

FSenSync - A software for enabling collaboration between art and science

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Background

We present a software family called FSenSync (Förger Analytics Sensor Synchronization) that aims to support designing and running installations and experiments that combine both artistic and scientific requirements. The need for this software arose from a collaboration in an ongoing project [1] where human behavior and psychology is studied in context of improvisation and dance. Our use case required wireless data collection while maintaining precise temporal sync between different data sources. This we solved by synchronizing the clocks of the Android devices used in the streaming and recording of data, and timestamping the data locally instead of relying on centralized timestamping on a server. In practice, this allows robust data recording from groups of people for scientific purposes [3], and simultaneous real-time streaming for artistic installations. Also, fast access to data can make dialog between artists and scientists more fluid.

Software overview

The software consists of Android apps, and a server running on a computer. The server and the apps communicate over Wifi. The apps allow access to sensors (e.g. accelerometers, touch screens, video cameras) and enable controlling media playback (e.g. sounds, videos) on Android devices (smart watches, phones, tablets). External sensors can be integrated to the Android apps using Bluetooth. This allows access to for example EEG, EDA, and breathing rate.

The server can launch Python scripts that enable quick data visualizations and further processing and analysis of the collected data. The sensor data can be streamed in real-time over OSC (Open Sound Control) protocol to for example programs running on the Processing platform [2].

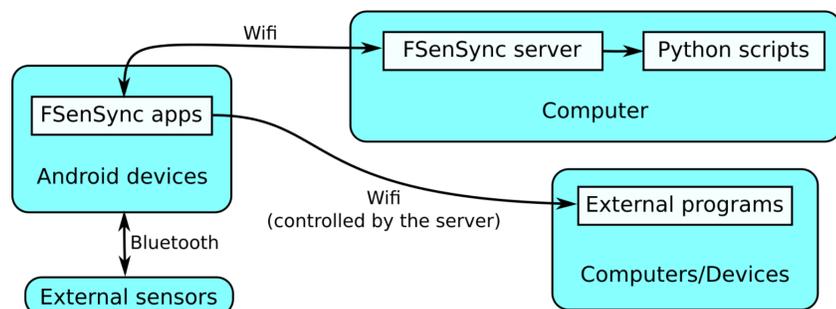


Fig. 1. Data flows in FSenSync

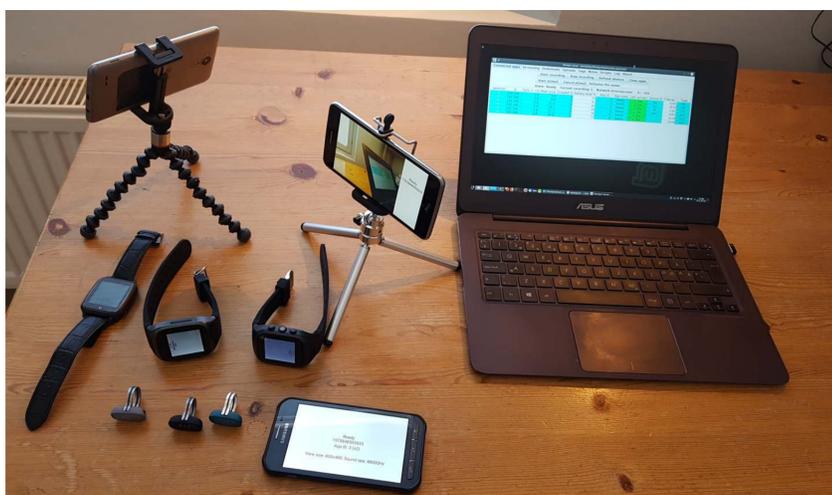


Fig. 2. A mobile laboratory powered by FSenSync

Features and use cases

- Real-time streaming of screen touches and accelerations to external visualizations/installations
- Creation of installations that are driven by the amount of synchronization between participants with wireless sensors
- Synchronized display of stimuli over several Android devices
- Recording of subjective experiences from large groups of test participants using tablets
- Local recording of data for off-line analysis (downloaded later over Wifi) while simultaneously streaming it in real-time
- Automated creation of synchronized composite videos showing multiple points of views
- Accelerometer recordings with less than 5 millisecond offsets
- Making timed notes synced with other recorded data
- Visualization of recorded data in sync with videos
- Synchronizing sensor data manually can be time consuming and prone to human errors, thus automation saves time



Fig. 3. A frame from a composite video created with FSenSync

Advantages for art and science collaborations

- Ability to visualize data and present preliminary analysis right after an artistic performance can allow a fluid dialog between artists and scientists
- FSenSync removes the need to make a trade-off between the quality of recorded data and scalability of real-time streaming
- Inexpensive, wireless sensors are good for situations where participants/performers need to move around e.g. dancing
- Real-time visualization of sensor data can give an intuitive understanding of the sensor to a person unfamiliar with it

How to get FSenSync

FSenSync is currently available to close collaborators (closed source) and paying customers (open source). Customized versions can also be developed as the current software may not fill all needs. Apps that communicate with an external sensor may require a permission from the producer of the sensor. For more information contact: klaus@forger.fi or visit: www.forger.fi

References

- [1] ICI, de l'Improvisation Conjointe à l'Interaction, <https://labodanse.org/ici/>
- [2] Processing, <https://www.processing.org/>
- [3] Himberg, T., Laroche, J., Bigé, R., Buchkowski, M., Bachrach, A.: Coordinated interpersonal behaviour in collective dance improvisation: The aesthetics of kinaesthetic togetherness. Behavioral Sciences 8(2) (2018)