

# Estimating qualitative parameters for assessment of body balance and arm function

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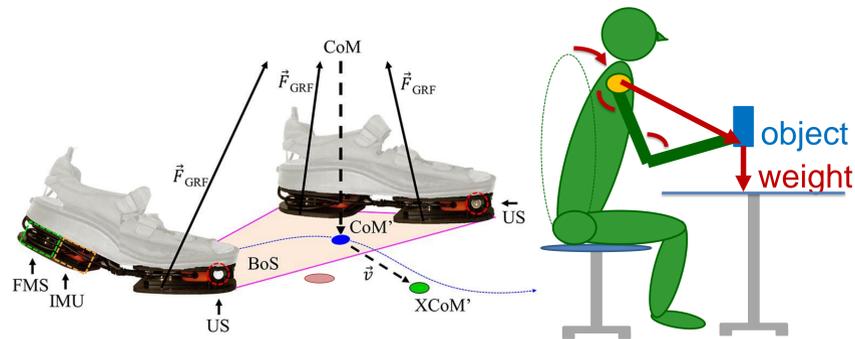
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**Objective** – monitoring capacity and performance of body balance and arm function in stroke patients during daily life.

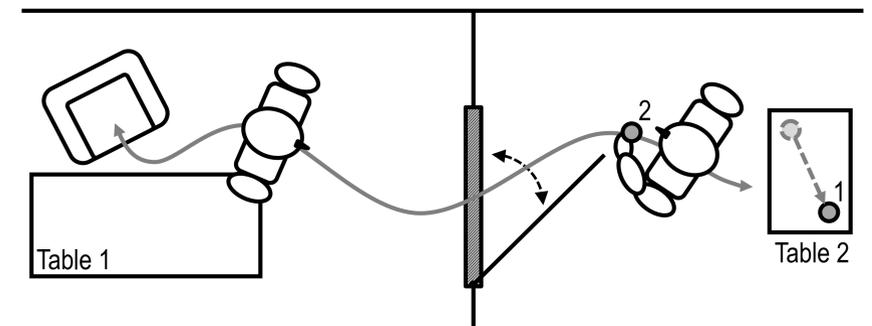
Body balance: estimating the movement of center of pressure (CoP), centre of mass (CoM), stance time and step length [1].

Arm function: estimating trunk orientation, lower and upper arm movements and deltoid muscle activity [2,3].



Qualitative parameters of balance (left) and arm function (right)

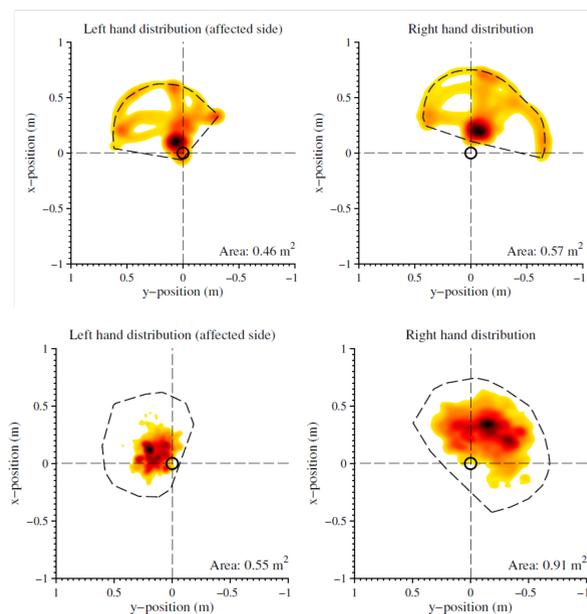
**Method** – evaluation of kinetics and kinematics using Xsens MVN Biomech and Xsens Instrumented ForceShoes™ while performing arm movements, walking 10 meters and doing a combination of tasks.



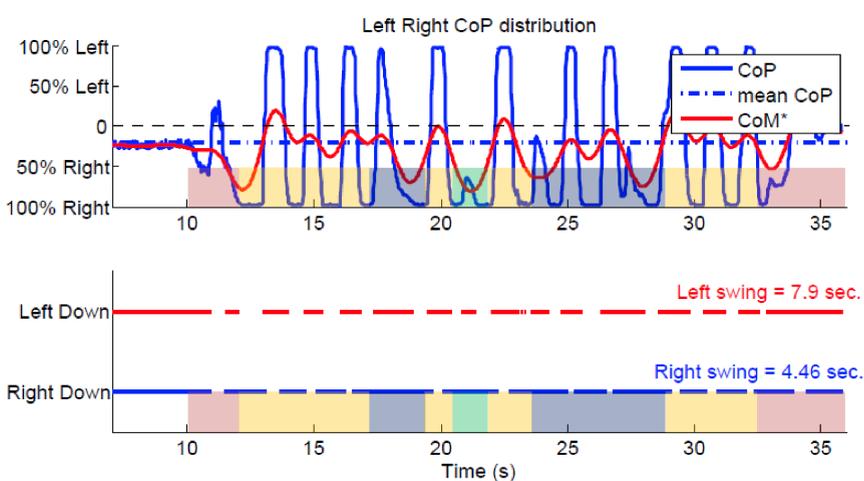
Schematic top-down overview of the simulated in-home task. Subjects start and finish at the first table (Table 1), walk along a hinged door, move the first tube (1) along the second table (Table 2) and take another tube (2) back to the first table.

