

Asterios Toutios

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Education

- PhD in Applied Informatics 2007
University of Macedonia, Thessaloniki, Greece
Thesis topic: Machine learning for inferring articulation from the speech signal
Advisor: Konstantinos Margaritis
- MSc in Information Systems 2002
University of Macedonia, Thessaloniki, Greece
Thesis topic: Neural network-based speaker identification
- Diploma/MEng in Electrical and Computer Engineering 1999
Aristotle University of Thessaloniki, Greece
Thesis topic: Computer-generated holograms from tilted planar object

Professional History

- Research Assistant Professor of Electrical and Computer Engineering since July 2017
Ming Hsieh Department of Electrical and Computer Engineering
University of Southern California, Los Angeles
- Research Associate, Signal Analysis and Interpretation Laboratory (SAIL) Jun 2012 – Jun 2017
Ming Hsieh Department of Electrical and Computer Engineering
University of Southern California, Los Angeles
Supervisor: Shrikanth Narayanan
- Research Associate, CNRS LTCI; TELECOM ParisTech, Paris, France May 2011 – Jun 2012
Supervisor: Shinji Maeda
- Research Associate, Université Nancy 2/LORIA, Nancy, France Nov 2009 - Apr 2011
Supervisor: Slim Ouni
- Postdoctoral Fellow, INRIA/LORIA, Nancy, France Sep 2007 - Jun 2009
Supervisor: Yves Laprie

Teaching Experience

- Teaching Assistant, Dept. of Applied Informatics 2004–2006
University of Macedonia, Thessaloniki, Greece
Courses: Digital Systems; Distributed Systems; Parallel Processing.
- Laboratory Associate, Dept. of Informatics and Communications 2004–2005
Technological Educational Institute of Serres, Greece
Courses: Computer Architecture; Numerical Analysis.

Awards and Honors

Interspeech Best Student Paper Award (Awarded to Tanner Sorensen) 2016
Tanner Sorensen, Asterios Toutios, Louis Goldstein, Shrikanth Narayanan, "Characterizing vocal tract dynamics across speakers using real-time MRI", Interspeech, San Francisco, CA, 2016.

ISMRM Magna cum Laude Merit Award 2014
Sajan Goud Lingala, Yinghua Zhu, Yoon-Chul Kim, Asterios Toutios, Shrikanth S. Narayanan, Krishna S. Nayak, "High spatio-temporal resolution multi-slice real time MRI of speech using golden angle spiral imaging with constrained reconstruction, parallel imaging, and a novel upper airway coil", International Society for Magnetic Resonance in Medicine (ISMRM) 20th Scientific Sessions, Toronto, Canada, pp. 1539, 2014.

HRAKLEITOS Scholarship 2003
Awarded, after a national competition, a full dissertation scholarship from the Greek research program HERAKLEITOS, co-funded by the European Social Fund and national resources.

Professional Memberships

Acoustical Society of America

International Speech Communication Association

International Phonetic Association

IEEE and IEEE Signal Processing Society

Technical Chamber of Greece

Academic Activities

Session chair, Interspeech, San Francisco, CA, 2016

Co-organizer, USC Speech MRI Summit, Los Angeles, California, 2014

Co-organizer, Special Session Articulatory Data Acquisition and Processing, in Interspeech, Lyon, France, 2013

Ad-hoc reviewer for: The Journal of the Acoustical Society of America; Journal of Phonetics; Journal of Speech, Language, and Hearing Research; IEEE Transactions on Audio, Speech, and Language Processing; Computer, Speech & Language; Behavior Research Methods

Conference reviewer for: Interspeech; IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP); European Signal Processing Conference (EUSIPCO); International Congress of Phonetic Sciences (ICPhS)

Invited Talks / Seminars

- [1] Vocal tract dynamics and speech acoustics. In *11th Annual Hearing Symposium*, Center for Speech and Hearing, UC Irvine, 2016.
- [2] Revolving around dynamic speech data. In *Séminaires de Recherches en Phonétique et Phonologie*, Laboratoire de Phonétique et Phonologie, Paris, France., 2011.
- [3] A short introduction to L^AT_EX. In *Seminar on Typesetting of Special Documents*, University of Macedonia, Thessaloniki, Greece, 2005.
- [4] Statistical acoustic-to-electropalatographic mapping. In *International EPG Symposium*, Edinburgh, UK, 2005.
- [5] Acoustic-to-articulatory inversion of speech and detection of phonetic features in the speech signal (student talk). In *Machine Learning Summer School (MLSS)*, Tübingen, Germany, 2003.

