CURRICULUM VITAE.

Date prepared: 09/01/2017
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EDUCATION

1971 – 1975 B.Sc. in Electrical Engineering, School of Engineering, Tel Aviv University, Tel Aviv, Israel

1975 – 1977 M.Sc. in Electrical Engineering, Dept. of Communications, Control and Computer Systems, Tel Aviv University, Tel Aviv, Israel. Title of M.Sc. thesis: "Pitch extraction of voiced speech – new approaches," (March 1977)

1977 – 1983 Ph.D. in Electrical Engineering, Dept. of Communications, Control and Computer Systems, Tel Aviv University, Tel Aviv, Israel. Title of Ph.D. thesis: "Auditory-based criteria for parameter quantization of linear prediction coded speech," (June 1983).

PROFESSIONAL EXPERIENCE

1968 – 1975 Electrical Engineer, Signal Corps Research Lab, Israeli Defense Forces

1975 – 1984 Research Associate, Department of Communications, Control and Computer Systems, Tel Aviv University, Tel Aviv, Israel

1980 – 1984 Consultant, Signal Corps Research Lab, Israeli Defense Forces

1984 – 1985 Postdoctoral Trainee, MIT, Cambridge, Massachusetts

1984 – 1985 Consultant, Speech Systems Technology Group, MIT Lincoln Laboratory, Lexington, Massachusetts

1985 – 2003 Member of Technical Staff, Acoustics and Speech Research, Bell Labs, Murray Hill, New Jersey

2003 – 2011 Senior Research Scientist, Sensimetrics Corporation, Malden, Massachusetts

2005 – 2008 MIT Affiliate, Research Laboratory of Electronics, MIT

2006 – 2011 Senior Research Associate, Boston University

2011 – Now Research Professor, Boston University

2017 – Now Visiting Researcher, Neuroscience Department, Max Planck Institute for Empirical Aesthetics, Frankfurt, Germany

MOST SIGNIFICANT AWARDS

1998 Elected Fellow of the Acoustical Society of America, "For contributions to signal processing techniques for speech"

1993 Elected Senior Member of IEEE
1984 Recipient of the MIT Myron A. Bantrell post-doctoral fellowship.

ORGANIZING COMMITTEE CHAIR
Workshop on "Brain Rhythms in Speech Perception and Production" (2008). Cambridge, Massachusetts, November.

GUEST EDITOR
Special Issue on "Objective Quality Assessment of Speech and Audio" (2006). IEEE Trans. Audio, Speech and Language Proc., SAP-14(6).

MOST SIGNIFICANT TALKS
1. "On the role of hearing research in contemporary speech technology" (2000). MIT EECS Colloquium, Cambridge, USA, November. (Plenary Talk.)
2. "On the perceptual distance between two segments" (1996). Workshop on The Auditory Basis of Speech Perception, Keele, UK, July. (Keynote address.)
3. "Auditory models as a front end to automatic speech recognition" (1993). DoD workshop on Robust Speech Analysis, Piscataway, New Jersey, August. (Keynote address.)
4. "An acoustic-phonetic diagnostic tool for the evaluation of auditory models" (1991). Workshop on The Psychophysics of Speech Perception", Utrecht, Netherlands, July. (Keynote address.)

