ETH zürich

RISC-V®

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RISC-V Edge Inference for Real-Time Eye-Movement Control on GAPses Smart Glasses

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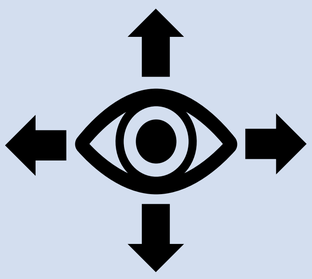
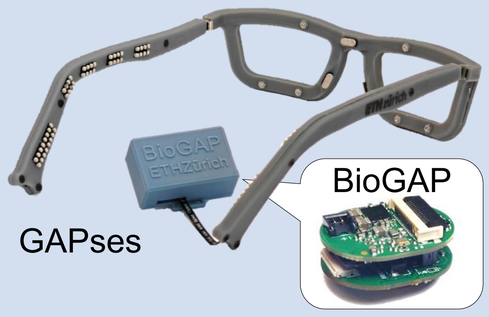
Pipeline

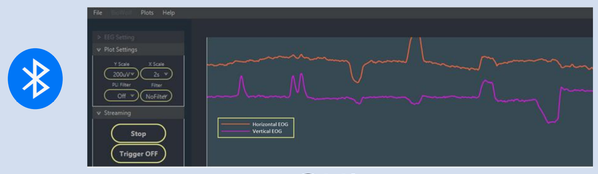
EOG from Eye Movements



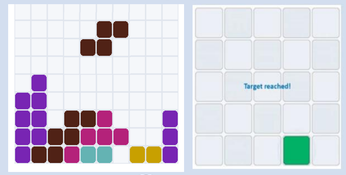
Acquisition and Processing Platform



HMI Interface in host PC

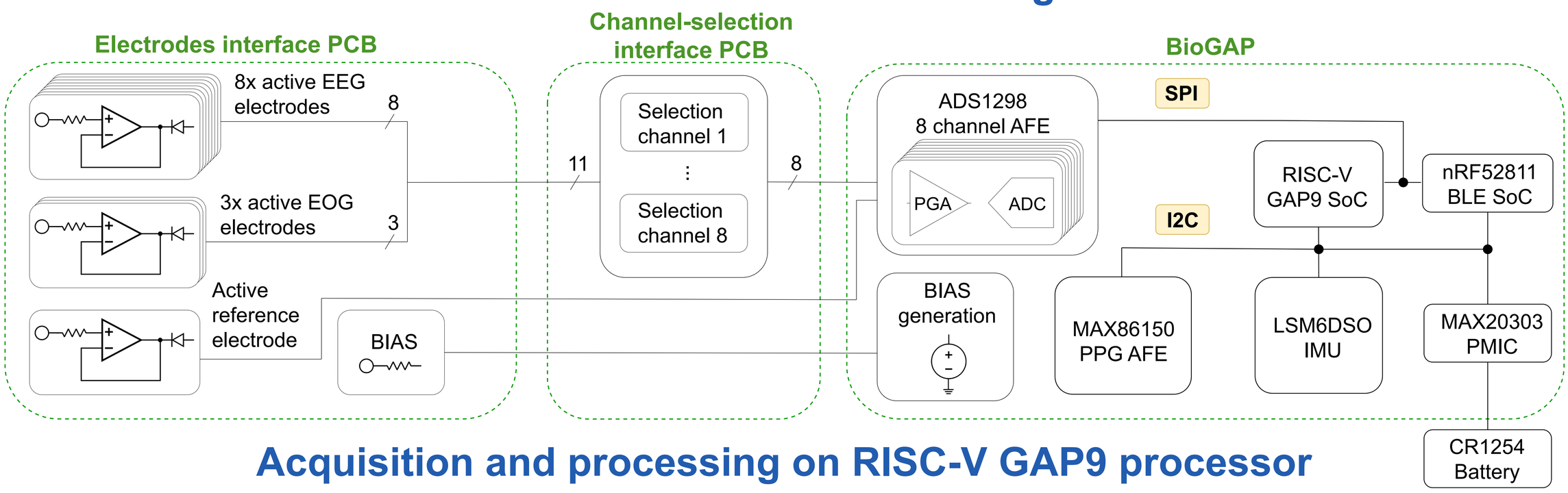


GUI



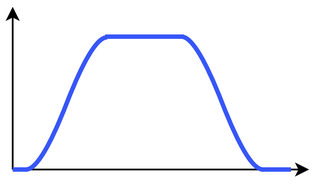
Games

GAPses and BioGAP Block Diagram



Acquisition and processing on RISC-V GAP9 processor

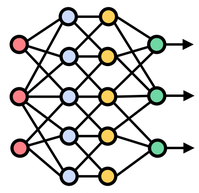
EOG acquisition → BP filtering → Ver. and hor. EOG computation → Edge inference on GAP9 → Classification output

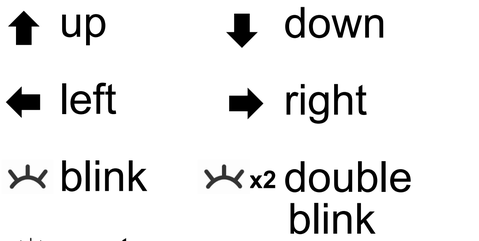


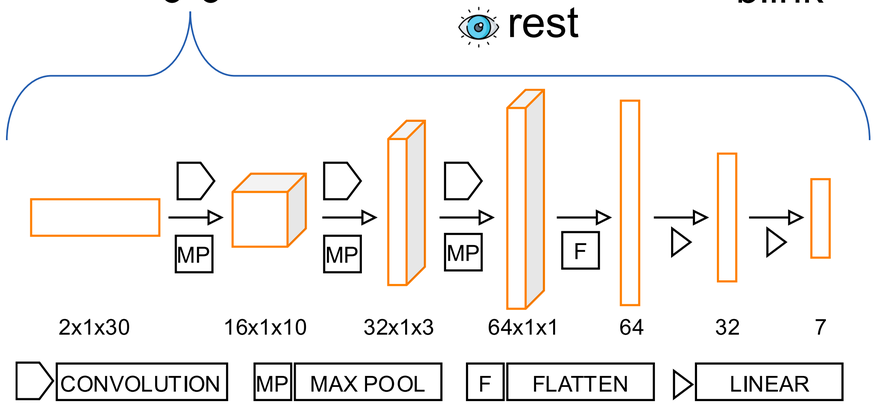
$$V_V = V_C - \frac{(V_R + V_L)}{2}$$

$$V_H = V_R - V_L$$

CNN







- EOG-based **human machine interface** task reaching an accuracy of 96.78% and an **information transfer rate of 161.43 bit/min**.
- Deployed CNN consumes only **24 µJ per inference** leading to a total system power of 16.28 mW, allowing for **continuous operation of 12 h**.

PULP Parallel Ultra Low Power

DATWYLER

GAPses paper

Demo video