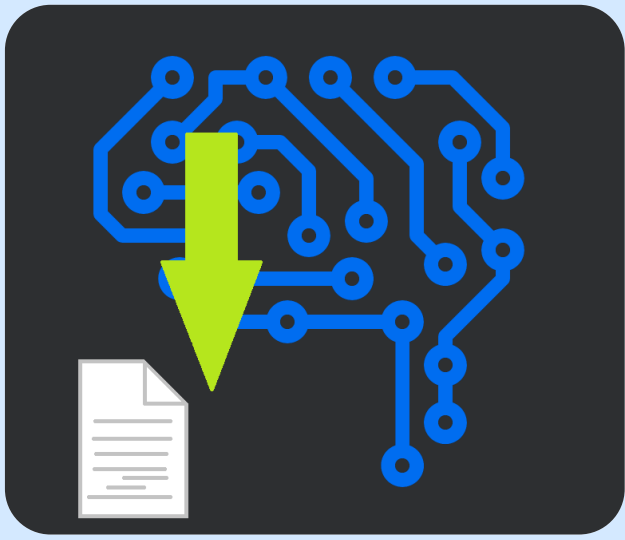
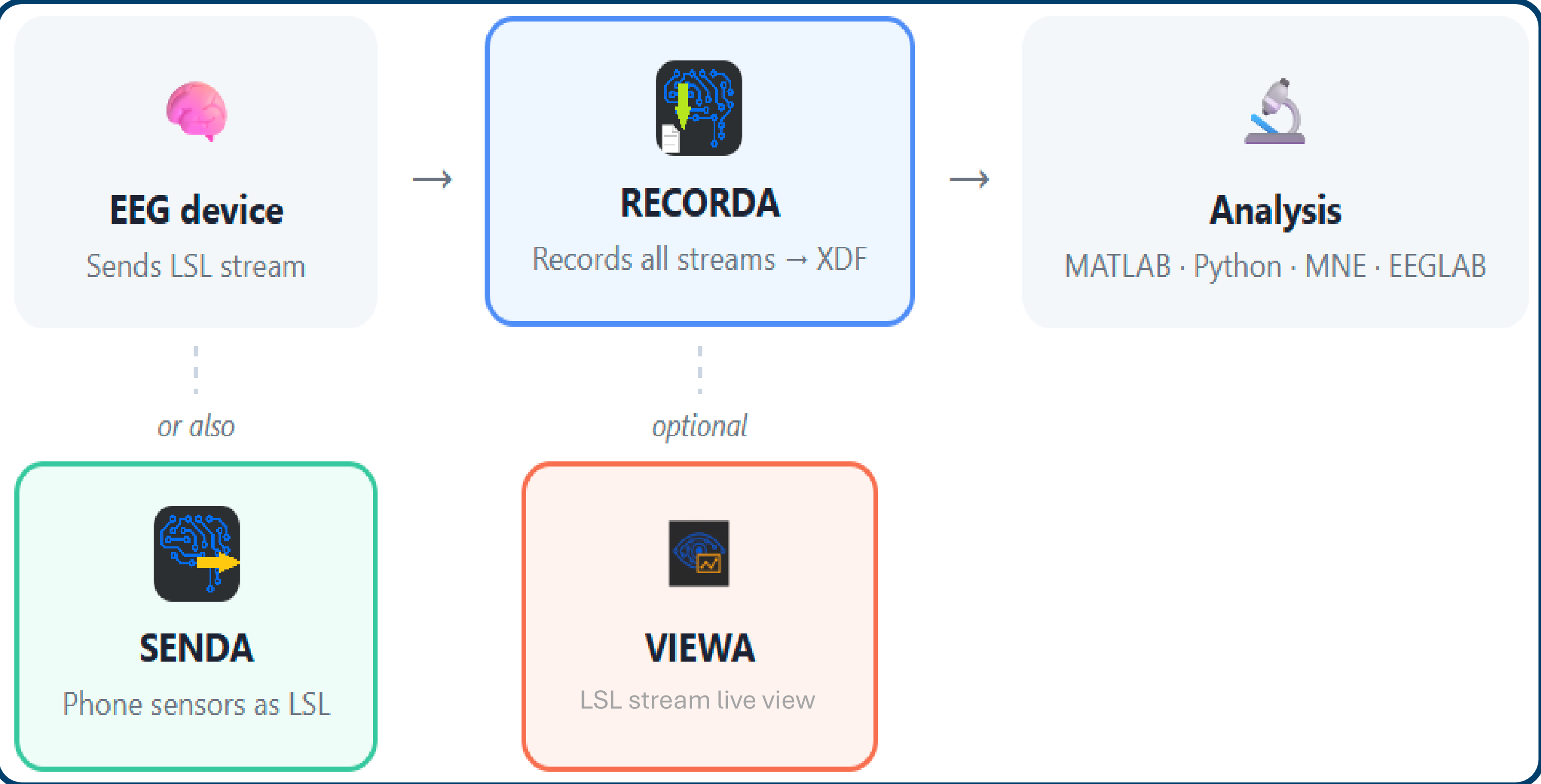


