, Italy, May 2014.

P. Bilinski, J. Ahrens, M. R. P. Thomas, I. J. Tashev and J. C. Platt, "[HRTF Magnitude Synthesis via Sparse Representation of Anthropometric Features](#)," in *Proc. International Conf. Acoustics, Speech, and Signal Process. (ICASSP)*, Florence, Italy, May 2014.

F. Lim, M. R. P. Thomas and P. A. Naylor, "[MINTFormer: A Spatially Aware Channel Equalizer](#)," in *Proc. Workshop on App. of Signal Processing to Audio and Acoust. (WASPAA)*, New Paltz, New York, Oct. 2013.

J. Ahrens, M. R. P. Thomas and I. J. Tashev, "[Efficient Implementation of the Spectral Division Method for Arbitrary Virtual Sound Fields](#)," in *Proc. Workshop on App. of Signal Processing to Audio and Acoust. (WASPAA)*, New Paltz, New York, Oct. 2013.

J. Ahrens, M. R. P. Thomas and I. J. Tashev, "[Gentle Acoustic Crosstalk Cancellation Using the Spectral Division Method and Ambiophonics](#)," in *Proc. Workshop on App. of Signal Processing to Audio and Acoust. (WASPAA)*, New Paltz, New York, Oct. 2013.

J. Ahrens, M. R. P. Thomas and I. J. Tashev, "[HRTF Magnitude Modeling Using a Non-Regularized Least-Squares Fit of Spherical Harmonics Coefficients on Incomplete Data](#)," in *Proc. APSIPA Annual Summit and Conf.*, Hollywood, CA, USA, Dec. 2012.

M. R. P. Thomas, J. Ahrens and I. J. Tashev, "[Beamformer Design Using Measured Microphone Directivity Patterns](#)," in *Proc. APSIPA Annual Summit and Conf.*, Hollywood, CA, USA, Dec. 2012.

- M. R. P. Thomas, J. Ahrens and I. J. Tashev, "Optimal 3D Beamforming Using Measured Microphone Directivity Patterns," in *Proc. Intl. Workshop Acoust. Signal Enhancement (IWAENC)*, Aachen, Germany, Sep. 2012.
- M. R. P. Thomas, N. D. Gaubitch, E. A. P. Habets and P. A. Naylor, "An Insight into Common Filtering in Noisy SIMO Blind System Identification," in *Proc. International Conf. Acoustics, Speech, and Signal Process. (ICASSP)*, Kyoto, Japan, Mar. 2012.
- A. Sarti, W. Kellermann, R. Rabenstein, P. A. Naylor, M. Omologo, P. Svaizer, F. Antonacci, P. Annibale, P. Bestagini, A. Canclini, D. Markovic, K. Kowalczyk, M. R. P. Thomas and A. Brutti, "The SCENIC Project: Space-Time Audio Processing for Environment-Aware Acoustic Sensing and Rendering," in *Proc. AES 131st Convention*, New York, Oct. 2011.
- M. R. P. Thomas, N. D. Gaubitch and P. A. Naylor, "Application of Channel Shortening to Acoustic Channel Equalization in the Presence of Noise and Estimation Error," in *Proc. Workshop on App. of Signal Processing to Audio and Acoust. (WASPAA)*, New Paltz, New York, Oct. 2011.
- A. Canclini, F. Antonacci, M. R. P. Thomas, J. Filos, A. Sarti, P. A. Naylor and S. Tubaro, "Exact Localization of Acoustic Reflectors from Quadratic Constraints," in *Proc. Workshop on App. of Signal Processing to Audio and Acoust. (WASPAA)*, New Paltz, New York, Oct. 2011.
- J. Filos, A. Canclini, M. R. P. Thomas, F. Antonacci, A. Sarti and P. A. Naylor, "Robust Inference of Room Geometry from Acoustic Measurements Using the Hough Transform," in *Proc. European Signal Processing Conf. (EUSIPCO)*, Barcelona, Spain, August 2011.
- D. P. Jarrett, E. A. P. Habets, M. R. P. Thomas N. D. Gaubitch and P. A. Naylor, "Dereverberation Performance of Rigid and Open Spherical Microphone Arrays: Theory & Simulation," in *Proc. Workshop on Hands-Free Speech Communication and Microphone Arrays (HSCMA)*, Edinburgh, Scotland, May 2011.
- D. P. Jarrett, E. A. P. Habets, M. R. P. Thomas and P. A. Naylor, "Simulating Room Impulse Responses for Spherical Microphone Arrays," in *Proc. International Conf. Acoustics, Speech and Signal Processing (ICASSP)*, Prague, Czech Republic, May 2011.
- M. R. P. Thomas, N. D. Gaubitch, E. A. P. Habets and P. A. Naylor, "Supervised Identification and Removal of Common Filter Components in Adaptive Blind SIMO System Identification," in *Proc. International Workshop Acoust. Echo and Noise Control (IWAENC)*, Tel-Aviv, Israel, August 2010.
- M. R. P. Thomas, B. Geiser, J. Gudnason, P. A. Naylor and P. Vary, "Voice Source Estimation for Artificial Bandwidth Extension of Telephone Speech," in *Proc. International Conf. Acoustics, Speech and Signal Processing (ICASSP)*, Dallas, USA, March 2010.
- J. Gudnason, M. R. P. Thomas, P. A. Naylor and D. P. W. Ellis, "Voice Source Waveform Analysis and Synthesis using Principal Component Analysis and Gaussian Mixture Modelling," in *Proc. Interspeech Conf.*, Brighton, UK, Sept. 2009.
- M. R. P. Thomas, J. Gudnason and P. A. Naylor, "Detection of Glottal Closing and Opening Instants using an Improved DYPSA Framework," in *Proc. European Signal Processing Conf. (EUSIPCO)*, Glasgow, Scotland, August 2009.