Grants and funding

Understanding individual-level speech variability: From novel articulatory data to robust speaker recognition (2015-2019). NSF RI Medium. Role: Senior researcher. PI: Shrikanth Narayanan.

Publications

Journal Articles

- [1] Tanner Sorensen, **Asterios Toutios**, Louis Goldstein, and Shrikanth Narayanan. Task-dependence of articulator synergies. *The Journal of the Acoustical Society of America*, 145(3):1504–1520, 2019.
- [2] Christina Hagedorn, Tanner Sorensen, Adam Lammert, **Asterios Toutios**, Louis Goldstein, Dani Byrd, and Shrikanth Narayanan. Engineering innovation in speech science: data and technologies. *Perspectives of the ASHA Special Interest Groups*, pages 1–10, 2019.
- [3] Johannes Töger, Tanner Sorensen, Krishna Somandepalli, **Asterios Toutios**, Sajjan Goud Lingala, Shrikanth Narayanan, and Krishna Nayak. Test-retest repeatability of human speech biomarkers from static and real-time dynamic magnetic resonance imaging. *The Journal of the Acoustical Society of America*, 141(5):3323–3336, 2017.
- [4] Betty McMicken, Frederico Salles, Shelley Von Berg, Margaret Vento-Wilson, Kelly Rogers, **Asterios Toutios**, and Shrikanth S. Narayanan. Bilabial substitution patterns during consonant production in a case of congenital aglossia. *Journal of Communication Disorders, Deaf Studies & Hearing Aids*, 5(2):1–6, 2017.
- [5] Sajjan Goud Lingala, Yinghua Zhu, Yongwan Lim, **Asterios Toutios**, Yunhua Ji, Wei-Ching Lo, Nicole Seiberlich, Shrikanth Narayanan, and Krishna S. Nayak. Feasibility of through-time spiral generalized autocalibrating partial parallel acquisition for low latency accelerated real-time mri of speech. *Magnetic Resonance in Medicine*, 78(6):2275–2282, 2017.
- [6] **Asterios Toutios** and Shrikanth Narayanan. Advances in real-time magnetic resonance imaging of the vocal tract for speech science and technology research. *APSIPA Transactions on Signal and Information Processing*, 5:e6, 2016.
- [7] Sajjan Goud Lingala, Yinghua Zhu, Yoon-Chul Kim, **Asterios Toutios**, Shrikanth S. Narayanan, and Krishna S. Nayak. Towards high frame rate real-time magnetic resonance imaging of speech production. *SPIE Newsroom*, 2015.
- [8] Jangwon Kim, **Asterios Toutios**, Sungbok Lee, and Shrikanth S. Narayanan. A kinematic study of critical and non-critical articulators in emotional speech production. *The Journal of the Acoustical Society of America*, 137(3):1411–1429, 2015.
- [9] Shrikanth Narayanan, **Asterios Toutios**, Vikram Ramanarayanan, Adam Lammert, Jangwon Kim, Sungbok Lee, Krishna Nayak, Yoon-Chul Kim, Yinghua Zhu, Louis Goldstein, Dani Byrd, Erik Bresch, Prasanta Ghosh, Athanasios Katsamanis, and Michael Proctor. Real-time magnetic resonance imaging and electromagnetic articulography database for speech production research (tc). *The Journal of the Acoustical Society of America*, 136(3):1307–1311, 2014.
- [10] Slim Ouni, Vincent Colotte, Utpala Musti, **Asterios Toutios**, Brigitte Wrobel-Dautcourt, Marie-Odile Berger, and Caroline Lavecchia. Acoustic-visual synthesis technique using bimodal unit-selection. *EURASIP Journal on Audio, Speech, and Music Processing*, 2013(1):1–13, 2013.
- [11] **Asterios Toutios**, Slim Ouni, and Yves Laprie. Estimating the parameters of an articulatory model from electromagnetic articulograph data. *Journal of the Acoustical Society of America*, 129(5):3245–3257, 2011.
- [12] **Asterios Toutios** and Konstantinos Margaritis. Estimating electropalatographic patterns from the speech signal. *Computer Speech & Language*, 22(4):346–359, 2008.

