

# Homework 1

February 03, 2017



## Objective

The data set is available at <https://osf.io/c42cn/>

The description of the data set is available here - <https://osf.io/c42cn/wiki/home/>

You should perform quality control on the following data channels:

- BR
- HR
- peda
- pp
- RES

All these channels hold signals, either physiological signals (e.g., heart rate | HR) or driving performance signals (e.g., speed - included in the RES set). With the exception of the pp signal, which has been pre-cleaned, all other signals represent raw sensory output and need to be checked before curated. You should consider using the following methods in the quality control process:

Draw one figure with two columns for each data channel. The left column panel should have the raw signals, as these acquired by the data bank. The right column should have the clean signal set, after applying the quality control checks. These checks should primarily (but not exclusively) depend on the nominal ranges defined in the sensor specification documents. For example, the nominal range of the peda sensor is between 10 KOhm and 4.7 MOhm. Hence, your code should check each signal and if it finds at least one value outside this range, should label this signal as suspect and exclude it from the clean set, to be depicted in the right column.

There are some cases where values outside the nominal range are due to known sensor hypersensitivity rather than bad placement. In such cases, these values should be replaced with correct values or NA, and the rectified signal should be kept. Cases in point are negative values in some acceleration signals. An addendum gives information about all these and more.

Finally, there are some cases where all the signal values are within the nominal range, but the form of the signal manifests drifting problems, and thus the signal needs to be discarded. A case in point is certain heart rate signals, where the intensity keeps increasing monotonically – a sign that the sensor is in friction with the subject's body.

## Submission

- The homework should be submitted on BlackBoard by 11:59pm Thursday, February 23, 2017.
- The homework report should be a pdf generated in Latex with figures from R only.
- Zip your code/documents and submit to blackboard. Name your zip file “**HW1TeamX**” (replace X with your team number). One submission per group.
- All the figures and plots should have appropriate labels, titles and annotations.
- The code should be provided in the Appendix section
- No extensions are allowed for the homework.

## Grading

Total points **125pts** i.e., **25pts for each channel**

## Extra Credit

[+10] Use Latex for the generating PDF of your report.