M. R. P. Thomas, J. Gudnason and P. A. Naylor, “[Data-Driven Voice Source Waveform Modelling](#),” in *Proc. International Conf. Acoustics, Speech and Signal Processing (ICASSP)*, Taipei, Taiwan, April 2009.

M. R. P. Thomas, J. Gudnason and P. A. Naylor, “[Application of the DYPSA Algorithm to Segmented Time Scale Modification of Speech](#),” in *Proc. European Signal Processing Conf. (EUSIPCO)*, Lausanne, Switzerland, Aug. 2008.

M. R. P. Thomas and P. A. Naylor, “[The SIGMA Algorithm for Estimation of Reference-Quality Glottal Closure Instants from Electroglottograph Signals](#),” in *Proc. European Signal Processing Conf. (EUSIPCO)*, Lausanne, Switzerland, Aug. 2008.

M. R. P. Thomas, N. D. Gaubitch, Jon Gudnason and P. A. Naylor, “[A Practical Multichannel Dereverberation Algorithm using Multichannel DYPSA and Spatiotemporal Averaging](#),” in *Proc. Workshop on App. of Signal Processing to Audio and Acoust. (WASPAA)*, New Paltz, New York, Oct. 2007.

N. D. Gaubitch, M. R. P. Thomas and P. A. Naylor, “[Subband Method for Multichannel Least Squares Equalization of Room Transfer Functions](#),” in *Proc. Workshop on App. of Signal Processing to Audio and Acoust. (WASPAA)*, New Paltz, New York, Oct. 2007.

M. R. P. Thomas, N. D. Gaubitch and P. A. Naylor, “[Multichannel DYPSA for Identification of Glottal Closure in Reverberant Speech](#),” in *Proc. European Signal Processing Conf. (EUSIPCO)*, Poznan, Poland, Sept. 2007.

#### **Contributions to Books**

N. D. Gaubitch, M. R. P. Thomas and P. A. Naylor, “[Dereverberation using LPC-Based Approaches](#),” in *Speech Dereverberation*, P. A. Naylor and N. D. Gaubitch, (eds.), Springer 2010, ch.4, pp. 99–132.

#### **Internal Publications**

M. R. P. Thomas and C. Poole, “Alternative Hardware for ASIMux Video Playout Software,” *BBC R&D Technical Note* no. 2267, Oct. 2003.

M. R. P. Thomas, “Project SPuD: Sound Processor and Delay for Plasma Display Panels,” *BBC R&D Design Manual* AAA-1824-0130, Sept. 2002.

M. R. P. Thomas, A. Wiewiorka and T. Ferne, “A Tokenising Compression Algorithm,” *BBC R&D Technical Note* no. 1830, Apr. 2002.

#### **Patents**

K. Kjoerling and D. S. McGrath and H. Purnhagen and M. R. P. Thomas, “[Methods and devices for coding soundfield representation signals](#),” US Patent 11,322,164, 2022

N. R. Tsingos and M. R. P. Thomas and C. Fersch, “[Methods, apparatus and systems for encoding and decoding of directional sound sources](#),” US Patent 11,315,578, 2022

C. Q. Robinson and M. R. P. Thomas and M. J. Smithers, “[Methods and devices for bass management](#),” U. S. Patent App. 17/286,313 2021

M. R. P. Thomas and J-H. Hanschke, “[Methods, apparatus and systems for audio sound field capture](#),” US Patent 10,721,559, 2020.

P. Bilinski, J. Ahrens, M. R. P. Thomas, I. J. Tashev, J. C. Platt, D. E. Johnston, [“HRTF Personalization Based on Anthropometric Features,”](#) US Patent 10,313,818, 2019.

P. Bilinski, J. Ahrens, M. R. P. Thomas, I. J. Tashev, J. C. Platt, D. E. Johnston, [“HRTF Personalization Based on Anthropometric Features,”](#) US Patent 10,284,992, 2019.

H. Gamper, D. E. Johnston, I. J. Tashev, A. Politis, M. R. P. Thomas, [“Systems and methods for non-parametric processing of head geometry for HRTF personalization”](#), US Patent 10,278,002, 2019.

S. Kordon and J-M. Batke, A. Krueger, M. R. P. Thomas, [“Method and Apparatus for Processing Signals of a Spherical Microphone Array on a Rigid Sphere used for Generating an Ambisonics Representation of the Sound Field,”](#) US Patent 10,021,508, 2018.

P. Bilinski, J. Ahrens, M. R. P. Thomas, I. J. Tashev, J. C. Platt, D. E. Johnston, [“HRTF Personalization Based on Anthropometric Features,”](#) US Patent 9,900,722, 2019.

H. Gamper, M. R. P. Thomas, I. J. Tashev, D. E. Johnston, [“Systems and Methods for Audio Creation and Delivery,”](#) US Patent 9,609,436, 2017.

**Other Interests** Music production (esp. piano & guitar), precision engineering of metals and plastics, fine woodworking, winter sports, latte art.