



University of Antwerp
| Cosys-lab | Co-Design of
Cyber Physical Systems

Synchronisation of a Multimodal Sensing Setup for Analysis of Conservatory Pianists



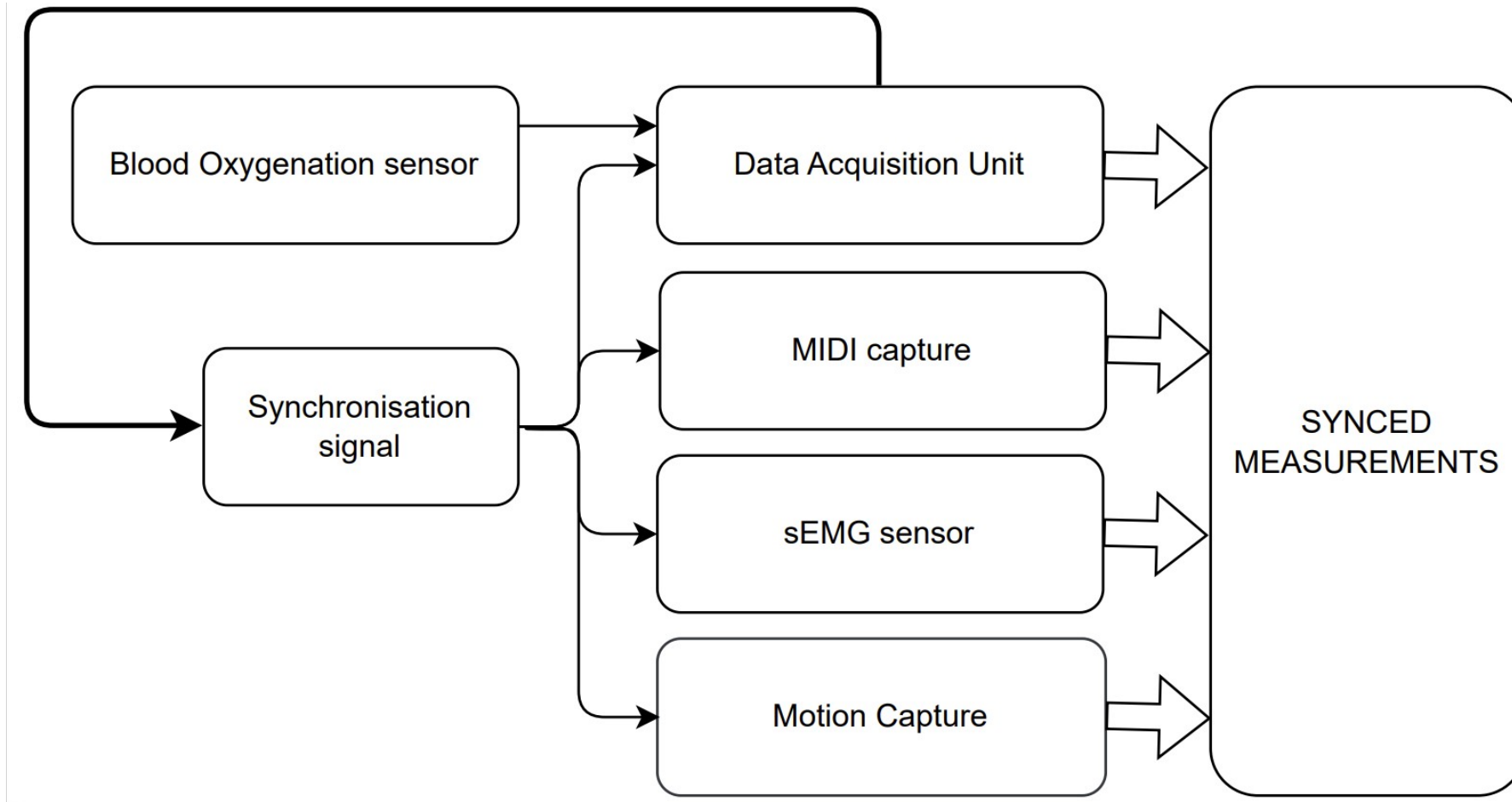
Universiteit Antwerpen
| Faculteit Toegepaste
Ingenieurswetenschappen

FLANDERS
MAKE

Introduction

- Analysis of pianist's physical characteristics
- Previous research → unsynchronized
 - No correlation analysis between parameters
- Synchronize to reveal mechanisms/interplay