Stream, Record, Visualize: Smartphone-Based Sensor Signals for Mobile Setups

Sarah Blum, Stefan Debener
University of Oldenburg, Department of Psychology, Neuropsychology Lab
Hearing4All.connects Cluster of Excellence

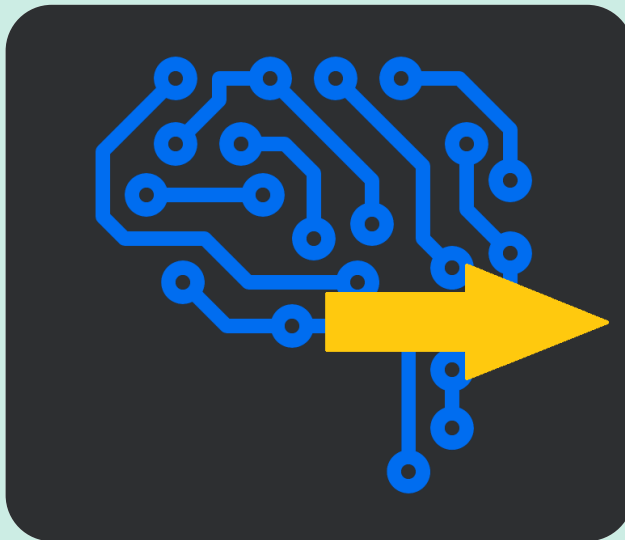
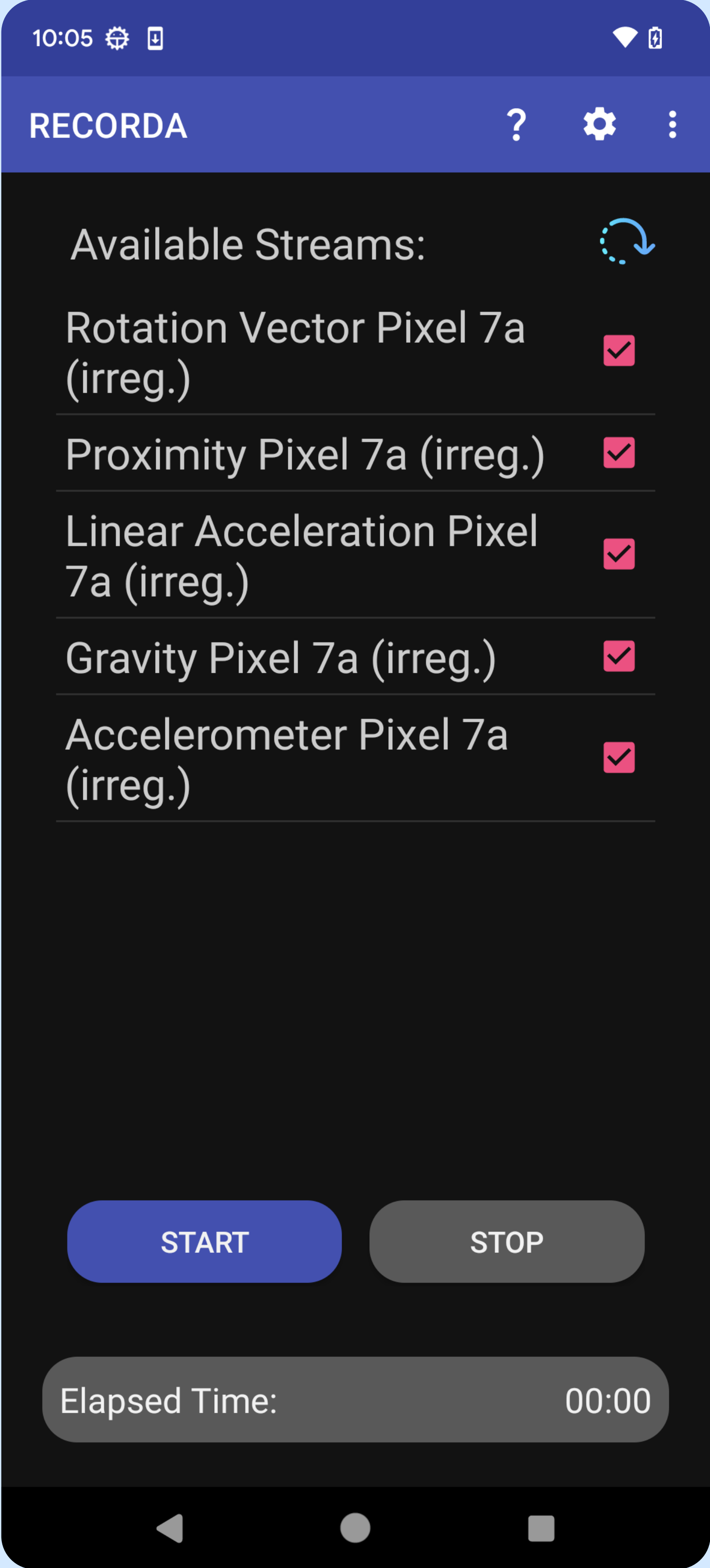
Abstract

Clinical and rehabilitation research increasingly demands ambulatory, multimodal assessments outside the lab and at home. Our free open-source Android Apps **RECORDA**, **SENDA** and **VIEWA** enable data recording, streaming and inspection on smartphones and replace bulky desktop setups with lightweight, off the shelf hardware. The apps implement the Lab Streaming Layer (LSL) on Android. LSL is a widely adopted protocol for time-synchronized multimodal data handling. Together, they cover the full pipeline from sensor streaming to synchronized recording and live visualization. No specialized hardware is required beyond an Android 8.0+ phone.



