The use of a failure detection algorithm as input for improving balance in normal subjects and patients

Contact: Prof. M. Van Hulle
Laboratorium voor Neuro- en Psychofysiologie Campus Gasthuisberg, O&N2, 3000 Leuven
E-mail: marc.vanhulle@med.kuleuven.be

Human balance control is always performed in a dynamic environment. This means that the central nervous system (CNS) must routinely compensate for perturbations, both predictable and unpredictable. These compensations can take the form of feed forward (predictive) or feedback (reactive) control. Intuitively it’s understood what is meant by ‘loss of balance’ (LOB), yet, how and when the CNS decides in quantitative terms that a loss of balance is in process is not well understood. There is evidence that LOB is the result of a control error signal anomaly that happens a short time before the LOB occurs.

The purpose of this thesis is to come up with 1) a model based adaptive controller and failure detection algorithm representing the CNS decision making system during an anterior/posterior and lateral balancing test and 2) to use information from the failure detection algorithm as input for improving balance in normal subjects and patients with balance disorders.

Possibly used technology for measurements:

http://www.tekscan.com/medical.html
http://www.medicredit.ro/data/cat_113/prod_841/Placa_Balans_pdf_1.pdf?mediCredit=6b48e04152c0d6996ca1e5be147bb8f

References (advised literature):


Required skills:

Programming in Matlab or alike
Basic knowledge adaptive/control systems
Interest in clinical applications

**Workload**
60 % data analysis
20 % programming
20 % literature

**Number of students**
1 (or 2)

Daily supervisor: Jo Van Vaerenbergh ([jozef.vanvaerenbergh@med.kuleuven.be](mailto:jozef.vanvaerenbergh@med.kuleuven.be))
Supervisor: Marc M. Van Hulle ([Marc.VanHulle@med.kuleuven.be](mailto:Marc.VanHulle@med.kuleuven.be))