

Seminar Series: Advanced Topics in Signal Processing

Wed. April 1st 2020

Zoom info:

<https://mit.zoom.us/j/700288997>

ID: 700 288 997

Time: 2pm-3pm

Website:

www.rle.mit.edu/ss-atsp/

Speaker: Prof. Aníbal Ferreira, University of Porto

Title: Is there art in the phase structure of your voice ? – the role of phase in voice rehabilitation

Abstract: Harmonic sinusoidal models are well known and very useful tools in representing quasi-periodic signals, notably voice and speech. Typical application areas include speech coding/compression, enhancement and transformation. However, voice rehabilitation, and especially whispered-speech to voiced-speech conversion remains largely an unsolved problem preventing patients suffering for example from spasmodic dysphonia, to engage in person-to-person and person-to-machine oral communication, in an effective way, which has critical professional and social implications.

In this seminar, which will be mostly based on illustrations and demos, we will highlight the importance of decoupling the spectral phase information from the spectral magnitude information in parametric representation of the quasi-period part of voice signals as a result of phonation. In particular, we will focus on a shift-invariant phase-related feature which facilitates fully-flexible representation of a quasi-periodic signal with arbitrary spectral magnitude and phase structure.

Our results help to emphasize that voice production and auditory perception are not only symbiotic areas but also highly connected. Deep human understanding in both areas is nuclear to successful technical solutions addressing, for example, voice rehabilitation.



Bio: Aníbal Ferreira is a Visiting Scientist in the Digital Signal Processing Group of the Research Laboratory of Electronics, at MIT, and Associate Professor in the Electrical and Computers Engineering Department of the Faculty of Engineering at the University of Porto, in Portugal, where he lectures in the areas of signal theory, physiological signal processing, multimedia and telecommunications.

He started his research career in 1988 at Philips Research Labs, in Eindhoven (The Netherlands), in the area of automatic VLSI silicon compilation of signal processing blocks. In 1990/91 and in 1993, he was a consultant at AT&T Bell Laboratories Murray Hill, New Jersey, in the area of perceptual audio coding.

This work led to significant contributions concerning the specification of the MPEG-Audio Advanced Audio Coder (AAC) standard, as well as proprietary solutions currently in use today for satellite radio broadcasting (SiriusXm Satellite Radio). Dr. Ferreira has participated in several European research projects and has coordinated seven Portuguese research projects in the areas of real-time audio analysis, synthesis, compression, modification, transcription, and dysphonic voice analysis and reconstruction. Dr. Ferreira has also been involved in several entrepreneurial initiatives, addressing voice quality assessment, biofeedback in stuttering treatment, visual feedback of the singing voice, and multimedia communication. His research interests include psychoacoustics, audio and voice/speech analysis, synthesis and coding, multirate filter banks, acoustic analysis of the spoken and singing voice, dysphonic voice reconstruction and forensic audio.