The setup - schematic



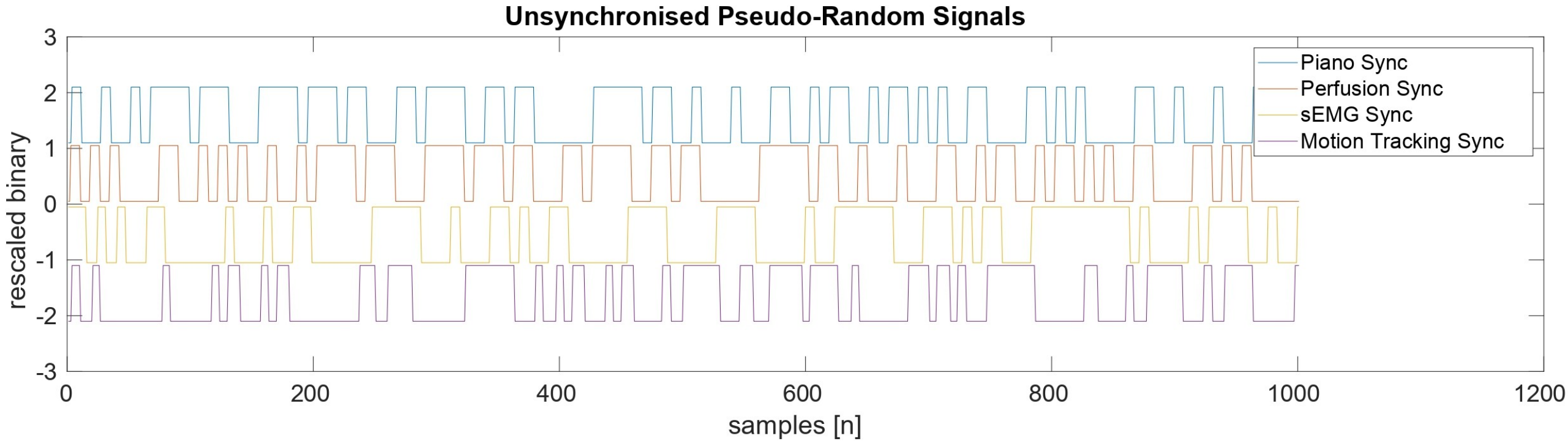
The setup - live



First test



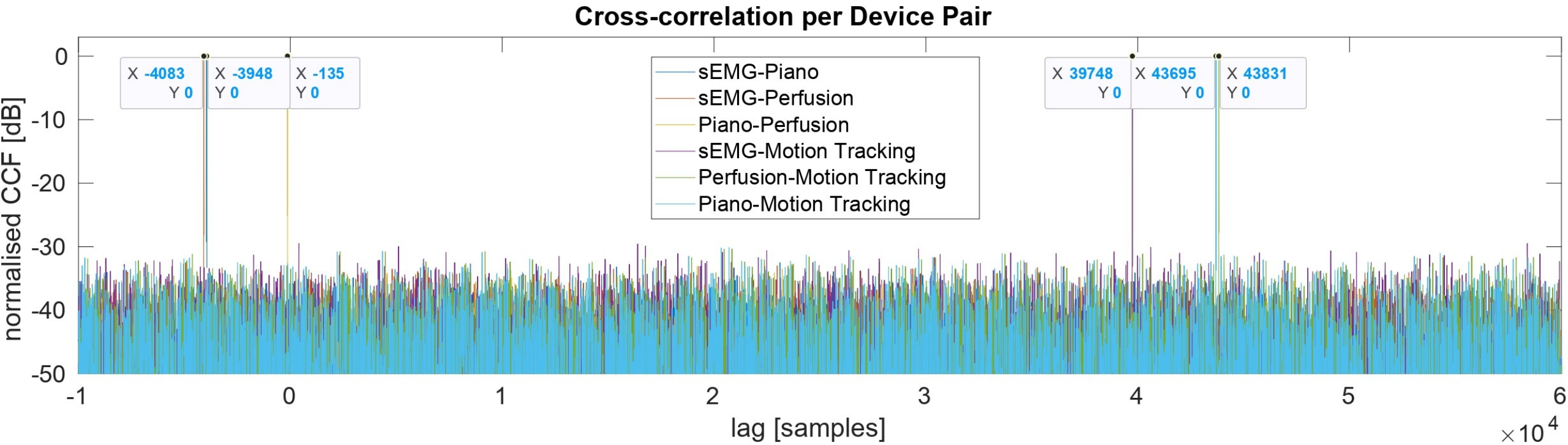
Test results



Intermezzo: Cross-correlation

$$(f \star g)(\tau) \triangleq \int_{-\infty}^{\infty} \overline{f(t)} g(t + \tau) dt$$

