

Neural engineering: integration of life sciences and technology

D. Popović^{1,2}

¹University of Belgrade, Faculty of Electrical Engineering, Serbia

²Aalborg University, Department of Health Science and Technology, Denmark

Abstract

Neural engineering is a discipline which connects computational and experimental neuroscience, neurology, electrical and computer engineering related to the interfaces between living neural tissues and machines. Neural engineering comprises robotics, cybernetics, computer engineering, neural tissue engineering, micro and nanotechnology, etc.

The main task of neural engineering is the restoration and augmentation of human functions by integrating the sensory-motor system and artificial devices.

One direction of the neural engineering research relates to the coding and processing of information of the sensory-motor mechanisms in the nature. Since there is a major alteration of these mechanisms in the pathological state, the research addresses both the healthy and impaired sensory-motor systems. Another direction of neural engineering is related to the cell and membrane characteristics with the intention to replicate those and create life. Other research concentrates more on investigation by experimentation, including the use of neural implants connected with external technology.

In this presentation the brain machine and brain computer interface will be discussed. The challenges and the limitations of the systems available will be discussed from both physiological and technological aspects. The technology which will be discussed includes implantable and surface electrodes, and possible use of magnetic sensors as means of the acquisition of the signals of interest.