icteam

Secteur des Sciences et Technologies

UCLouvain

Invitation à la soutenance publique de thèse de

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Master ingénieur civil mécanicien à finalité spécialisée

Pour l'obtention du grade de Docteur en sciences de l'ingénieur et technologie

« Short- and long-term adaptation of grip dynamics and arm kinematics to novel gravito-inertial environments. »

qui se déroulera
le jeudi 30 septembre 2021 à 16h15
Auditoire BARB93
Place Sainte Barbe
1348 Louvain-la-Neuve

During object manipulation on Earth, muscular activities reflect an anticipation of the force of gravity. These loads must be compensated for or can be used to save muscular effort as well as to improve limb position sense. Furthermore, the gravitational vector constitutes a very important reference axis for spatial orientation. Given the promising future of Space exploration, a good understanding of the role played by gravity in sensorimotor control and of how the central nervous system adapts to novel gravito-inertial backgrounds is crucial. In this thesis, we study the dynamics of finger forces and the kinematics of the arm during object manipulation in humans exposed to such altered gravito-inertial environments. We first explore the coordination between arm movements and finger forces in Mars, Moon and micro- gravity during parabolic flight maneuvers. We then study sensorimotor coordination in upright and upside-down participants on the ground to test the contributions of body-centered and gravity-centered reference frames to upper-limb motor control. Finally, we study sensorimotor coordination in astronauts and observe that finger forces are finely tuned to object properties and to movement-induced inertial loads, both on the ground and in the weightless environment of the International Space Station. However, gravity appears to be critical to maintain movement accuracy in the absence of vision. These works contribute to our understanding of how gravity is accounted for during motor planning and control and of the impacts of novel gravito-inertial contexts on upper-limb motor control.

Jury members :

Prof. Philippe Lefèvre (UCLouvain), supervisor
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Prof. Roland Keunings (UCLouvain), chairperson
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