

# **2018 IEEE Signal Processing in Medicine and Biology Symposium (SPMB 2018)**

**Philadelphia, Pennsylvania, USA  
1 December 2018**



**IEEE Catalog Number: CFP1891R-POD  
ISBN: 978-1-5386-5917-5**

**Copyright © 2018 by the Institute of Electrical and Electronics Engineers, Inc.  
All Rights Reserved**

*Copyright and Reprint Permissions:* Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

***\*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP1891R-POD
ISBN (Print-On-Demand):	978-1-5386-5917-5
ISBN (Online):	978-1-5386-5916-8
ISSN:	2372-7241

**Additional Copies of This Publication Are Available From:**

Curran Associates, Inc  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: (845) 758-0400  
Fax: (845) 758-2633  
E-mail: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

# TABLE OF CONTENTS

**Plenary Talks:** *Joseph Picone, Temple University (Chair), Ivan Selesnick, NYU-Tandon (Chair)*

SPMB-I1.01: Observing the Brain-on-Task using Functional Optical Brain Monitoring 1  
*Hasan Ayaz, Drexel University*

SPMB-I1.02: Evaluation of Neurological Diseases by Means of Speech Processing and Multimodal Analysis 2  
*Najim Dehak, Johns Hopkins University*

**Lecture Session No. 1:** *Davide Piovesan, Gannon University (Chair)*

SPMB-L1.01: Parkinson's Disease Diagnosis Using Machine Learning and Voice 3  
*T. Wroge, University of Pittsburgh*  
*Y. Ozkanca and C. Demiroglu, Ozyegin University*  
*D. Si, D. Atkins, and R. Ghomi, University of Washington*

SPMB-L1.02: Skin-Coupled PVDF Microphones for Noninvasive Vascular Blood Sound Monitoring 10  
*B. Panda, S. Chin, and S. Mandal, Case Western Reserve University*  
*S. Majerus, Louis Stokes Cleveland Veterans Affairs Medical Center*

SPMB-L1.03: A Real-Time Personalized Noise Reduction Smartphone App for Hearing Enhancement 14  
*N. Alamdari, S. Yaraganalu, and N. Kehtarnavaz, University of Texas at Dallas*

SPMB-L1.04: The Suppression of Transient Artifacts in Time Series via Convex Analysis 19  
*Y. Feng and I. Selesnick, New York University*  
*H. Graber, Photon Migration Technologies Corp.*

SPMB-L1.05: Data-intensive Undergraduate Research Project Informs to Advance Healthcare Analytics 25  
*M. D'Souza, D. Wentzien, R. Bautista, J. Santana, M. Skivers, S. Stotts, and F. Fiedler, Wesley College*

SPMB-L1.06: The Temple University Hospital Digital Pathology Corpus 33  
*D. Houser, G. Shadhin, R. Anstotz, C. Campbell, I. Obeid, J. Picone, T. Farkas, Y. Persidsky, and N. Jhala, Temple University*

**Poster Session No. 1:** *Silvia Lopez, Blackfynn (Chair)*

SPMB-P1.01: Machine Learning Classification of Cancer Cells Migration in 3D Multi-cue Microenvironments 40  
*K. Pourfarhangi and B. Gligorijevic, Temple University*

SPMB-P1.02: Phonocardiography Data Compression using Discrete Wavelet Transform 42  
*M. Chowdhury, K. Poudel, and Y. Hu, Middle Tennessee State University*

SPMB-P1.03: Calibration of Dynamic Hand-Wrist EMG-Force Models using a Minimum Number of Electrodes 44

*B. Bardizbanian, Z. Zhu, J. Li, and E. Clancy, Worcester Polytechnic Institute*

*C. Dai, University of North Carolina at Chapel Hill*

*C. Martinez-Luna and T. Farrell, Liberating Technologies, Inc.*

SPMB-P1.04: Reducing Electric Power Consumption when Transmitting ECG/EMG/EEG using a Bluetooth Low Energy Microcontroller 46

*J. Li, M. Bhuiyan, X. Huang, and E. Clancy, Worcester Polytechnic Institute*

*B. McDonald and T. Farrell, Liberating Technologies, Inc.*

SPMB-P1.05: A Statistical Technique to Assess Overall Cardiac Ventricle Contraction Dyssynchrony 48

