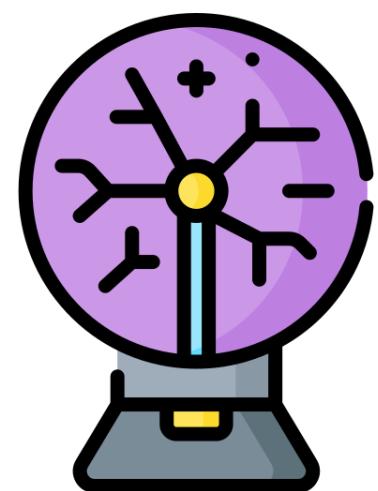


# Lab smarter with task-centric Multimodal neuro-physical recording tools: A Demo

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## PLASMA: LSL-backed Multimodal neuro-physical instrumentation

- Cognitive science research is moving from *unimodal* to *multi-modal*
- Current state of practice:
  - one sensor + one app: labor intensive, prone to operator error
  - lab streaming layer (LSL) to timestamp measurements for post-processing

## What is *task-centric* for multimodal neuro-physical recording?

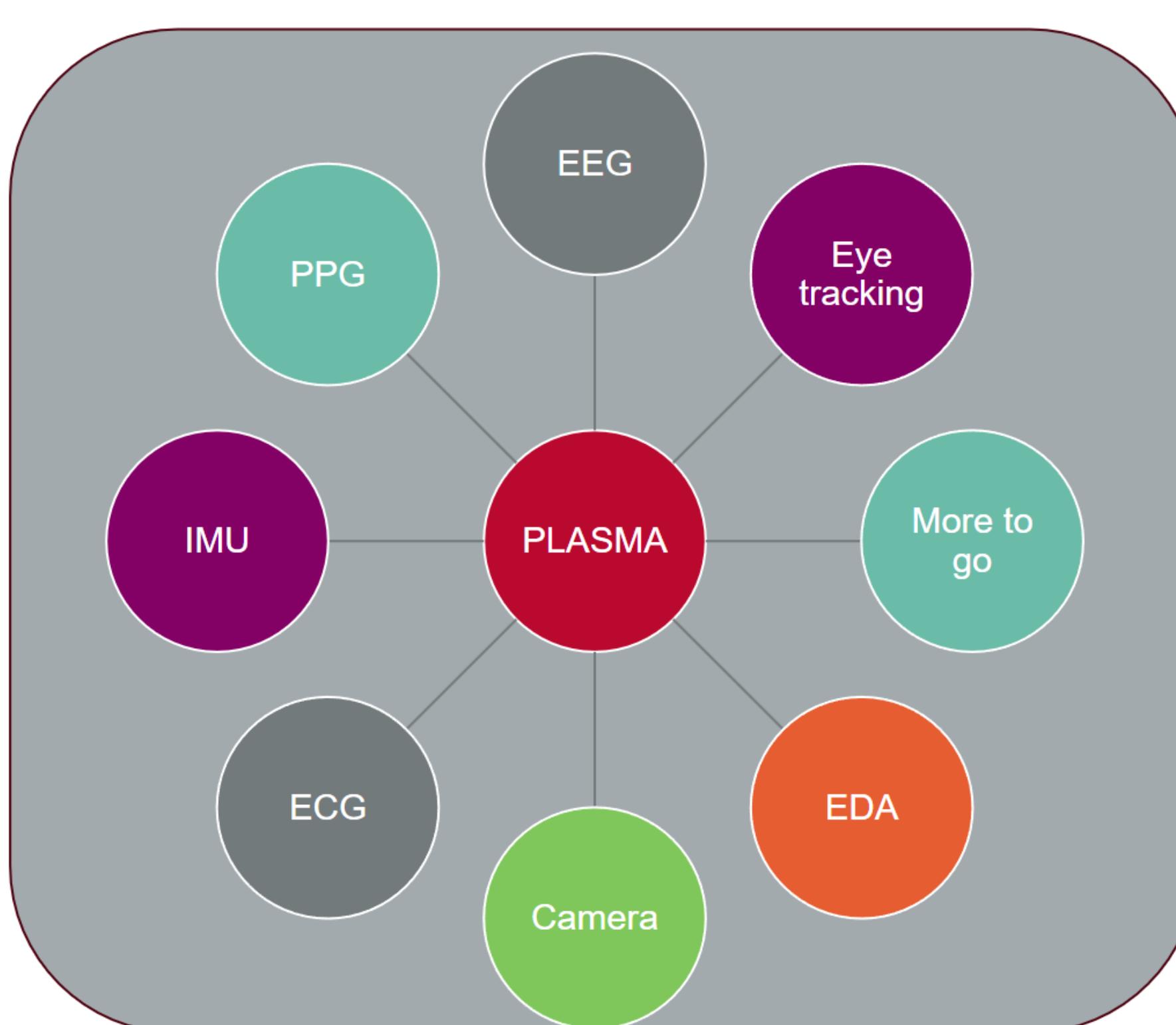
Inspiration from aviation: centralized display for critical system and status



