

THESIS G-SCOP 2020

Title: **Frugal engineering for postural balance measurement**

Supervisor : : Guillaume Thomann, Maître de Conférences, HDR

Phd school : IMEP2

2020

Financements envisagés – Contexte – Partenaires éventuels : Financement bourse ministérielle, via l'école doctorale IMEP2

Brief Description :

Recent discussions with teachers and researchers in the physiotherapy field made possible to understand the advantages and disadvantages of the postural balance measurement system currently developed at the G-SCOP laboratory. The subject of this Ph.D. thesis is to mobilize the current experiences of researchers from the Collaborative Design team of the G-SCOP laboratory to propose an innovative system allowing an efficiency diagnosis of postural balance and which can therefore also be used for the phase of treatment using biofeedback for example. A Frugal engineering has to be used to answer requirements from researchers and teachers from the physiotherapy field. This innovative system could integrate (1) a precise observation of the ankles and hip of the patient for his strategy of balance, (2) a synchronization of several movement sensors allowing a reliable dynamic analysis, thus freeing himself from a force platform, (3) a real-time digital visual feedback of the patient and the evolution of his Center of Mass (CoM) in relation to the patient's equilibrium polygon, and (4) a means of carrying out in-depth support for a patient in the time by the practitioner.

Skills requested from the doctoral student

- A good technological basic knowledge particularly on force sensors, motion sensors
- Knowledge of signal processing and experimental command and control interface (Labview / Matlab for example)
- Statistical analysis and data processing tools
- Knowledge of anatomy or biomechanics would be a plus
- Knowledge would be appreciated in user-centered design and frugal innovation design methods and tools

- All researchers must be able to carry out quality bibliographic studies and analyzes of this research
- A good level of English is necessary

Contact(s) :

Guillaume Thomann, Maître de Conférences, HDR
Laboratoire G-SCOP, équipe Conception Collaborative
guillaume.thomann@grenoble-inp.fr
tel. 04 76 82 70 24