

Electronic depth control with Neuroprobes microarrays

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We have developed electronic depth control software for managing intracortical microprobes designed by the Neuroprobes consortium for in vivo extracellular recording of neurons. The microprobe arrays contain a large number (up to 8208) of electronically switchable electrodes to enable the precise positioning of each electrode contacts with respect to individual neurons. Recorded signal quality may degrade over time due to tissue drift, cell expiration, inflammation and reactive gliosis among others. Hence, there is a need for (re)selecting the electrodes which are most informative about the firing activities of the cells. In our case, we don't move the array mechanically, but using electronics to select the 'best' electrodes for recording along each shaft, based upon a signal quality metric. In the software there are two different methods to select the electrodes. Either, the user directly selects the electrodes manually, or starts an additional signal quality scan to give assistance in the electrode selection (semi-automatic mode). In the latter case results of the signal to noise computations are visualized by color-coding. The software is suitable for manipulating all versions of Neuroprobes microarrays (2mm, 4mm, 8mm length). Finally, the selection is sent to the hardware controller by a defined protocol. In addition the software provides a graphical user interface and integrates the components for data acquisition, signal processing, and communication with the hardware controllers and for storing the neural signals for further analysis.