*E. Marcus, A. Adar, D. Mah, and D. Harrild, Boston Children's Hospital*

SPMB-P1.06: Expanding an HPC Cluster to Support the Computational Demands of Digital Pathology 50

*C. Campbell, N. Mecca, T. Duong, I. Obeid, and J. Picone, Temple University*

SPMB-P1.07: Open Source Resources to Advance EEG Research 52

*S. Ferrell, E. von Weltin, I. Obeid, and J. Picone, Temple University*

SPMB-P1.08: Optimizing EEG Visualization Through Remote Data Retrieval 55

*N. Capp, C. Campbell, T. Elseify, I. Obeid, and J. Picone, Temple University*

SPMB-P1.09: Adapting an Automatic Speech Recognition System to Event Classification of Electroencephalograms 57

*V. Shah, R. Anstotz, I. Obeid, and J. Picone, Temple University*

SPMB-P1.10: Comparison of Fetal Phonocardiogram Wavelet Denoising Methods 61

*R. Rahankova and R. Martinek, Technical University of Ostrava*

SPMB-P1.11: Exploring P300-based Biometric for Individual Identification Based on Convolutional Neural Networks 64

*H. Du, I. Jouny, and Y. Yu, Lafayette College*

*S. Wang, Georgia Institute of Technology*

SPMB-P1.12: Automatic Mouth Detection for Self-Feeding 66

*N. Islam, A. Amiri, and S. Hiremath, Temple University*

*J. Forlizzi, Carnegie Mellon University*

## **Lecture Session No. 2: Hansen Mansy, University of Central Florida (Chair)**

SPMB-L2.01: Hand Movement Discrimination Using Particle Filters 68

*N. Amor, G. Rasool, and N. Bouaynaya, Rowan University*

*R. Shterenberg, University of Alabama at Birmingham*

SPMB-L2.02: Gaussian Filtering of EMG Signals for Improved Hand Gesture Classification 73

*I. Ghalyan, Z. Abouelenin, and V. Kapila, New York University*

SPMB-L2.03: Speckle Noise Reduction in OCT and Projection Images using Hybrid Wavelet Thresholding 79

*X. Sui and I. Selesnick, New York University*

*H. Ishikawa, G. Wollstein, and J. Schuman, New York University School of Medicine*

SPMB-L2.04: Deep BV: A Fully Automated System for Brain Ventricle Localization and Segmentation in 3D Ultrasound images of Embryonic Mice 85

*Z. Qiu, J. Langerman, N. Nair, and Y. Wang, New York University*

*O. Aristizabal, J. Mamou, and J. Ketterling, Riverside Research*

*D. Turnbull, New York University School of Medicine*

SPMB-L2.05: Estimating Peak Velocity Profiles from Doppler Echocardiography using Digital Image Processing 91

*A. Taebi, R. Sandler, and H. Mansy, University of Central Florida*

*B. Kakavand, Nemours Children's Hospital*

SPMB-L2.06: Stenosis Characterization and Identification for Dialysis Vascular Access 95

*S. Chin, B. Panda, M. Damaser, and S. Majerus, Louis Stokes Cleveland VA Medical Center*

### **Lecture Session No. 3:** *Nashwa Elarby, Penn State University (Chair)*

SPMB-L3.01: Comprehensive Fully Automated Left-Ventricular Ejection and Contractility Analysis 100

*G. Angus-Barker and J. Kar, University of South Alabama*

SPMB-L3.02: An Acoustic Approach for Early Screening of Developmental Dysplasia of the Hip 106

*T. Hassan, L. McKinney, R. Sandler, A. Kassab, C. Price, F. Moslehy, and H. Mansy,*

*University of Central Florida*

SPMB-L3.03: Reconstructing Speech Stimuli from Human Auditory Cortex Activity Using a WaveNet Approach 112

*R. Wang, Y. Wang, and A. Flinker, New York University*

SPMB-L3.04: The Hurst Exponent – A Novel Approach for Assessing Focus During Trauma Resuscitation 118

*I. Ohu, D. Piovesan, and J. Carlson, Gannon University*

SPMB-L3.05: Clustering SCG Events using Unsupervised Machine Learning 123

*P. Gamage, M. Azad, R. Sandler, and H. Mansy, University of Central Florida*

*A. Taebi, University of California*

SPMB-L3.06: Characterization of Arousals in Polysomnography using the Statistical Significance of Power Change 128

*J. Liu and H. Yaggi, Yale University School of Medicine*