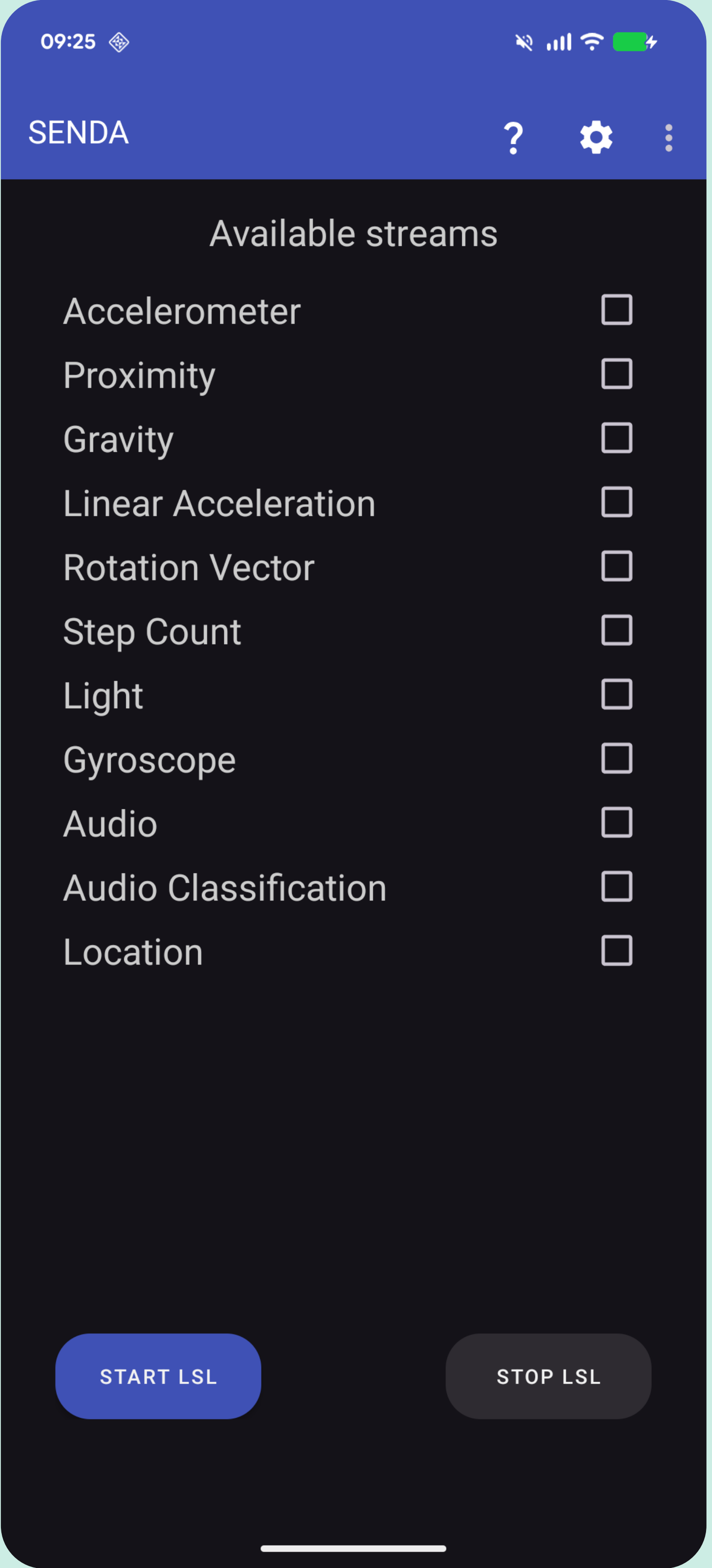
RECORDA Lab Recorder for Android

Discovers LSL Streams on the local network and records them directly into the standard xdf file format which can be imported into MATLAB, Python and other analysis software. Data are synchronized, time-stamped and ready for further analyses.