Book Chapters

- [1] **Asterios Toutios**, Dani Byrd, Louis Goldstein, and Shrikanth Narayanan. Advances in vocal tract imaging and analysis. In William Katz and Peter Assmann, editors, *The Routledge Handbook of Phonetics*. Routledge, London and New York, 2019.
- [2] Michael Proctor, Yinghua Zhu, Adam Lammert, **Asterios Toutios**, Bonny Sands, Ulrich Hummel, and Shrikanth Narayanan. Click consonant production in Khoekhoe: a real-time MRI study. In Sheena Shah and Matthias Brenzinger, editors, *Khoisan Languages and Linguistics. Proc. 5th Intl. Symposium, July 13-17, 2014, Riezlern/Kleinwalsertal*, Research in Khoisan Studies, pages 337–366. Rüdiger Köppe, Cologne, 2016.
- [3] **Asterios Toutios** and Konstantinos Margaritis. On the acoustic-to-electropalatographic mapping. In M. Faundez-Zanuy et al., editor, *Nonlinear Analyses and Algorithms for Speech Processing, LNCS 3817*, pages 186–195. Springer-Verlag, 2005.
- [4] **Asterios Toutios** and Konstantinos Margaritis. Mapping the speech signal onto electromagnetic articulography trajectories using support vector regression. In V. Matusec et al., editor, *Text Speech and Dialogue, LNCS 3658*, pages 318–325. Springer-Verlag, 2005.

Papers in Conference Proceedings

- [1] Rachel Alexander, Tanner Sorensen, **Asterios Toutios**, and Shrikanth S. Narayanan. VCV synthesis using Task Dynamics to animate a factor-based articulatory model. In *Interspeech*, Stockholm, Sweden, 2017.
- [2] Krishna Somandepalli, **Asterios Toutios**, and Shrikanth S. Narayanan. Semantic edge detection for tracking vocal tract air-tissue boundaries in real-time magnetic resonance images. In *Interspeech*, Stockholm, Sweden, 2017.
- [3] Tanner Sorensen, Zisis Skordilis, **Asterios Toutios**, Yoon-Chul Kim, Yinghua Zhu, Jangwon Kim, Adam Lammert, Vikram Ramanarayanan, Louis Goldstein, Dani Byrd, Krishna Nayak, and Shrikanth S. Narayanan. Database of volumetric and real-time vocal tract MRI for speech science. In *Interspeech*, Stockholm, Sweden, 2017.
- [4] Tanner Sorensen, **Asterios Toutios**, Johannes Töger, Louis Goldstein, and Shrikanth S. Narayanan. Test-retest repeatability of articulatory strategies using real-time magnetic resonance imaging. In *Interspeech*, Stockholm, Sweden, 2017.
- [5] Jieshen Chen, Sajjan Goud Lingala, Yongwan Lim, **Asterios Toutios**, Shrikanth Narayanan, and Krishna Nayak. Task-based optimization of regularization in highly accelerated speech RT-MRI. In *International Society for Magnetic Resonance in Medicine (ISMRM) 25th Scientific Sessions*, Honolulu, HI, 2017.
- [6] Johannes Töger, Tanner Sorensen, Krishna Somandepalli, **Asterios Toutios**, Sajjan Goud Lingala, Shrikanth Narayanan, and Krishna Nayak. Test-retest repeatability of human speech biomarkers from static and real-time dynamic magnetic resonance imaging. In *International Society for Magnetic Resonance in Medicine (ISMRM) 25th Scientific Sessions*, Honolulu, HI, 2017.
- [7] Zisis Skordilis, **Asterios Toutios**, Johannes Tömlger, and Shrikanth S. Narayanan. Estimation of vocal tract area function from volumetric magnetic resonance imaging. In *IEEE International Conference on Audio, Speech and Signal Processing (ICASSP)*, New Orleans, LA, 2017.
- [8] Yongwan Lim, Sajjan Goud Lingala, **Asterios Toutios**, Shrikanth Narayanan, and Krishna Nayak. Improved depiction of tissue boundaries in vocal tract real-time MRI using automatic off-resonance correction. In *Interspeech*, San Francisco, CA, 2016.
- [9] **Asterios Toutios**, Tanner Sorensen, Krishna Somandepalli, Rachel Alexander, and Shrikanth Narayanan. Articulatory synthesis based on real-time magnetic resonance imaging data. In *Interspeech*, San Francisco, CA, 2016.