PUBLICATIONS
Peer-Reviewed Articles
1. Ghitza, O. (2016). "Acoustic-driven delta rhythms as prosodic markers." *Language, Cognition and Neuroscience*, http://dx.doi.org/10.1080/23273798.2016.1232419
2. Farbood, M. F., Rowland, J., Marcus, G., Ghitza, O. and Poeppel, D. (2014). "Decoding time for the identification of musical key." *Atten Percept Psychophys*. doi:10.3758/s13414-014-0806-0
3. Ghitza, O. (2014). "Behavioral evidence for the role of cortical theta oscillations in determining auditory channel capacity for speech." *Front. Psychol.* **5**:652. doi:10.3389/fpsyg.2014.00652
4. Jepsen, M. L., Dau, T. and Ghitza, O. (2014). "Refining a model of hearing impairment using speech psychophysics." *J. Acoust. Soc. Am*., 135 (4), EL179, http://dx.doi.org/10.1121/1.4869256
5. Doelling, K. B., Arnal, L. H., Ghitza, O. and Poeppel, D. (2014). "Acoustic landmarks drive delta–theta oscillations to enable speech comprehension by facilitating perceptual parsing." *NeuroImage*, 85:761–768. doi:10.1016/j.neuroimage.2013.06.035
6. Ghitza O. (2013). "The theta-syllable: a unit of speech information defined by cortical function." *Front. Psychol.* **4**:138. doi: 10.3389/fpsyg.2013.00138
7. Ghitza O., Giraud A-L and Poeppel D. (2013). "Neuronal oscillations and speech perception: critical-band temporal envelopes are the essence." *Front. Hum. Neurosci*. **6**:340. doi: 10.3389/fnhum.2012.00340

8. Ghitza, O. (2012). "On the role of theta-driven syllabic parsing in decoding speech: intelligibility of speech with a manipulated modulation spectrum." *Front. Psychol.* **3**:238. doi:10.3389/fpsyg.2012.00238
9. Ghitza, O. (2011). "Linking speech perception and neurophysiology: speech decoding guided by cascaded oscillators locked to the input rhythm." *Front. Psychol.* **2**:130. doi: 10.3389/fpsyg.2011.00130
10. Ghitza, O. and Greenberg, S. (2009). "On the possible role of brain rhythms in speech perception: Intelligibility of time compressed speech with periodic and aperiodic insertions of silence." Phonetica 66:113–126. doi:10.1159/000208934
11. Shamir, M., Ghitza, O., Epstein, S. and Kopell, N. (2009). "Representation of time-varying stimuli by a network exhibiting oscillations on a faster time scale." PLoS Comput Biol 5(5). doi:10.1371/journal.pcbi.1000370
12. Messing, D. P., Delhorne, L., Bruckert, E., Braida, L. D. and Ghitza, O. (2009). "A non-linear efferent-inspired model of the auditory system; matching human confusions in stationary noise." Speech Communication 51:668-683. doi:10.1016/j.specom.2009.02.002
13. Rix, A. W., Beerends, J. G., Kim, D.-S., Kroon, P. and Ghitza, O. (2006). "Objective Assessment of Speech and Audio Quality – Technology and Applications," IEEE Trans. Audio, Speech and Language Proc., SAP-14(6), 1890-1901
14. Ghitza, O. (2001). "On the upper cutoff frequency of the auditory critical-band envelope detectors in the context of speech perception." *J. Acoust. Soc. Am.*, 110(3), 1628-1640
15. Ghitza, O. and Sondhi, M. M. (1997). "On the perceptual distance between speech segments." *J. Acoust. Soc. Am.*, 101(1), 522-529
16. Ghitza, O. (1994). "Auditory models and human performance in tasks related to speech coding and speech recognition." IEEE Trans. on Speech and Audio, SAP-2(1). Special issue on Neural networks for Speech Processing, 115-132 (Invited)
17. Ghitza, O. (1993c). "Processing of spoken CVCs in the auditory periphery: I. Psychophysics," *J. Acoust. Soc. Am.*, 94(5), 2507-2516
18. Ghitza, O. (1993b). "Adequacy of auditory models to predict internal human representation of speech sounds." *J. Acoust. Soc. Am.*, 93(4), 2160-2171
19. Ghitza, O. and Sondhi, M. M. (1993a). "Hidden Markov Models with Templates as Nonstationary States: An Application to Speech Recognition." Computer Speech and Language, 7(2), 101-119
20. Ghitza, O. (1988). "Temporal non-place information in the auditory nerve firing patterns as a front-end for speech recognition in a noisy environment." Journal of Phonetics, 16(1), 109-124. Theme issue on the "Representation of speech in the auditory periphery" (Invited)
21. Ghitza, O. (1987). "Auditory nerve representation criteria for speech analysis/synthesis." IEEE Trans. Acoust. Speech and Signal Proc., ASSP-35(6), 736-740
22. Ghitza, O. (1986). "Auditory nerve representation as a front-end for speech recognition in a noisy environment." Computer Speech and Language, 1(2), 109-131
23. Ghitza, O. and Goldstein, J. L. (1986). "Scalar LPC quantization based on formant JNDs." IEEE Trans. Acoust. Speech and Signal Proc., ASSP-34(4), 697-709.

