

## Panagiotis C. Petrantonakis

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### CONTACT INFORMATION

Computational Biology Lab  
Institute of Molecular Biology and Biotechnology  
Foundation for Research & Technology Hellas  
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### RESEARCH INTERESTS

Signal Processing, Computational Neuroscience

### EDUCATION

**Aristotle University of Thessaloniki**, Thessaloniki, Greece

Ph.D., Signal Processing, December 2011

- Dissertation Topic: “Advanced Signal Processing Techniques for EEG-Based Emotion Recognition”
- Advisor: Prof. Leontios J. Hadjileontiadis

Diploma, Electrical & Computer Engineering, July 2007

- Diploma thesis title: “Dynamic Database Update in Multimodal Biometric Authentication Systems”
- Advisor: Prof. Michael G. Strintzis

**Massachusetts Institute of Technology**, MA:Boston, USA

Visiting student, June - September 2006

- Advisor: Dr. Emmanouil Chaniotakis

### ACADEMIC EXPERIENCE

**Foundation for Research & Technology Hellas**, Heraklion, Greece

*Postdoctoral Fellow at the Computational Biology Lab*

**December, 2012 - today**

Theoretical/Computational models for memory formation in hippocampus using the theory of Compressed Sensing. Extracellular recordings Analysis (Spike Sorting Algorithms Development).

Co-supervision of doctoral, master, and undergraduate students in the field of Computational Neuroscience.

**Aristotle University of Thessaloniki**, Thessaloniki, Greece

*Graduate Student*

**December, 2007 - December, 2011**

Ph.D. research, Ph.D. level coursework and research/consulting projects.

Co-supervision of four Diploma theses in the field of Signal Processing:

- Multidimensional directed Information Analysis of EEG signals for emotion recognition. (Undergraduate student: Vagia Kaltsa)
- Facial Expression recognition with Hopfield Networks and Lacunarity-based features. (Undergraduate student: Asteria Sarri)
- Classification of breast masses from mammograms using wavelet leader multifractal analysis. (Undergraduate student: Matias Kagias)
- Emotion recognition from EEG signals: A comparative study of various feature vector extraction methodologies. (Undergraduate student: Konstantinos Nasiotis)

*Teaching Assistantships*

**March, 2009 - June 2011**

Undergraduate level courses at the Dept. of Electrical & Computer Engineering, Aristotle University of Thessaloniki. Shared responsibility for lectures, exams and homework assignments.

- Advance Signal Processing Techniques - Applications in Biomedical Signals, Spring 2009 & 2011.
- Stochastic Signals & Processes, Spring 2009 & 2010.
- Digital Signal Processing, Fall 2009 & 2010.
- Signals and Systems, Fall 2009.
- Structural Programming (C language), Spring 2009.

*Teaching Assistantship*

**October - January, 2008**

Undergraduate level courses at the Dept. of Film Studies, Aristotle University of Thessaloniki. Shared responsibility for lectures, exams and homework assignments.

- Introduction to Informatics, Fall 2008.

**Massachusetts Institute of Technology, MA:Boston, USA**

*Visiting Student at the Dept. of Nuclear Science & Engineering*

**June - September, 2006**

Experimental research on Operational Amplifiers, Passive Filters and Transient Circuits in the line of course 6.071/22.071 "Introduction to Electronics, Signals and Measurements".

HONORS AND  
AWARDS

Journal article "Emotion Recognition from Brain Signals Using Hybrid Adaptive Filtering and Higher-Order Crossings Analysis" was included in the list of the most influential papers ever published in IEEE Transactions on Affective Computing journal. The list will be published in the conference proceedings of the 6th International Conference on Affective Computing and Intelligent Interaction (ACII2015), which will be held in Xian, China, September 21-24, 2015.

