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Prof. Dario Farina

## BFNT Lecture

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# MOTOR NEURAL PROSTHESES FOR MOTOR SUBSTITUTION AND RESTORATION

Prof. Dejan B. Popović  
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Department of Health Sciences and Technology, Aalborg University,  
Denmark

Friday 9<sup>th</sup> of September, 2011  
10:30 am

Von-Siebold-Str. 4, 37075 Göttingen  
Hörsaaleingang L04  
Seminarium L04

Prof. Dejan B. Popović  
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## Summary

This presentation sheds light on several issues that are being explored to optimize the application of electrical stimulation in a motor neural prosthesis (MNP) for the restoration of movement in humans with paralysis. Although several MNPs are commercially available, there are still bottlenecks that prevent this technology from being regularly used for neurorehabilitation or an orthosis in daily life.

The widening of these bottlenecks requires the following research results: 1) How to selectively access neural pathways in the peripheral and central nervous systems; 2) How to functionally induce inhibition of neural pathways; 2) How to integrate artificial control into the preserved biological control; 3) Which sensors are the most appropriate for artificial and natural exteroception and proprioception; and 4) How to improve communication between the user and the MNP. Some of these research activities benefit from the development of micro- and nanotechnologies, the availability of biocompatible materials, wireless communications and powerful microcontrollers, but others need convincing results from both basic and clinical works that involve humans with special needs.

### **Short CV**

Dejan B. Popović received the Dipl.Eng. in electrical engineering, the M.Sc. degree in solid state physics, and the Ph.D. degree in biomedical engineering from the Faculty of Electrical Engineering, University of Belgrade, Belgrade, Serbia, in 1974, 1977, and 1981, respectively. In June 2003, he obtained the Dr. Techn. degree from Aalborg University, Aalborg, Denmark. He is a Professor of Rehabilitation Engineering and codirects the Laboratory for Rehabilitation Engineering, Center for Sensory Motor Interaction, Department of Health Sciences and Technology, Aalborg University, Aalborg, Denmark. He is also a Professor of Biomedical Engineering at the Faculty of Electrical Engineering, University of Belgrade, Belgrade, Serbia, where he heads the Group for Biomedical Engineering and Technologies. His current research interests include motor control, rehabilitation of movement, and medical instrumentation. He is the author or coauthor of more than 350 articles published, out of that more than 60 in high impact journals and three reference books related to neural prostheses. He holds several patents. From 2009, he is a member of Serbian Academy of Sciences and Arts.