## Results – Metrics and visualisation:

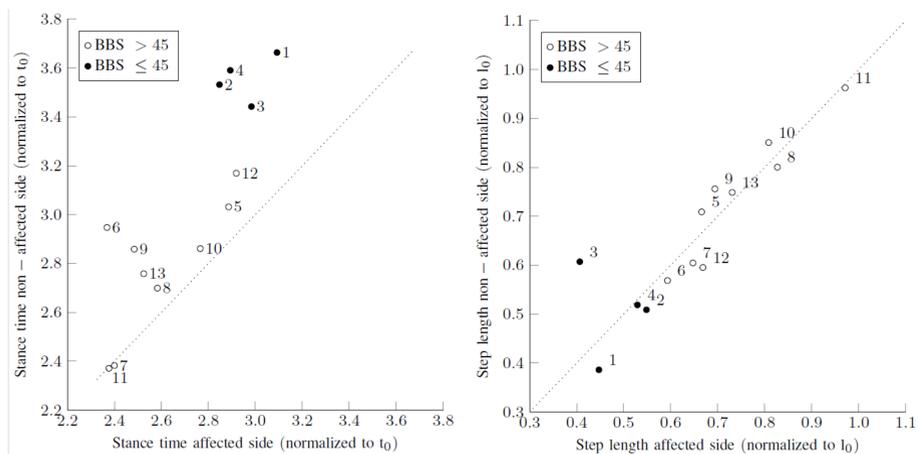
- **Man (47 yrs) left side affected, Berg Balance Scale: 53**
- **Hand Movements** – Transversal. Positions relative to pelvis. uFMA – 20/66. Upper – In clinic. Lower – in home [4]



## Walking

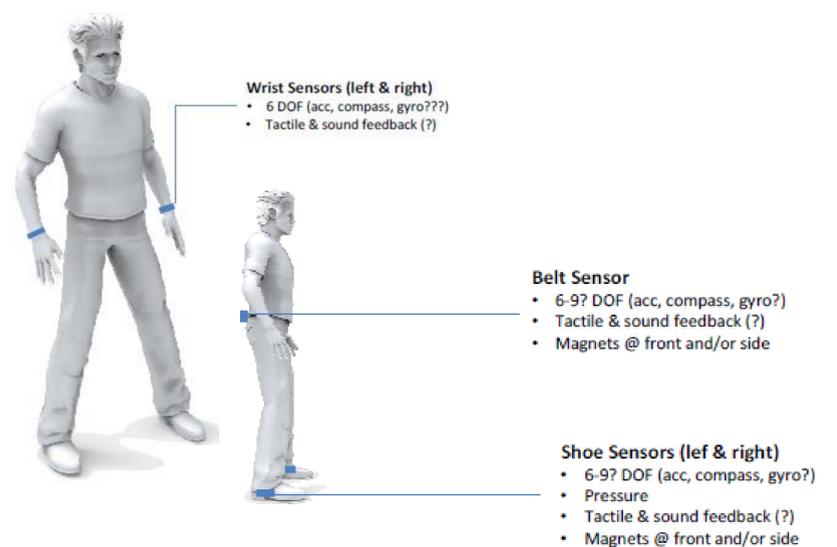


**Overall results** – Left - Mean stance time for affected vs non affected. Right – Mean step length for affected vs non affected. 13 stroke survivors during different tasks. Mean age of 63.9 (SD ± 9.0) years and 2.3 (SD ± 1.8) years post stroke



## NeuroCIMT Project 7 – Wearable Neuro Biofeedback

- Minimal Sensing Systems with Bio Feedback
  - Objective information Collection
  - Direct Real time feedback



**Conclusion** – Qualitative parameters of body balance and arm function in stroke patients can be estimated using the INTERACTION system in a simulated ambulatory setting.

## References

- [1] F. B. van Meulen et al. JNER 2016
- [2] Dewald et al. Brain, 1995
- [3] F. B. van Meulen et al. Ann Biomed. Eng, 2015
- [4] F.B. Van Meulen et al. Front Bioeng Biotechnol. 2010

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