



**ЗБОРНИК АПСТРАКТА И ПРОГРАМ  
65. КОНФЕРЕНЦИЈЕ ЕТРАН и 8. КОНФЕРЕНЦИЈЕ ИЦЕТРАН**

**Proceedings of Abstracts and Program  
8<sup>th</sup> Conference IcETRAAN in conjunction  
with the 65<sup>th</sup> ETRAN Conference**

**Етно село Станишићи, Република Српска, 8 - 10. септембра 2021. године  
Ethno Village Stanišići, Republic of Srpska, 8 - 10, September, 2021**

**IcETRAAN**

Електроника  
Телекомуникације  
Рачунарство  
Аутоматика  
Нуклеарна техника

# **ЗБОРНИК АПСТРАКТА И ПРОГРАМ**

**65. КОНФЕРЕНЦИЈЕ ЕТРАН**

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Београд, август 2021.

Electronics  
Telecommunication  
Computers  
Automations  
Nuclear Technique

## **Program and Abstracts**

8<sup>th</sup> International Conference on Electrical,  
Electronic and Computing Engineering

**IcETRAN 2021**

In conjunction with the 65<sup>th</sup> annual meeting  
of ETRAN Society

Etno willage Stanišići,  
Republic of Srpska, Bosnia and Herzegovina  
September 8 - 10, 2021

Belgrade, August 2021

### BT11.3 A MEASURE OF SPASTICITY BASED ON THE EXPONENTIAL FIT OF THE KNEE JOINT TORQUE ESTIMATED FROM THE GONIOGRAM DURING THE PENDULUM TEST

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Dejan B. Popović, Serbian Academy of Sciences and Arts, Serbia and Aalborg University, Aalborg, Denmark*

Pendulum test is a method to quantify the spasticity. We used the goniogram recorded during the pendulum test to estimate the knee joint torque based on the model which considers spastic reflex activity. We fitted the exponential curve  $T_h = ae^{-bt}$  to the estimated knee joint torque to calculate the parameters  $a$  and  $b$ . We compared the scaled value  $\log a/b$  with the modified Ashworth score. We used 8 sets of data collected in a clinical study with six complete paraplegic subjects. The comparison shows that the ratio  $a/b$  correlates with the MAS scores; thereby, can be used as a measure of spasticity. The advantage of using the ratio  $a/b$  is that this score is not rater dependent and that the scores are real numbers compared the MAS scores; thereby, providing better resolution of the level of spasticity.

### BT11.4 MULTIPLE MEASUREMENTS BY A PENDULUM TEST IMPROVE THE SPASTICITY ASSESSMENT IN SCI SUBJECTS

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Radoje Čobeljić, Clinic for Rehabilitation "Dr Miroslav Zotović", Serbia  
Slađana Kostić-Smith, Serbia  
Lana Popović Maneski, Institute of Technical Sciences of the Serbian Academy of Sciences and Arts, Serbia*

We present the variability of the spasticity scores during three consecutive days using the case series clinical study data with spinal cord injured (SCI) subjects. We assessed the spasticity by the Pendulum Test (PT) and Ashworth Scale (AS) scores. We measured the spasticity on the three consecutive days before and after the period of the treatment. Three subjects with SCI participated in the study. We found large variability from day to day. The PT score had more significant variability compared with the AS. The results suggest that the three consecutive testing by using the pendulum test and PT score on different days provide a better assessment of spasticity being essential in evaluating the treatment protocol

### BT11.5 PROOF OF CONCEPT PLATFORM OF AN ELECTROTACTILE BRAIN COMPUTER INTERFACE

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The aim of this paper is to present the concept and feasibility test of an electrotactile BCI platform consisted of EEG device, electrical stimulation device of nerves/muscles and custom software platform for device control. The developed application comprised GUI for device settings and synchronization of signal acquisition and stimulation control. Experiments for validation of the platform included transcutaneous electrical stimulation at 2 positions on the forearm for inducing somatosensory evoked potentials in the EEG signals in parallel with the tactile attention task performed by the subject. Initial results show that we were able to successfully acquire SEP with our system and that the tactile attention task modified SEP components in a physiologically congruent manner.