# *RELIABILITY AND PARAMETERIZATION OF ROMBERG TEST IN PEOPLE WHO HAVE SUFFERED A STROKE.*

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AIM: To analyze the reliability and describe the parameterization with inertial sensors, of Romberg test in people who have had a stroke.
METHODS: Romberg's Test was performed during 20 seconds in four different setting, depending from supporting leg and position of the eyes (opened eyes / dominant leg; closed eyes / dominant leg; opened eyes / non-dominant leg; closed eyes / non-dominant leg) in people who have suffered a stroke over a year ago. Two inertial sensors (sampling frequency 180Hz) were placed in lumbar ($L_5$-$S_1$) and in the trunk ($T_7$). The test was performed three times for the four different settings. The outcome variables were extracted in each of the axes (X, Y, Z) (figure 1). We considered as the maximum, minimum and mean velocity and the magnitude of the angular displacement for each of the sensors (Figure 2 shows an example of direct extraction of variables). Statistical Analysis: descriptive analysis of all outcome variables for each axis and sensor. Further analysis of the internal consistency of the measure was performed by analysis interclass correlation (ICC) with a confidence interval of 95%.

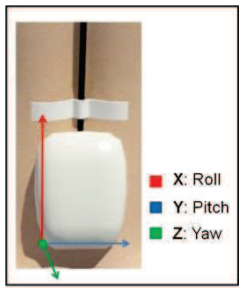
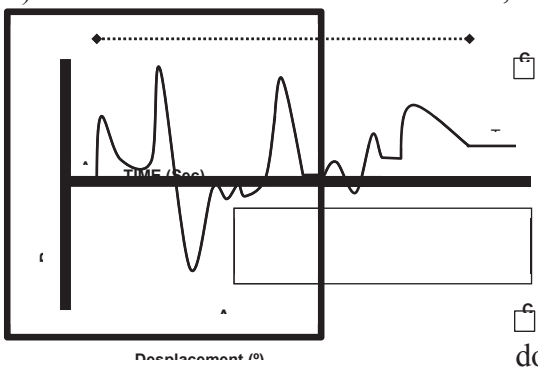


Figure 1: Axis




RESULTS: Values obtained after statistical analysis show levels of reliability ranging from 0.61 (Z axis speed - eyes closed / non-dominant leg) and 0.92 (Y axis offset - opened eyes / dominant leg). The descriptive results of all outcome variables are shown in Table 1.
CONCLUSION: Making inertial sensors in trunk and / or lumbar, inertial sensors are reliable tools for parameterizing Romberg test in different settings in people who have suffered stroke over a year ago.

| | | L1 | T1 | L2 | T2 | L3 | T3 | L4 | T4 |
|---|---|---|---|---|---|---|---|---|---|
| Displacement (º) | MAX_x | 4,88 | 5,92 | 11,54 | 7,52 | 24,7 | 12,56 | 22,66 | 25,19 |
| | Min_x | -5,64 | -2,36 | -12,25 | -13,24 | 1,07 | -2,75 | -24,39 | -18,55 |
| | Mean_x | 7.02 | 3,05 | 5,49 | -2,08 | 13,61 | 9,89 | -2,71 | 3,58 |
| | Max_y | 2,46 | 2,06 | 3,72 | 5,65 | 10,21 | 11,56 | 6,36 | 12,56 |
| | Min_y | 0,07 | -3,14 | -3,96 | -1,85 | 1,73 | 0,58 | -6,38 | -5,47 |
| | Mean_y | 2.06 | -1,28 | -0,49 | 0,06 | 4,32 | 5,29 | 1,1 | 2,87 |
| | Max_z | 4,84 | 8,12 | 14,92 | 8,46 | 3,42 | 1,98 | 19,28 | 15,73 |
| | Min_z | -6,62 | -2,25 | -3,86 | -0,45 | -13,52 | -10,36 | -18,22 | -22,63 |
| | Mean_z | -0,71 | 1,67 | 7,02 | 2,17 | -5,01 | -7,19 | 3,55 | -4,96 |
| Velocity(º/s) | MAX_x | 44,17 | 37,25 | 41,65 | 38,22 | 45,57 | 50,93 | 49,42 | 48,19 |
| | Min_x | -44,46 | -36,06 | -45,81 | -41,13 | -34,8 | -36,69 | -41,78 | -55,82 |
| | Max_y | 30,85 | 32,56 | 30,69 | 41,72 | 23,89 | 40,81 | 23,5 | 32,19 |
| | Min_y | -31,78 | -36,72 | -21,86 | -34,74 | -40,49 | -43,52 | -37,32 | -62,29 |
| | Max_z | 37,75 | 36,52 | 25.07 | 41,06 | 41,01 | 50,44 | 24,26 | 20,91 |
| | Min_z | -30,2 | -27,43 | -41,62 | -61,69 | -23,61 | -29,42 | -47,28 | -30,81 |
| | R_pos | 66.37 | 63,13 | 60,21 | 77,77 | 51,92 | 111,04 | 60,84 | 62,15 |
| | R_neg | 62,28 | 61,71 | 69,67 | 88,76 | 61,13 | 66.63 | 76,66 | 93,22 |

L1: Lumbar inertial sensor (opened eyes / dominant leg); T1: trunk inertial sensor (opened eyes / dominant leg); L2: Lumbar inertial sensor (opened eyes / non-dominant leg); T2: trunk inertial sensor (opened eyes / non-dominant leg); L3: Lumbar inertial sensor (closed eyes / dominant leg); T3: trunk inertial sensor (closed eyes / dominant leg); L4: Lumbar inertial sensor (closed eyes / non-dominant leg); T4: trunk inertial sensor (closed eyes / non-dominant leg); R_pos: positive resulting vector; R_neg: negative resulting vector