3rd IFMBE Young Investigator Award: XII Mediterranean Conference on Medical and Biological Engineering and Computing, 2010

Honorable award by Bill Gates, founder of Microsoft, for the development of innovative software by the Signal Processing and Biomedical Technology Unit, Telecommunications Laboratory, Dept. of Electrical & Computer Engineering, Aristotle University of Thessaloniki, 2008

Ranking in top-12 in the worldwide (Over 100 countries participated) Microsoft Imagine Cup Competition (Seoul, Republic of Korea) for the project NOESIS, 2007

1st award in the national Microsoft Imagine Cup Competition (Athens, Greece) for the project NOESIS, 2007

Distinction by the Hellenic Mathematical Society for exceptional performance in Thales mathematical contest, 2000 & 2001

PUBLICATIONS

*Book chapters*

1. **Panagiotis C. Petrantonakis** and Leontios J. Hadjileontiadis, "EEG-Based Emotion Recognition Using Advanced Signal Processing Techniques," in *Advances in Emotion Recognition*, Amit Konar and Aruna Chakraborty, Eds. New York, NY: Wiley-Blackwell Press, 2015.

*Journals*

**Postdoctoral research**

1. **Panagiotis C. Petrantonakis** and Panayiota Poirazi, "A radical spike detection and identification process from raw extracellular recordings," submitted, 2015.
2. **Panagiotis C. Petrantonakis** and Panayiota Poirazi, "Dentate Gyrus Circuitry Features Improve Performance of Sparse Approximation Algorithms," *Plos One*, vol. 10(1):e0117023, 2015.
3. **Panagiotis C. Petrantonakis** and Panayiota Poirazi, "A Compressed Sensing Perspective of Hippocampal Function," *Frontiers in Systems Neuroscience*, vol. 8:141, 2014.

### PhD research

1. **Panagiotis C. Petrantonakis** and Leontios J. Hadjileontiadis, "Adaptive Emotional Information Retrieval from EEG Signals in the Time-Frequency Domain," *IEEE Trans. Signal Processing*, vol. 60, no. 5, pp. 2604-2616, 2012.
2. **Panagiotis C. Petrantonakis** and Leontios J. Hadjileontiadis, "A Novel Emotion Elicitation Index Using Frontal Brain Asymmetry for Enhanced EEG-Based Emotion Recognition," *IEEE Trans. Information Technology in Biomedicine*, vol. 15, no. 5, pp. 737-746, 2011.
3. **Panagiotis C. Petrantonakis** and Leontios J. Hadjileontiadis, "Emotion Recognition from Brain Signals Using Hybrid Adaptive Filtering and Higher-Order Crossings Analysis," *IEEE Trans. Affective Computing*, vol. 1, no. 2, pp. 81-97, 2010. **(Listed as one of the most influential papers ever published in IEEE Transactions on Affective Computing)**
4. **Panagiotis C. Petrantonakis** and Leontios J. Hadjileontiadis, "EEG-Based Emotion recognition using Higher-Order crossings," *IEEE Trans. Information Technology in Biomedicine*, vol. 14, no. 2, pp. 186-197, 2010.

### Other

1. **Panagiotis C. Petrantonakis**, "Investigating the Stepwise Asymmetry in Chaotic Time Series," under preparation, 2015.
2. Vasiliki E. Kosmidou, **Panagiotis C. Petrantonakis** and Leontios J. Hadjileontiadis, "Enhanced Sign Language Recognition Using Weighted Intrinsic Mode Entropy and Signer's Level of Deafness," *IEEE Trans. Systems, Man, and Cybernetics, Part B: Cybernetics*, vol. 41, no. 6, pp. 1531-1543, 2011.

