

Digital Filter on FPGA for Subcellular Resolution Electrophysiology using a High-Density CMOS-based Microelectrode Array – Supplementary Material

Maximilian Ell ^{a*}

^a Institute of Biomedical Electronics, Faculty of Electrical Engineering and Information Technology, TU Wien, Vienna, Austria

E-Mail: maximilian.ell@tuwien.ac.at

ORCID: <https://orcid.org/0009-0009-6824-3045>

Ahmet Büyükakyüz ^a

^a Institute of Biomedical Electronics, Faculty of Electrical Engineering and Information Technology, TU Wien, Vienna, Austria

E-Mail: ahmet.bueyuekakyuez@tuwien.ac.at

ORCID: <https://orcid.org/0009-0003-6439-124X>

Paul Werginz ^a

^a Institute of Biomedical Electronics, Faculty of Electrical Engineering and Information Technology, TU Wien, Vienna, Austria

E-Mail: paul.werginz@tuwien.ac.at

ORCID: <https://orcid.org/0000-0002-3441-3167>

Günther Zeck ^a

^a Institute of Biomedical Electronics, Faculty of Electrical Engineering and Information Technology, TU Wien, Vienna, Austria

E-Mail: guenther.zeck@tuwien.ac.at

ORCID: <https://orcid.org/0000-0003-3998-9883>