Most Significant Non Peer-Reviewed Publications

1. Lee, C-Y, Glass, J. and Ghitza, O. (2011). “An efferent-inspired auditory model front-end for speech recognition.” Interspeech 2011, 49-52, Florence, Italy, August
2. Jepsen, M. L., Dau, T. and Ghitza, O. (2009). “Modeling a damaged cochlea: beyond non-speech psychophysics.” International Symposium on Auditory and Audiological Research, Copenhagen, Denmark, August
3. Ghitza, O. (2007). “Using auditory feedback and rhythmicity for diphone discrimination of degraded speech.” Proceed. Intern. Conf. on Phonetics, ICPhS XVI, 163-168, Saarbrücken, Germany, August
4. Ghitza, O. (2004). “On the possible role of MOC efferents in speech reception in noise.” *J. Acoust. Soc. Am.*, 115(5), A., 2500
5. Ghitza, O. and Kroon, P. (2000). “Dichotic presentation of interleaving critical-band envelopes: An application to multi-descriptive coding.” in Proc. IEEE Speech Coding Workshop, 72-74, Delavan, Wisconsin, September
6. Ghitza, O. and Sondhi, M. M. (1999). “Perceptually motivated measures for automatic speech recognition.” in: Proc. Robust Methods for Speech Recognition in Adverse Condition, Tampere, Finland, May
7. Kim, D. S., Ghitza, O. and Kroon, P. (1999). “A computational model for MOS prediction.” in Proc. IEEE Speech Coding Workshop, Provoo, Finland, June
8. Sandhu, S., Ghitza, O. and Lee C-H. (1995). “A comparative study of MEL Cepstra and EIH for phone classification under adverse conditions.” International Conference on Acoustics, Speech and Signal Processing – ICASSP '95, 409-412, Detroit, May
9. Ghitza, O. (1988). “Auditory neural feedback as a basis for speech processing.” International Conference on Acoustics, Speech and Signal Processing – ICASSP '88, 91-94, New York, April
10. Ghitza, O. (1987). "Robustness agaist noise: The role of timing-syncrony measurement.” International Conference on Acoustics, Speech and Signal Processing – ICASSP '87, Dallas, April
11. Ghitza, O. (1986). “Speech analysis/synthesis based on matching the synthesized and the original auditory nerve representation.” International Conference on Acoustics, Speech and Signal Processing – ICASSP '86, 2372-2375, Japan, April
12. Ghitza, "A measure of in-synchrony regions in the auditory nerve firing patterns as a basis for speech vocoding." International Conference on Acoustics, Speech and Signal Processing – ICASSP '85, 505-508, Tampa, March.

Book Chapters

1. Ghitza, O. and Greenberg, S. (2010). "Intelligibility of time-compressed speech with periodic and aperiodic insertions of silence: evidence for endogenous brain rhythms in speech perception?" In: The Neurophysiological Bases of Auditory Perception (Eds.) E. A. Lopez-Poveda, A. R. Palmer, R. Meddis, Springer-Verlag, Berlin Heidelberg, 393-406
2. Ghitza, O., Messing, D., Delhorne, L., Braida, L., Bruckert, E., and M. M. Sondhi (2007). “Towards predicting consonant confusions of degraded speech.” In: Hearing – from sensory processing to perception (Eds.) B. Kollmeier, G. Klump, V. Hohmann, U. Langemann, M. Mauermann, S. Uppenkamp and J. Verhey, Springer-Verlag, Berlin Heidelberg, 541-550