### Conferences

#### Postdoctoral research

1. **Panagiotis C. Petrantonakis** and Panayiota Poirazi, "Information Processing in Hippocampus: A Compressed Sensing Approach," in *Proc. of The Brain Conferences: Bridging Neural Mechanisms and Cognition*, Copenhagen, Denmark, 2015, *abstract*.
2. **Panagiotis C. Petrantonakis** and Panayiota Poirazi, "Dentate Gyrus Circuitry Improves Performance Of The Iterative Soft Thresholding Algorithm," in *Proc. of AREADNE 2014, Research in Encoding And Decoding of Neural Ensembles*, Santorini, Greece, 2014, *abstract*.
3. **Panagiotis C. Petrantonakis**, Athanassia Papoutsis, and Panayiota Poirazi, "Towards Predicting Persistent Activity of Neurons by Statistical and Fractal Dimension-Based Features," in *Proc. of International Joint Conference on Neural Networks*, Dallas, TX, USA, 2013.
4. Athanassia Papoutsis, **Panagiotis C. Petrantonakis**, and Panayiota Poirazi, "Dendritic Non-linearities Enable PFC Microcircuits to Serve as Predictive Modules of Persistent Activity," in *Proc. of 22nd Annual Computational Neuroscience Meeting*, Paris, France, 2013, *abstract*.

### PhD research

1. **Panagiotis C. Petrantonakis** and Leontios J. Hadjileontiadis, "An Emotion Elicitation Metric for the Valence/Arousal and Six Basic Emotions Affective Models: A comparative Study," *Proc. of the 10th IEEE International Conf. on Information Technology and Applications in Biomedicine*, Corfu, Greece, 2010, pp. 1-4.
2. **Panagiotis C. Petrantonakis** and Leontios J. Hadjileontiadis, "Adaptive Extraction of Emotion-Related EEG Segments Using Multidimensional Directed Information in Time-Frequency Domain," *Proc. of the 32nd Annual International Conf. of the IEEE Engineering in Medicine and Biology Society*, Buenos Aires, Argentina, 2010, pp. 1-4. **(invited paper)**

3. **Panagiotis C. Petrantonakis** and Leontios J. Hadjileontiadis, “Frontal EEG asymmetry and Affective States: A Multidimensional Directed Information Approach,” in *Proc. of the XII Mediterranean Conf. on Medical and Biological Engineering and Computing (MEDICON 2010)*, Chalkidiki, Greece, 2010, pp. 687-690. **(3rd Young Investigator Award)**
4. **Panagiotis C. Petrantonakis**, Vagia Kaltsa and Leontios J. Hadjileontiadis, “Selective EEG analysis for emotion recognition using multidimensional directed information criteria,” in *Proc. of the 1st International Congr. on Neurobiology and Clinical Psychopharmacology & European Psychiatric Association Conf. on Treatment Guidance*, Thessaloniki, Greece, 2009, *abstract*.
5. **Panagiotis C. Petrantonakis** and Leontios J. Hadjileontiadis, “EEG-Based Emotion Recognition Using Hybrid Filtering and Higher Order Crossings,” in *Proc. of the 2009 International Conf. on Affective Computing and Intelligent Interaction*, Amsterdam, The Netherlands, 2009, pp. 147-152.
6. **Panagiotis C. Petrantonakis** and Leontios J. Hadjileontiadis, “On Modelling User’s EEG Response During a Human-Computer Interaction: A Mirror Neuron System-Based Approach,” in *Proc. of the 4th European Conf. of the International Federation for Medical and Biological Engineering*, Antwerp, Belgium, 2008, pp. 1241-1245. **(Finalist (top 10) at the Young Investigators Competition)**

