

Digital Signal Processing - DSP
(PDS - Processamento digital de Sinais)
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Biomedical signal processing

This work is about the *electrooculogram* (EOG) signal. This signal measures the electric potentials that are generated by the movements of the eye. It is obtained by placing electrodes on either side of the eyes or above and below them as show in Figure 1. A typical EOG signal is shown in Figure 2.

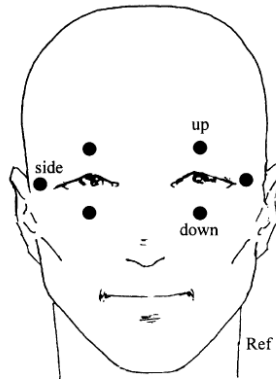


Figure 1: Electrode placement for EOG recording

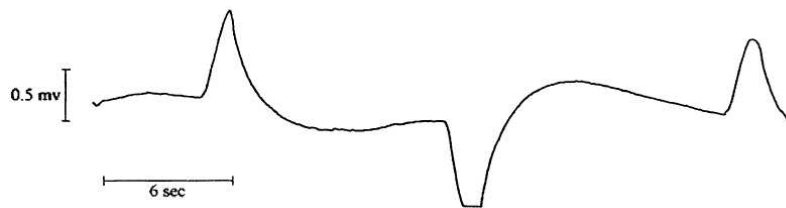


Figure 2: EOG obtained from movement of eyes from left to right.

The EOG signal used in this work was obtained from lateral movements of the eyes and the goal is to process it to remove the noise and estimate the velocity and direction of the movements. The processed signal can be used for monitoring or command purposes and therefore, the algorithms must be prepared to deal with infinite and causal signals, which means, real time processing.

1. Load the eogSig.mat matlab file and visualize the eog and also the signal t which shows the time instants when a command to move the eyes was given.
2. Remove the EOG noise by choosing an appropriate linear filter.

3. Remove the DC component of the signal using a moving window.
4. From the filtered signal propose an algorithm to estimate the direction and velocity of the eye movement, which can be used, for instance, to control the movement and position of a computer mouse or a robotic moving platform.