*** Correspondence:**

Günther Zeck

guenther.zeck@tuwien.ac.at

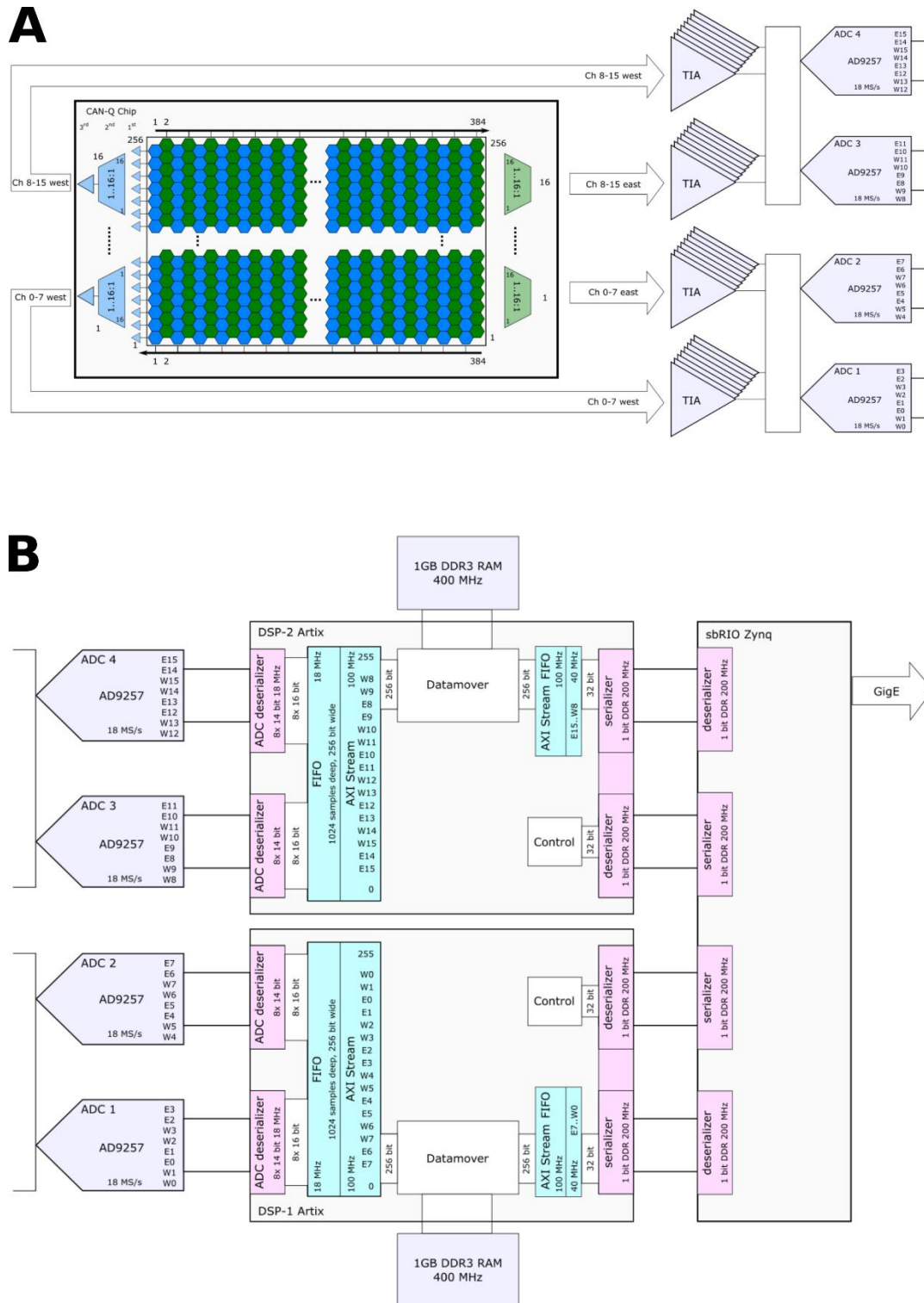
Gusshausstrasse 27-29

1040 Vienna

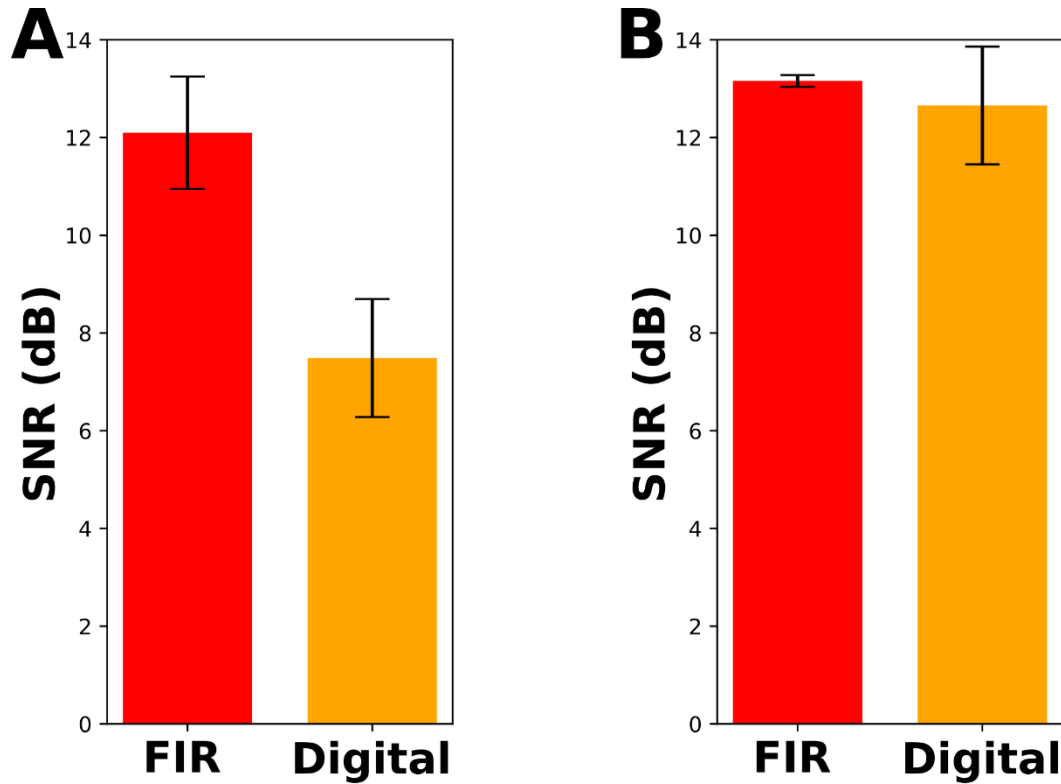
Austria

Tel.: +43 1 58801 363100

Supplementary Material



Supplementary Figure S1: **Block scheme of signal flow of the CAN-Q Station.** The voltage is recorded by the CMOS MEA System. The ADCs on the CMOS MEA System enable the conversion of real-world analog signals (i.e., voltage) from the biological tissue into digital data that can be processed by the FPGA.



Supplementary Figure S2: **Comparison of spikes' signal-to-noise ratio (SNR) before and after filtering.** (A) The signal-to-noise ratio (SNR) of detected spikes before filtering (i.e., raw data) was 12.1 dB, and of the digital filter 7.5 dB; error bars indicate the standard deviation (FIR filter: 1.1 dB, digital filter: 1.2 dB). (B) SNR of detected spikes after FIR-filtering the data was 13.2 dB, and after the digital filter 12.7 dB; error bars indicate the standard deviation (FIR filter: 0.12 dB, digital filter: 1.2 dB).