#### Other

1. S. Georgoulis, S. Eleftheriadis, D. Tzionas, K. Vrenas, **Panagiotis C. Petrantonakis**, and Leontios J. Hadjileontiadis, “Epione: An Innovative Pain Management System Using Facial Expression Analysis, Biofeedback and Augmented Reality-Based Distruction”, *Proc. of the International Conference on Intelligent Networking and Collaborative Systems (INCoS 2010)*, Thessaloniki, Greece, 2010, pp. 24-26.
2. D. Tzionas, K. Vrenas, S. Eleftheriadis, S. Georgoulis, **Panagiotis C. Petrantonakis**, and Leontios J. Hadjileontiadis, “Phantom Limb Pain Management Using Facial Expression Analysis, Biofeedback and Augmented Reality Interfacing”, *Proc. of the International Conference on Software Development for Enhancing Accessibility and Fighting Info-exclusion (DSAI 2010)*, Oxford, United Kingdom, 2010, pp. 25-26. **(invited paper)**
3. **Panagiotis C. Petrantonakis**, Jason Vittorias, Dimitris Bolis, Alexandra Tsiligkyri, Vasiliki Kosmidou, Leontios J. Hadjileontiadis, and Stavros M. Panas, “On Modeling the Educational Process of Kids with Autism Spectrum Disorders: The NOESIS Project”, *Proc. of the 11th IASTED International Conference on Computers and Advanced Technology in Education*, Crete, Greece, 2008, pp. 8-13. **(Finalist (top 5) at the Student Paper Competition)**
4. **Panagiotis C. Petrantonakis**, Vasiliki Kosmidou, Magda Nikolarazi, Sofia Koutsogiorgou, and Leontios J. Hadjileontiadis, “’SEE and SEE’ : An Educational Tool for Kids with Hearing Impairment”, *Proc. of Workshop WALTD’08 held by ICALT 2008*, Santander, Spain, 2008, pp. 35-39.
5. Jason Vittorias, **Panagiotis C. Petrantonakis**, Dimitris Bolis, Alexandra Tsiligkyri, Vasiliki Kosmidou, and Leontios J. Hadjileontiadis, “NOESIS: An Enhanced Educational Environment for Kids with Autism Spectrum Disorders”, *Proc. of Workshop WALTD’08 held by ICALT 2008*, Santander, Spain, 2008, pp. 10-14.

CITATIONS

301 (7-6-2015, source: Google Scholar)

PROJECTS

**dEMORY, Computational Biology Lab, FORTH**, Heraklion, Greece

*Postdoctoral researcher*

**December, 2012 - today**

The goal of the project is to characterize the role of dendrites in learning and memory processes so as to formulate a unifying theory regarding their contribution in memory formation across brain regions and abstraction levels.

**HUMABIO (HUMAN Monitoring and Authentication using Biodynamic Indicators and BehaviOral Analysis), Informatics and Telematics Institute, Thessaloniki, Greece**

*researcher*

**September, 2006 - June, 2007**

Research work in the line of my diploma thesis where I studied template ageing issues (face, voice) in multimodal biometric authentication systems.

**Noesis**, Aristotle University of Thessaloniki, Thessaloniki, Greece

*researcher-developer*

**February, 2007 - August, 2007**

NOESIS project: development of a novel educational tool for kids with Autism Spectrum Disorders. Physiologic (Heart Rate Variability, Galvanic Skin Response, Relative Movement) signal processing techniques were developed to detect the stress level of the kid and adapt accordingly the computer-based educational procedure.

**SEE & SEE**, Aristotle University of Thessaloniki, Thessaloniki, Greece

*software developer*

**November, 2007 - October, 2008**

Supportive software for the education of deaf children.

**Epione**, Aristotle University of Thessaloniki, Thessaloniki, Greece

*research consulting/supervising*

**March, 2010 - June, 2011**

Epione is a novel system for pain management, both physical and psychological. It integrates cutting-edge technology within a variety of alternative pain management solutions, following a personalized health approach. (<http://www.projectepione.com/>)

PROFESSIONAL  
SERVICE

Journal Reviewer:

- Frontiers in Systems Neuroscience
- Plos One
- IEEE Transactions on Information Technology in Biomedicine
- IEEE Transactions on Affective Computing
- IEEE Transactions on Neural Networks
- IEEE Transactions on Neural Systems & Rehabilitation Engineering
- IEEE Transactions on Biomedical Engineering
- IEEE Transactions on Information Forensics and Security
- IEEE Signal Processing Letters
- EURASIP Journal on Advances in Signal Processing
- Biomedical Signal Processing and Control
- Applied Soft Computing
- International Journal of Synthetic Emotions

COMPUTER SKILLS

- Languages: Matlab (expert), C/C++ (basic knowledge)

LANGUAGES

- English: speak fluently and read/write with high proficiency (University of Michigan, Certificate of Proficiency in English).
- Greek: Native Language

MEMBERSHIPS

- Member of IEEE (Institute of Electrical & Electronic Engineers)
- Member of Technical Chamber of Greece

REFERENCES

Upon request