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Special Session:

Neurodegenerative Disorders between Screening and Rehabilitation

Assoc.Prof. PhD **Oana Geman**

PhD Stud. **Diana-Roxana Izdrui**

PhD Stud. **Simona Elena Nastase**

Health and Human Development
Department
"Stefan cel Mare" University of
Suceava, Romania
Email: oana.geman@usm.ro

"Stefan cel Mare" University of
Suceava, Romania
Email: diana.izdrui@usm.ro

"Stefan cel Mare" University of
Suceava, Romania
Email: simona.nastase@usm.ro

Scope:

The most well-known Neurodegenerative disorders are Alzheimer's, Parkinson's, multiple sclerosis. Symptoms that suggest the existence of Neurodegenerative disorders may affect thinking, ability to move, endurance, coordination, sensations, etc., and it is very difficult to diagnose neurodegenerative diseases. The early diagnosis cannot be established after a simple screening test. The appearance of Alzheimer's and Parkinson's diseases is correlated with the aging; however, we often find more and more variants of "early onset". This is the case of multiple sclerosis which mainly affects young adults, the diagnosis being made between 20-40 years. Nowadays, diagnosis in Parkinson's disease remains a clinical, subjective diagnostic and there are more than 25% of cases undiagnosed. There is no screening test (or a biomarker) for early diagnosis of Parkinson's disease. From our perspective, it is important to enable measurement and fusion of various information, highly affected by the development of Parkinson's disease, algorithmically, in order to efficiently recognize and identify the early stages of the disease. There is hope that new findings will lead to a more effective treatment and rehabilitation of this disease. Neurological rehabilitation is designed to help patients to increase functions, reduce symptoms and improve a patient's quality of life. Rehabilitation through dance or music and poetry can contribute to a good non-invasive recovery of neurodegenerative diseases patients.

Topics:

- 1) Improving the existing methodologies for the analysis of a tremor or other symptoms.
- 2) Discovering new methodologies related to symptoms of Parkinsonian tremor.
- 3) Finding new solutions concerning the relevance of specific parameters of nonlinear dynamic analysis of time series signals arising from physiological and Parkinsonian tremor.
- 4) Comparing the results from linear analysis, nonlinear analysis and demonstrated the relevance of nonlinear analysis.
- 5) Finding data, knowledge, metaknowledge on the physiological or pathological symptoms.
- 6) Deduction of new rules, including knowledge of specific parameters of the nonlinear dynamics signal diagnostic purposes in the normal and Parkinsonian tremor.
- 7) Implementing knowledge-based systems for differential diagnosis of the tremor symptoms.
- 8) Implementing knowledge-based systems for predicting outcome neuromuscular electrical Stimulation of the brain.
- 9) Estimating the vector of features for classification of Parkinsonian tremor signal.
- 10) Analyzing other parameters related to Parkinson's disease.
- 11) Improving and establishing protocols for assessing patients with Parkinsonian tremor with / without DBS, with / without medication incorporating both measurement data and relevant physiological knowledge.
- 12) Body Sensors Network for screening of PD.
- 13) EEG signal processing for PD patients.
- 14) Deep Learning and Machine Learning Tools using for early identification of Parkinson's disease.
- 15) Non-invasive rehabilitation of PD patients using music, dance and poetry.
- 16) Other Topics.

Special Session Organizer:

Assoc.Prof. PhD **Oana Geman**

Health and Human Development Department

“Stefan cel Mare” University of Suceava, Romania

Email: oana.geman@usm.ro



Oana Geman is Medical Bioengineer and PhD in Electronics and Telecommunication (Title of Doctoral Thesis: “Contributions To Knowledge-based Systems Using Nonlinear Analysis, With Medical Applications;” 2005) and a post-doctoral researcher in Computer Science (2012). She is currently an Associate Professor at the Human and Health Development Department at University of Suceava, Romania and obtained Habilitation in Electronics and Telecommunication Field. Within the past five years she published 8 books, has published over 76 articles (55 articles in ISI Web of Science journals, 15 articles in ISI indexed conference volumes as main author, and 6 papers in Q1 and Q2 Journals, with FI over 30), and her various works have been cited over 750 times, and H-index is 15. She served as Chair of many International Conferences or Organizer, Session Chair and member in Program or Technical Committees and a Member IEEE. She has been a director or a member in 10 national and international grants. Her current research interests include: non-invasive measurements of biomedical signals, wireless sensors, signal processing, and processing information by way of Artificial Intelligence such as

nonlinear dynamics analysis, stochastic networks and neuro-fuzzy methods, classification and prediction, Data-Mining, Deep Learning, Intelligent Systems, Bioinformatics and Biostatistics and Biomedical Applications. Current work focuses on identifying ways to contribute to the understanding of the role and predictive power of specific neural circuitries in the occurrence of neurological disorders and rehabilitation or other Biomedical Applications. She is a reviewer of many top journals, including IEEE Transactions, IEEE ACCESS, IOT Journal, Sensors, and Symmetry etc.



Diana-Roxana Izdrui is an Engineer and a Ph.D. student at the University of Suceava in cotutelle with ISCTE – Instituto Universitario de Lisboa, studying Electronics. She has a MSc degree (2020) in Applied Electronics at Technical University of Iasi. Her studies in Applied Electronics systems for Parkinson’s disease during college (BSc thesis: “Optical Sensors Network with Applicability in Intelligent Clothing”, continued by the MSc thesis: Optical Sensors for Intelligent Clothing”) brought her together with the others in this project. Current areas of interest and focus are identifying and creating a complete system of early diagnosis of Parkinson’s disease, intelligent systems which will be able to communicate with the environment and which does not disturb the wellbeing of the wearer, as well as new methods of rehabilitation through dance, music or poetry. She’s also interested in how arts, and poetry especially, influences the self-confidence and the behavior of the Parkinsonian patients. Neuroscience and trying to bring something good in the world with her work have always been two things that fascinated her the most.



Simona Nastase is Clinical Psychologist and a PhD student in Neurolinguistics with a background in the arts. She is interested in non-invasive and creative interventions for social anxiety and neurodegenerative diseases. Simona has a Master in Clinical Psychology from University Babes Bolyai, Cluj Napoca. Her current interest in research is on social anxiety and depression and the potential of interventions based on acting and improvisation as a treatment for subclinical cases. Also she has an interest in binaural beats used for enhancement in attention and memory and also in Virtual Reality and serious games used for rehabilitation and neuroplasticity.