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| ***School/Department:*** | ***Department of Neurosciences*** |
| ***Supervisor information:*** | ***Dr. P.A. Forbes, PhD and Prof. M.A. Frens***   * ***Email:***[*p.forbes@erasmusmc.nl*](mailto:p.forbes@erasmusmc.nl) *;* [*m.frens@erasmusmc.nl*](mailto:m.frens@erasmusmc.nl) * ***Website:***[*http://www.neuro.nl*](http://www.neuro.nl) * ***Personal Grants:*** * *Dutch Scientific Organization Grant (VIDI, Top Talent, VENI), 2017, 2019, 2021* * *ESA Parabolic Flight Campaigns, 2016, 2017, 2018* * *European Research Commission (Marie Sklodowska-Curie Action), 2014* * *National Science and Engineering Research Council (Canada), 2013* * *Nissan Motors, 2013* * ***Most important publications:*** * **eLife**, 2021, doi: 10.7554/eLife.65085 * **Scientific Reports**, 2021, doi: 10.1038/s41598-021-93037-7 * **Journal of Neuroscience**, 2020, doi: 10.1523/JNEUROSCI.1463-19.2020 * **Annals of Neurology**, 2020, doi: 10.1002/ana.25679 * **Nature Communications** 2019, doi: 10.1038/s41467-019-09738-1 * **Journal of Physiology**, 2019, doi: 10.1113/JP278642 * **Frontiers in Physiology**, 2019, doi: 10.3389/fphys.2019.00476 * **eNeuro**, 2018, doi: 10.1523/ENEURO.0170-18.2018 * **Handbook of Clinical Neurology**, 2018, doi: 10.1016/B978-0-444-63916-5.00004-5 * **Journal of Physiology**, 2017, doi: 10.1113/JP272614 * **Journal of Neuroscience**, 2016, doi: 0.1523/JNEUROSCI.1902-16.2016 |
| **Project Title:** | **Neuromechanical principles underlying the multiaxial control of human balance** |
| ***Abstract:*** | *Upright balance is a continuous struggle against Earth’s gravitational pull. Our vertical posture is inherently unstable and must be balanced within a small base of support. Any difficulties in maintaining upright balance puts us at risk of serious injuries due to falls, bringing personal, societal and economic burdens that will continue to increase without a comprehensive understanding of the mechanisms underpinning standing balance. Ongoing balance control relies on complex interactions between our body’s biomechanics and the neural (sensory, motor and cognition) systems contributing to standing. For example, the brain must account for the fact the muscles generating torque around our joints often cross axes, meaning that any passive/active muscle tension influences joint torques in multiple directions (i.e. cross-talk). While these biomechanical and neural factors of balance have intrigued researchers for decades, methodological difficulties in unraveling their interactions provides an incomplete picture of how the brain controls standing. The long-term aim of our research is to disentangle these biomechanical and neural contributions to standing balance by combining robotic simulation, human neurophysiology (EEG/EMG), computational modeling and sensory stimulation to push the field passed these obstacles. This project will determine how biomechanical and neural factors along our two primary axes of balance are coordinated to maintain balance, establishing whether cross-talk between their control impedes or enhances our adaptation to the daily challenges of balance. In addition, this project will reveal how sensory and motor cues of balancing self-motion govern the conscious perception and control during imposed sensorimotor errors. Finally, by performing experiments in healthy participants and patients (i.e. vestibular loss and cerebellar ataxia), we will directly test how disruption at different levels of balance influence the brain’s ability to adapt and learn. Overall, this innovative research will reveal causal relationships between the neural computations and compensatory responses required for balance and locomotion.* |
| ***Requirements of candidate:*** | * We are looking for a highly motivated, hardworking student to join our very international team. Our strength is in using team work to tackle large scientific questions and thus requires a student with good communication skills. * Master degree or MD. Background or experience with engineering/robotics is a plus. * Scholarship that will, at least, cover subsistence allowance and international air plane ticket (we could help with the scientific part of your scholarship proposal) * English language requirement: * *English speaking countries & Netherlands:* no requirement * *Other countries:* IELTS 7.0 *(min 6.0 for all subs)*, TOEFL 100 *(min 20 for all subs)* |

**English requirements：**

**Please refer to Erasmus University China Center official website for your information** [www.eur.nl/eucc](http://www.eur.nl/eucc)

*Erasmus University China Center -> CSC Scholarship -> “I am a prospective CSC PhD Candidate” -> Table 1*

Please note:

Each institute requires difference level of English, make sure to find the right institute. 2022 CSC-PhD programme information will be shared and updated soon!