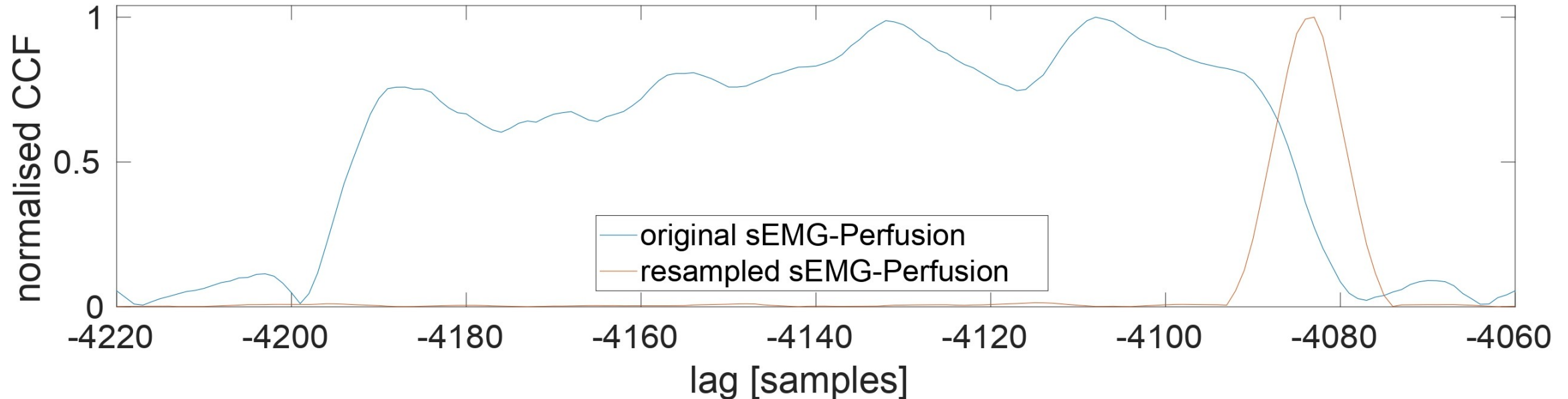
Test results



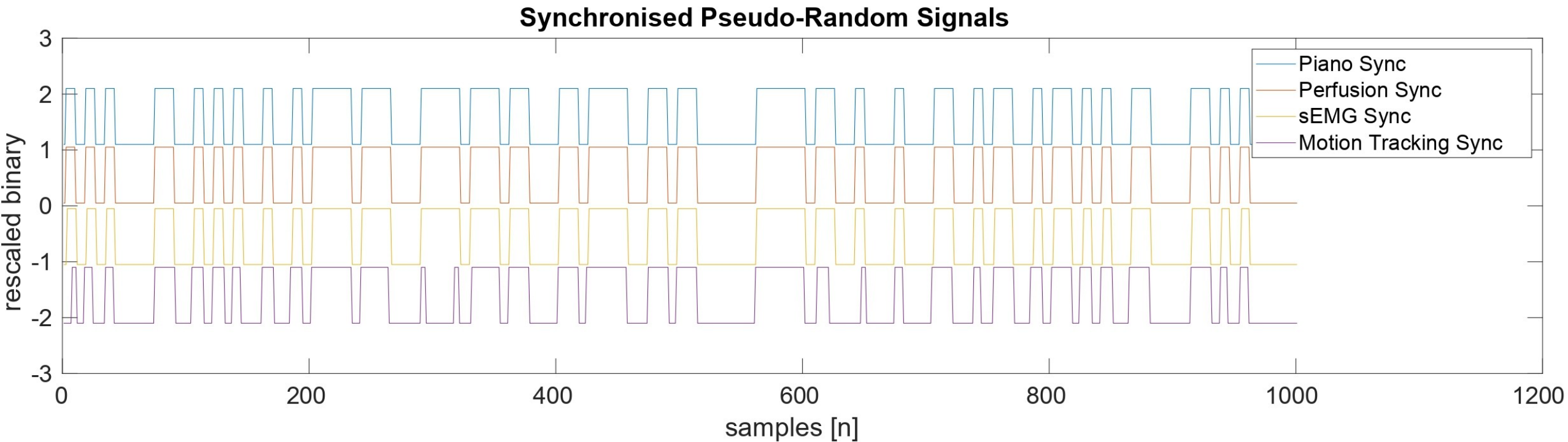
The mole

- Plux clock frequency mismatch
- Calculate actual frequency and resample accordingly

Cross-correlation of original sEMG signal vs. resampled sEMG with perfusion data



Test results



The project

- Cross-correlate the signals
- Reveal and solve the frequency deviation
- Synchronize all data
- Enveloped representation of sEMG (search literature)
- GUI Processing tool using Matlab appDesigner
 - Bulk processing (optional with visual rendering of synced data)

Evaluation

- 30/70 practice/theory
- Project submission as a group
 - Source code (following Matlab style guidelines and properly documented)
 - Compiled executable
 - Peer review (sent separately to me via mail)
 - Manual for the developed tool
- Individual project defense

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<https://cosys.uantwerpen.be/>

Image references: