**Instructions for Dataset accompanying publication "** *Is intermittent control the source of the nonlinear oscillatory component (0.2-2Hz) in human balance control?*"

This dataset supports the following publication:

**Manuscript**: Is intermittent control the source of the nonlinear oscillatory component (0.2-2Hz) in human balance control?
**Manuscript DOI**:
**Manuscript ID**:
**Publication**: *IEEE Transactions on Biomedical Engineering*

Please read the publication for full details.

In summary, the data includes 68 trials from 14 healthy participants. Using the whole body mover, as reported in the paper, each participant attempted five 250s trials in randomized order including eyes open unstable (EO US), eyes closed unstable (EC US), eyes open stable (EO S), eyes closed stable (EC S), lower amplitude disturbance eyes open unstable (L EO US).

The data includes the experimental signals (input disturbance *d*, myoelectric control signal *ue* and the system output (position) *y,* raw EMG), transfer functions for the external and neuromuscular system, and trial descriptors required for readers to investigate the experimental data using their own methods and models. The dataset also includes MATLAB code for the cost function to enable readers to compare their own results with those reported in this publication.

**Experimental DataSet.**

The data file ‘DataAccompanyingPaper.mat’ can be opened using MATLAB.

This file contains the experimental data from all trials in a structure variable DATA which includes the following fields.

Condition: 68 x 1 cell, [(EO US), (EC US), (EO S), (EC S), (L EO US)]

Participant: 68 x 1 cell, (Subject 1, Subject 2 …)

ExternalSystem: state space and transfer function forms for (experimental control input *ue* to output *y*)

NeuromuscularSystem: state space and transfer function forms for model control input *u* to experimental control input ue and also for recorded rectified, scaled, summed muscle activity to myoelectric output

Please will you cite both the source publication (DOI: …) and the dataset (DOI: […](https://doi.org/10.23634/MMUDR.00624643)) for any publication using this dataset.

Alld: 1 x 68 cell, Input disturbance *d* in Volts. Positive indicates pushing the WBM forwards. This disturbance is zero referenced. In addition to this disturbance a small constant, forward disturbance was applied to require tonic activation from the calf muscles.

Ally: 1 x 68 cell, System output (position) *y* in Volts. Positive indicates forward angle from vertical of WBM.

Allu\_e: 1 x 68 cell, Experimental control *ue* signal in Volts. This is the output of the myoelectric interface and was the human generated control signal used to control the whole body mover (WBM).

AllyDeg: 1 x 68 cell, system ouput (position) *y* in Degrees. Positive indicates absolute forward angle from vertical of WBM.

timestep: timestep (0.01s) for all the above signals. In real time operation the timestep was 0.001s, however, data was down sampled to timestep 0.01s prior to saving for analysis.

AllrawEMG: 1 x 68 cell. Each cells contains a four column matrix. Columns represent raw EMG from 1. Right Tibialis Anterior, 2. Right Calf (boundary of Gastrocnemius medialis and soleus), 3. Left TA, 4. Left Calf.

EMGtimestep: timestep (0.001s) of raw EMG data.

**Code for Cost Function**

The folder ‘FilesToPublish’ contains the MATLAB script ‘RunCostFunctionExample.m’. This script runs the function ‘evaluateCostFunction’ which reproduces the cost function used in this paper. Necessary sub-functions are included in the folder. Example data to run the script is stored in the file ‘Examples.mat’.

This script and functions run with MATLAB 2020a, and may require modification for other versions of MATLAB. The reader will need to modify the path for the folder in line 5 of the script ‘RunCostFunctionExample.m’.

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