

## **CLAIMS**

1. A method for determining postural balance of a person, the method comprising a  
5 processor implemented steps of:

obtaining a skeleton data of the person using a 3D motion sensor, wherein the person is  
performing a single limb stance (SLS) exercise;

removing a plurality of noises from the skeleton data using a noise filtering module;

calculating a single limb stance (SLS) duration of the person using the skeleton data of  
10 the person;

computing a velocity profile of each joints of the person;

measuring a vibration jitter and a force per unit mass (FPUM) of the person using a joint  
movement profile of the person in 3D space, wherein the joint movement profile is different for  
each joint of the person, wherein the joint movement profile is obtained from the 3D motion  
15 sensor;

generating a vibration index based on the vibration jitter and FPUM of the person for  
each joint of the person, wherein the vibration index is an aggregated score comprising a  
vibration profile of the person for each joint of the person; and

generating a first balance score and a second balance score of the person using the SLS  
20 duration and the vibration index, wherein the first and the second balance score is indicative of  
the postural balance of the person.

2. The method of claim 1, wherein the first balance score is indicative of how much  
vibration is associated to different joint/body parts during single limb stance.

3. The method of claim 1, wherein the second balance score is indicative of the vibration in each joint in 3 dimensional space and the time duration for which the person stays in the single limb stance.

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4. The method of claim 1 further comprising validating the second balance score with respect to a standard clinical score.

5. The method of claim 4, wherein the standard clinical score is at least one of a Berg  
10 Balance Scale or a Timed up and go scale

6. The method of claim 1, wherein the SLS duration of the person is measured using an Eigen vector based curvature analysis.

15 7. The method of claim 1, wherein the plurality of noises are at least one of an electromagnetic interference, IR interference, or a quantization noise.

8. The method of claim 1 further comprising validating the measured SLS duration, vibration jitter and FPUM using a Brand-Altman plot.

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9. The method of claim 1 further comprising segmentation of the skeleton data in before the SLS exercise, during the SLS exercise and after the SLS exercise.

10. The method of claim 1, wherein the skeleton data is the measurement of the spatio-temporal variation of twenty joints of the person in the X-Y-Z coordinates.

11. A system for determining postural balance of a person, the system comprising:

5 a 3D motion sensor for obtaining a skeleton data of the person, wherein the person is performing a single limb stance (SLS) exercise;

a noise filtering module for removing a plurality of noises from the skeleton data;

a memory; and

a processor in communication with the memory, wherein the processor further configured

10 to perform the steps to:

calculate a single limb stance (SLS) duration of the person using the skeleton data of the person;

compute a velocity profile of each joint of the person;

15 measure a vibration jitter and a force per unit mass (FPUM) of the person using a joint movement profile of the person in 3D space, wherein the joint movement profile is obtained from the 3D motion sensor;

generate a vibration index based on the vibration jitter and FPUM of the person wherein the vibration index is an aggregated score comprising a vibration profile of the person for each joint of the person; and

20 generate a first balance score and a second balance score of the person using the SLS duration and the vibration index, wherein the first and the second balance score is indicative of the postural balance of the person.

12. The system of claim 11, wherein the 3D motion sensor is a Kinect sensor.

13. One or more non-transitory machine readable information storage mediums comprising one or more instructions which when executed by one or more hardware processors causes:

5 obtaining a skeleton data of the person using a 3D motion sensor, wherein the person is performing a single limb stance (SLS) exercise;

removing a plurality of noises from the skeleton data using a noise filtering module;

calculating a single limb stance (SLS) duration of the person using the skeleton data of the person;

10 computing a velocity profile of each joint of the person;

measuring a vibration jitter and a force per unit mass (FPUM) of the person using a joint movement profile of the person in 3D space, wherein the joint movement profile is different for each joint of the person, wherein the joint movement profile is obtained from the 3D motion sensor;

15 generating a vibration index based on the vibration jitter and FPUM of the person for each of the joints, wherein the vibration index is an aggregated score comprising a vibration profile of the person for each joint of the person; and

generating a first balance score and a second balance score of the person using the SLS duration and the vibration index, wherein the first and the second balance score is indicative of  
20 the postural balance of the person.

14. The one or more non-transitory machine readable information storage mediums of claim 13, wherein the first balance score is indicative of how much vibration is associated to different joint/body parts during single limb stance.

5 15. The one or more non-transitory machine readable information storage mediums of claim 13, wherein the second balance score is indicative of the vibration in each joint in 3 dimensional space and the time duration for which the person stays in the single limb stance.

16. The one or more non-transitory machine readable information storage mediums of claim 10 13, further comprising validating the second balance score with respect to a standard clinical score.

17. The one or more non-transitory machine readable information storage mediums of claim 13, wherein the SLS duration of the person is measured using an Eigen vector based curvature 15 analysis.

18. The one or more non-transitory machine readable information storage mediums of claim 13, wherein the plurality of noises are at least one of an electromagnetic interference, IR interference, or a quantization noise.

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19. The one or more non-transitory machine readable information storage mediums of claim 13, further comprising validating the measured SLS duration, vibration jitter and FPUM using a Brand-Altman plot.

20. The one or more non-transitory machine readable information storage mediums of claim 13, further comprising segmentation of the skeleton data in before the SLS exercise, during the SLS exercise and after the SLS exercise.