3. Ghitza, O. (1994). “Auditory models and human performance in tasks related to speech coding and speech recognition.” In: Modern methods of speech processing (Eds.) R. P. Ramachandran, R. J. Mammone, Kluwer Academic Publishers, 401-448
4. Ghitza, O. (1992). “Auditory nerve representation as a basis for speech processing.” In: Advances in speech signal processing (Eds.) S. Furui and M. M. Sondhi, Marcel Dekker, New York, 453-485
5. Ghitza, O. and Goldstein, J. L. (1983). “JNDs for the spectral envelope parameters in natural speech.” In: Hearing – Physiological Bases and Psychophysics (Eds.) R. Klinke and R. Hartmann, Springer-Verlag, Berlin Heidelberg, 352-359.

PATENTS

1. "Method And Apparatus For Performing Audio Coding And Decoding By Interleaving Smoothed Critical Band Envelopes At Higher Frequencies” (2002). European Patent Number: EP1158494
2. "Method And Apparatus For Estimating Subjective Audio Signal Quality From Objective Distortion Measures” (2003). U.S Patent Number: 6,609,092
3. "Analysis arrangement based on a model of human neural responses" (1990). U.S Patent Number: 4,905,285.

RESEARCH SUPPORT

Ghitza (PI)
AFOSR (Contract) 3/15/03 – 12/31/03 Completed
“Auditory Peripheral Processing of Degraded Speech.” Formulating signal processing principles realized by the auditory periphery, in particular when the input signal is speech in noise

Ghitza (PI) 9/1/03 – 8/31/04 Completed
AFOSR (STTR-Phase I)
“Application of Cortical Processing Theory to Acoustical Analysis.” Using psychophysical approach to determine phenomenological models of cortical processing of speech sounds

Ghitza (PI)
AFOSR (STTR-Phase II) 4/1/05 – 6/31/07 Completed
“Application of Cortical Processing Theory to Acoustical Analysis.”

Ghitza (PI)
AFOSR (Contract) 4/1/07 – 12/31/07 Completed
“Spoken Word Recognition by Humans: A Single- or a Multi- Layer Process?” Providing psychophysical support for a possible single-layer process for lexical access of words with meaning

Ghitza (PI)
NSF (STTR-Phase I) 1/1/07 – 12/31/07 Completed
“Exploiting Nervous System Rhythmicity for Spoken Word Recognition.” Recognizing diphones (i.e. speech segments of duration of few tens of milliseconds) by exploiting the presumed role of nervous-system rhythms in neural computation

Ghitza (PI)
AFOSR (Grant) 3/1/08 – 3/31/11 Completed
"Decoding Speech Using Neural Rhythmicity and Synchrony." Using psychophysical approach to validate the role of brain rhythms in speech perception.

Ghitza (PI)
AFOSR (Grant) 9/1/11 – 8/31/16 Completed
"Cascading Oscillators in decoding speech: a reflection of a cortical computation principle." Using psychophysical approach to develop a computational model of speech perception with an array of cascaded oscillators locked to the input rhythm at its core.

Ghitza (PI)
AFOSR (Grant) 7/1/17 –10/31/20 Active
"Parsing continuous speech: the role of neuronal oscillations and sentential context." Here we test whether a model of speech comprehension based on cortical oscillations can account for the improved intelligibility afforded by the contextual information contained in continuous everyday speech.

RESEARCH AREAS OF INTERESTS

Past

Hearing; Speech perception; Speech technology (Speech recognition, Speech and Audio coding.); Perception based signal analysis methods for speech recognition and speech coding; Objective, diagnostic assessment of speech intelligibility and speech quality.

Present

Decoding speech using neuronal oscillations; Hierarchical neuronal oscillators and the basis for cortical computation; Analysis of MEG signals recorded while performing a speech perception task; Predicting consonant confusions in noise; Closed-loop auditory models for robust automatic speech recognition; Modeling damaged cochleae using speech-governed methodologies.