- [10] **Asterios Toutios**, Sajan Goud Lingala, Colin Vaz, Jangwon Kim, John Esling, Patricia Keating, Matthew Gordon, Dani Byrd, Louis Goldstein, Krishna Nayak, and Shrikanth Narayanan. Illustrating the production of the International Phonetic Alphabet sounds using fast real-time magnetic resonance imaging. In *Interspeech*, San Francisco, CA, 2016.
- [11] Colin Vaz, **Asterios Toutios**, and Shrikanth Narayanan. Convex hull convolutive non-negative matrix factorization for uncovering temporal patterns in multivariate time-series data. In *Interspeech*, San Francisco, CA, 2016.
- [12] Sajan Goud Lingala, **Asterios Toutios**, Johannes Toger, Yongwan Lim, Yinghua Zhu, Yoon-Chul Kim, Colin Vaz, Shrikanth Narayanan, and Krishna Nayak. State-of-the-art MRI protocol for comprehensive assessment of vocal tract structure and function. In *Interspeech*, San Francisco, CA, 2016.
- [13] Tanner Sorensen, **Asterios Toutios**, Louis Goldstein, and Shrikanth Narayanan. Characterizing vocal tract dynamics across speakers using real-time MRI. In *Interspeech*, San Francisco, CA, 2016.
- [14] Sajan Goud Lingala, Yinghua Zhu, Yunhua Ji, **Asterios Toutios**, Wei-Ching Lo, Nicole Seiberlich, Shrikanth S. Narayanan, and Krishna S. Nayak. Accelerating real-time mri of speech using spiral through-time grappa. In *International Society for Magnetic Resonance in Medicine (ISMRM) 24th Scientific Sessions*, Singapore, 2016.
- [15] **Asterios Toutios** and Shrikanth S. Narayanan. Factor analysis of vocal-tract outlines derived from real-time magnetic resonance imaging data. In *International Congress of Phonetic Sciences (ICPhS 2015)*, Glasgow, UK, 2015.
- [16] Sajan Goud Lingala, Yinghua Zhu, Yoon-Chul Kim, **Asterios Toutios**, Shrikanth S. Narayanan, and Krishna S. Nayak. High spatio-temporal resolution multi-slice real time MRI of speech using golden angle spiral imaging with constrained reconstruction, parallel imaging, and a novel upper airway coil. In *International Society for Magnetic Resonance in Medicine (ISMRM) 20th Scientific Sessions*, Toronto, Canada, 2014.
- [17] Jangwon Kim, **Asterios Toutios**, Yoon-Chul Kim, Yinghua Zhu, Sungbok Lee, and Shrikanth S. Narayanan. Usc-emo-mri corpus: An emotional speech production database recorded by real-time magnetic resonance imaging. In *International Seminar on Speech Production (ISSP)*, Cologne, Germany, 2014.
- [18] **Asterios Toutios** and Shrikanth S. Narayanan. Articulatory synthesis of french connected speech from ema data. In *Interspeech*, Lyon, France, 2013.
- [19] Yinghua Zhu, **Asterios Toutios**, Shrikanth S. Narayanan, and Krishna S. Nayak. Faster 3D vocal tract real-time MRI using constrained reconstruction. In *Interspeech*, Lyon, France, 2013.
- [20] Yoon-Chul Kim, Jangwon Kim, Michael I. Proctor, **Asterios Toutios**, Krishna S. Nayak, Sungbok Lee, and Shrikanth S. Narayanan. Toward automatic vocal tract area function estimation from accelerated three-dimensional magnetic resonance imaging. In *ISCA Workshop on Speech Production in Automatic Speech Recognition (SPASR)*, Lyon, France, 2013.
- [21] Michael I. Proctor, Louis Goldstein, Adam Lammert, Dani Byrd, **Asterios Toutios**, and Shrikanth S. Narayanan. Velic coordination in French nasals: a realtime magnetic resonance imaging study. In *Interspeech*, Lyon, France, 2013.
- [22] **Asterios Toutios** and Shinji Maeda. Articulatory VCV synthesis from EMA data. In *Interspeech*, Portland, OR, 2012.
- [23] Utpala Musti, Vincent Colotte, **Asterios Toutios**, and Slim Ouni. Introducing visual target cost within an acoustic-visual unit-selection speech synthesizer. In *International Conference on Auditory-Visual Speech Processing (AVSP)*, Volterra, Italy, 2011.
- [24] **Asterios Toutios**, Utpala Musti, Slim Ouni, and Vincent Colotte. Weight optimization for bimodal unit-selection talking head synthesis. In *Interspeech*, Florence, Italy, 2011.