We want a smart lab experience:

- Unified control: “One app to control them all!”
- Human-centered design: task-aware monitoring

## Unified multimodal sensor synchronization



## Integrated dashboard with real time visualization

Integrated dashboard with real time visualization

Session dashboard Configuration

Participant /session info

Sensor selection

Control switch

Integrated dashboard

## Session-sensor lifecycle management

Device initialization

Collection in progress

Collection stopped

Parameters

Collection in progress: sub-4004 ses-02

Collection stopped: sub-4004 ses-02

- IMU:
- Camera recorder:
- Eye tracking:
- MotionSENSE PPG wristband:
- Skin conductance:
- Camera Recorder 2:

Sensor exception

Parameters

Ready to start: sub-4004 ses-02

IMU: FAULT

“Catch faulty sensor real time, not after the session”

More to go

EDA

Camera

ECG

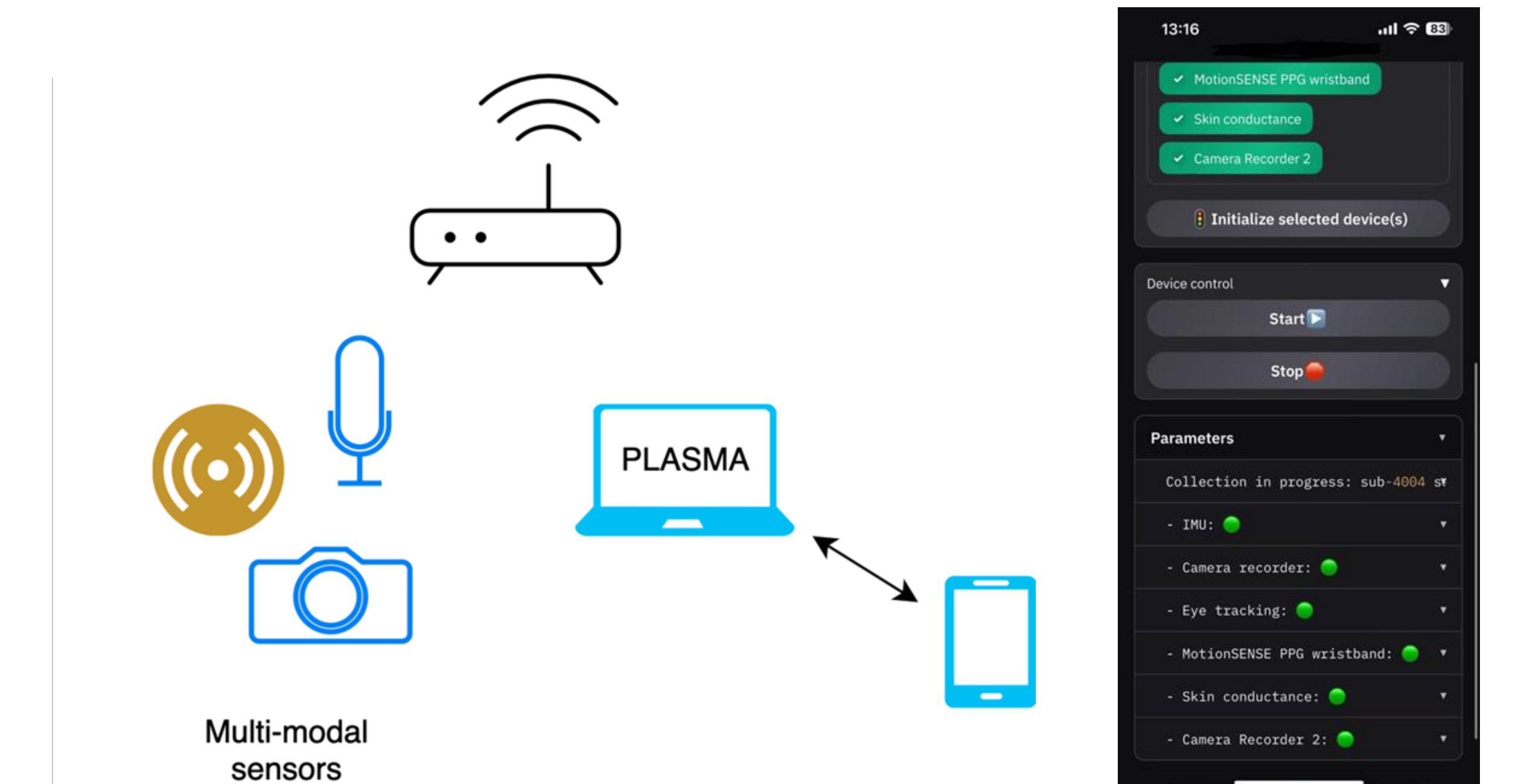
PLASMA

IMU

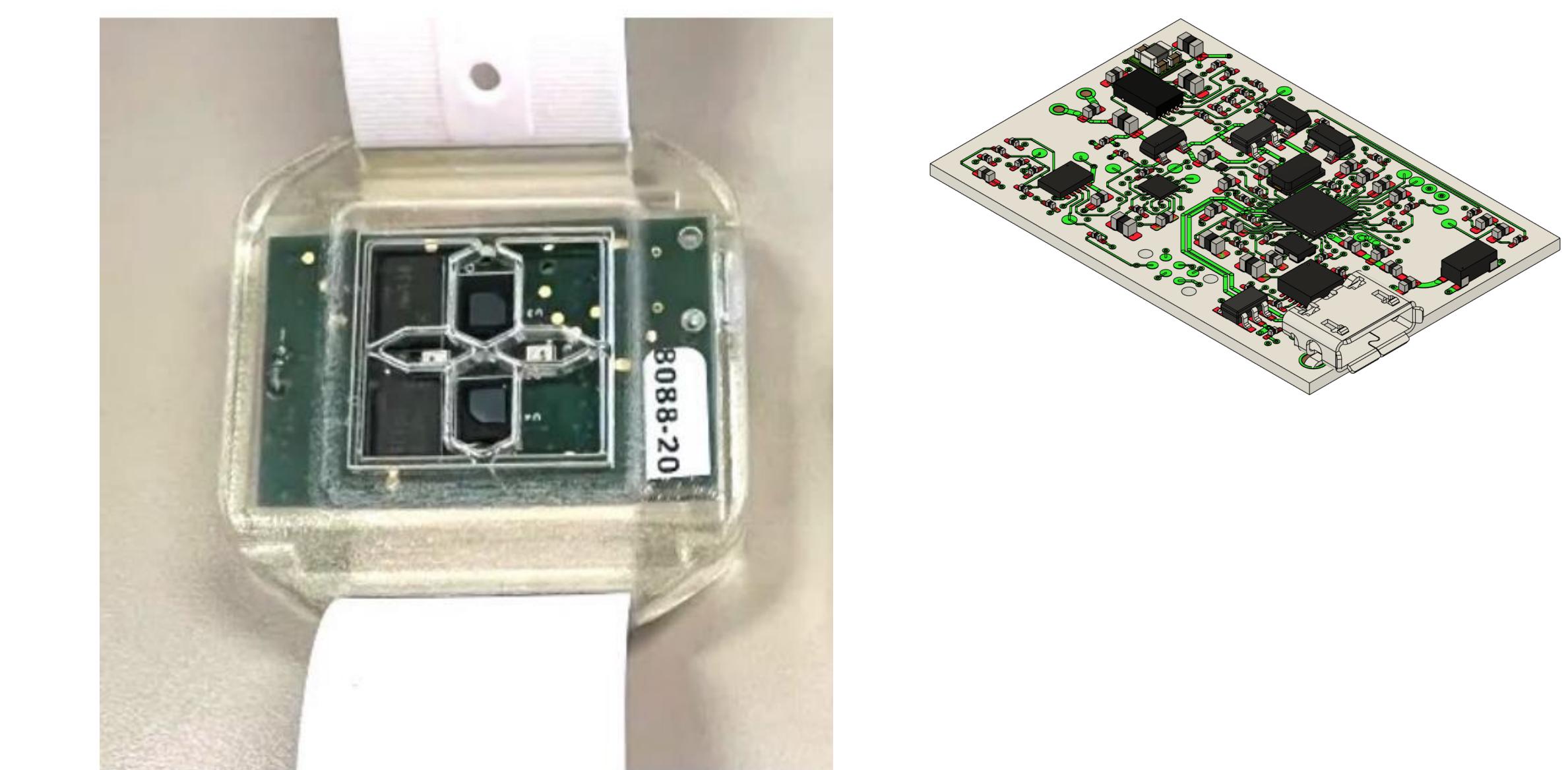
PPG

EEG

## Web-based UI allowing remote instrumentation



## MotionSenSE HRV v4: Open research wristband for HRV and motion



- MotionSENSE v4: our next generation nRF-53 based wristband
  - Green and IR PPG
  - 9-Axis MEMS IMU
  - 2GB/4GB NAND Flash for up to 30-day of recordings
  - Custom FTL powered FAT-FS 8 gigabit file system
  - USB mass storage support
  - Real-time Zephyr OS
  - Smaller physical footprint vs previous gen
- Sensing features
  - Real-time IMU and PPG measurements with internal RAW data backup
  - LabStreamingLayer (LSL) integration
  - Time-stamped ENMO calculation