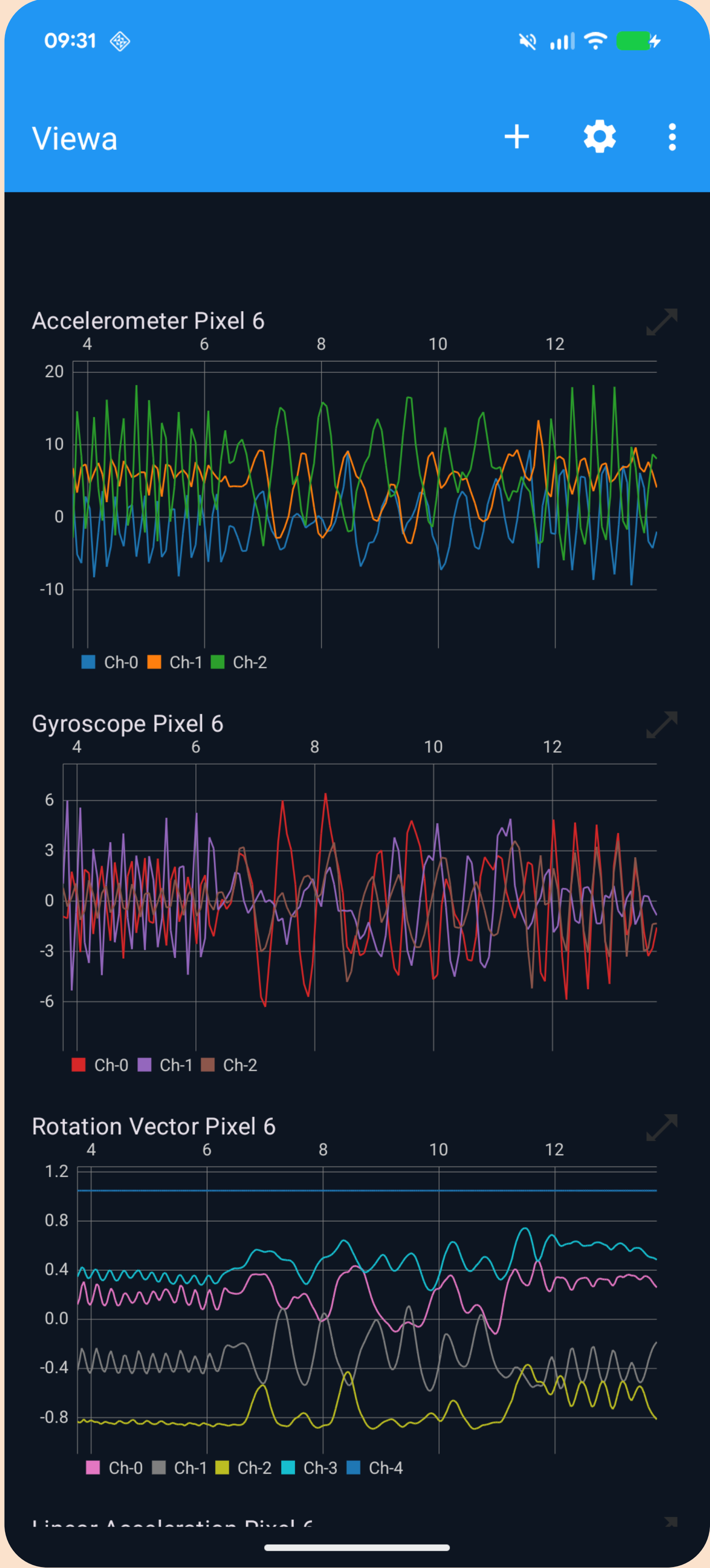
SENDA Sensor Data Streamer

Streams all built-in smartphone sensors – accelerometer, gyroscope, magnetometer, step, light, GPS and more – as LSL streams. Connects to external sensors via Bluetooth and runs a local YAMNet for audio event classification.



VIEWA Sensor Data Viewer

Shows LSL data from the local network – sent bei SENDA or from any other device in the same network. Shows a live view of the channel data for real-time inspection and plausibility analysis.



References

- Apps are developed and published on GitHub: github.com/NeuropsychOL
- Haupt et al. (accepted 2026) Enhancing Mobile Brain and Body Imaging: Open-Source Solutions for Real-World Research Applications.
- SENDA uses Google MediaPipe (Yamnet): https://developers.google.com/edge/mediapipe/solutions/audio/audio_classifier
- LSL Reference paper: Kothe et al. The Lab Streaming Layer for Synchronized Multimodal Recording. *Imaging Neurosci (Camb)*. 2025;3:IMAG.a.136. doi:10.1162/IMAG.a.136