- [25] **Asterios Toutios** and Slim Ouni. Predicting tongue positions from acoustics and facial features. In *Interspeech*, Florence, Italy, 2011.
- [26] **Asterios Toutios**, Utpala Musti, Slim Ouni, Vincent Colotte, Brigitte Wrobel-Dautcourt, and Marie-Odile Berger. Towards a true acoustic-visual speech synthesis. In *International Conference on Auditory-Visual Speech Processing (AVSP)*, Hakone, Kanagawa, Japan, 2010.
- [27] Utpala Musti, **Asterios Toutios**, Slim Ouni, Vincent Colotte, Brigitte Wrobel-Dautcourt, and Marie-Odile Berger. HMM-based automatic visual speech segmentation using facial data. In *Interspeech*, Makuhari, Japan, 2010.
- [28] **Asterios Toutios**, Utpala Musti, Slim Ouni, Vincent Colotte, Brigitte Wrobel-Dautcourt, and Marie-Odile Berger. Setup for acoustic-visual speech synthesis by concatenating bimodal units. In *Interspeech*, Makuhari, Japan, 2010.
- [29] Michael Aron, **Asterios Toutios**, Marie-Odile Berger, Erwan Kerrien, Brigitte Wrobel-Dautcourt, and Yves Laprie. Registration of multimodal data for estimating the parameters of an articulatory model. In *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, Taipei, Taiwan, 2009.
- [30] **Asterios Toutios**, Slim Ouni, and Yves Laprie. Protocol for a model-based evaluation of a dynamic acoustic-to-articulatory inversion method using electromagnetic articulography. In *International Seminar on Speech Production (ISSP)*, Strasbourg, France, 2008.
- [31] **Asterios Toutios** and Konstantinos Margaritis. Contribution to statistical acoustic-to-EMA mapping. In *European Signal Processing Conference (EUSIPCO)*, Lausanne, Switzerland, 2008.
- [32] **Asterios Toutios** and Konstantinos Margaritis. Enhancing acoustic-to-EPG mapping with lip position information. In *Interspeech*, Antwerp, Belgium, 2007.
- [33] **Asterios Toutios** and Konstantinos Margaritis. Learning electropalatograms from acoustics. In *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, Toulouse, France, 2006.
- [34] **Asterios Toutios** and Konstantinos Margaritis. On the acoustic-to-electropalatographic mapping. In *International Conference on Non-Linear Speech Processing (NOLISP)*, Barcelona, Spain, 2005.
- [35] **Asterios Toutios** and Konstantinos Margaritis. Mapping between the speech signal and articulatory trajectories. In *Hellenic European Conference on Computer Mathematics and its Applications (HERCMA)*, Athens, Greece, 2005.
- [36] **Asterios Toutios** and Konstantinos Margaritis. A support vector approach to the acoustic-to-articulatory mapping. In *Interspeech*, Lisbon, Portugal, 2005.
- [37] **Asterios Toutios** and Konstantinos Margaritis. Learning articulation from cepstral coefficients. In *International Conference on Speech and Computer (SPECOM)*, Patras, Greece, 2005.
- [38] **Asterios Toutios** and Konstantinos Margaritis. Estimating tongue-palate contact patterns from the speech signal. In *International Conference on Speech and Computer (SPECOM)*, St. Petersburg, Russia, 2004.
- [39] **Asterios Toutios** and Konstantinos Margaritis. A rough guide to the acoustic-to-articulatory inversion of speech. In *Hellenic European Conference on Computer Mathematics and its Applications (HERCMA)*, Athens, Greece, 2003.
- [40] **Asterios Toutios** and Konstantinos Margaritis. Acoustic-to-articulatory inversion of speech: a review. In *International Turkish Symposium on Artificial Intelligence and Neural Networks (TAINN)*, Canakkale, Turkey, 2003.
- [41] **Asterios Toutios** and Konstantinos Margaritis. Development of a text-dependent speaker identification system with the OGI toolkit. In *Hellenic Conference on Artificial Intelligence (SETN)*, Thessaloniki, Greece, 2002.

Posters and Abstracts

- [1] Tanner Sorensen, Alison Yu, **Asterios Toutios**, Brenda Villegas, Melody Ouyoung, Shrikanth Narayanan, and Uttam Sinha. Feasibility of real-time magnetic resonance imaging of true vocal fold paralysis. In *Poster presentation at the American Academy of Otolaryngology Head and Neck Surgery Foundation Annual Meeting and OTO Experience*, Atlanta, GA, 2018.
- [2] Tanner Sorensen, **Asterios Toutios**, Louis Goldstein, and Shrikanth S. Narayanan. Tracking developmental changes in articulatory strategy during childhood. *The Journal of the Acoustical Society of America*, 142(4):2584–2584, 2017.
- [3] Miran Oh, **Asterios Toutios**, Dani Byrd, Louis Goldstein, and Shrikanth S. Narayanan. Tracking larynx movement in real-time MRI data. 142(4):2579–2579, 2017.
- [4] Mairym Llorens, Dani Byrd, Nancy Vazquez, Louis Goldstein, Tanner Sorensen, **Asterios Toutios**, and Shrikanth S. Narayanan. Indexing tongue profile narrowing for english lateral consonants using 3D volumetric MR imaging. 142(4):2581–2581, 2017.
- [5] Rachel Alexander, Tanner Sorensen, **Asterios Toutios**, and Shrikanth S. Narayanan. VCV synthesis using task dynamics to animate a factor-based articulatory model. In *Workshop for Young Female Researchers in Speech Science & Technology*, Stockholm, Sweden, 2017.
- [6] Tanner Sorensen, **Asterios Toutios**, Louis Goldstein, and Shrikanth Narayanan. Decomposing vocal tract constrictions into articulator contributions using real-time magnetic resonance imaging. In *Speech Motor Control*, Groningen, The Netherlands, 2017.
- [7] Gary Yeung, Steven M. Lulich, **Asterios Toutios**, Abeer Alwan, and Amber Afshan. Analysis of children’s high front vowel area function using three-dimensional ultrasound imaging. *The Journal of the Acoustical Society of America*, 140(4):3448–3448, 2016.
- [8] Rachel Alexander, **Asterios Toutios**, and Shrikanth Narayanan. Articulatory speech synthesis from vocal-tract MRI data. In *Workshop for Young Female Researchers in Speech Science & Technology*, San Francisco, CA, 2016.
- [9] Tanner Sorensen, **Asterios Toutios**, Louis Goldstein, and Shrikanth S. Narayanan. Characterizing vocal tract dynamics with real-time MRI. In *15th Conference on Laboratory Phonology*, Ithaca, NY, 2016.