

## The OpenVIMO Platform

### A Tutorial on Building and Managing Large-scale Online Experiments involving Videoconferencing

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# The OpenVIMO Platform: A Tutorial on Building and Managing Large-scale Online Experiments involving Videoconferencing

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## Abstract

Online experiments leveraging video conferencing offer significant advantages for studying human social interactions, including enhanced participant diversity and scalability. However, challenges include complex adjustments, privacy risks, software requirements, limited customization, and remote participant management.

OPENVIMO is a software framework for creating video-based online interaction experiments built to address these challenges. It operates on open-source technologies, allowing deployment on researchers' servers without relying on third-party services. OPENVIMO facilitates the creation of web-based experiments with video calls, live monitoring of participants' progress or interactions, and comprehensive data collection, including audio and video. Moreover, it supports highly customizable experimental protocols and dynamic expansion by the research community.

This tutorial will describe the functionality and design rationale underlying OPENVIMO. Moreover, it will outline possible application scenarios and provide examples for developing and managing studies using the platform. Finally, attendees will gain hands-on experience implementing a small-scale study of their design.

## CCS Concepts

• **Human-centered computing** → **Empirical studies in ubiquitous and mobile computing.**

## Keywords

Multimodal Modeling, Data Collection, Video Conferencing, Online Interaction, Online Survey, Online Experiment

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## 1 List of Topics

The proposed tutorial will span the following topics:

- Design Rationale (Why does OPENVIMO exist?)



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- Deployment (e.g., installation)
- Study development (e.g., configuration of surveys and calls)
- Study management (e.g., monitoring participants' progress)
- Discussion of potential for Applications and Use-Cases

## 2 Learning Objectives

Attendees of the tutorial will be able to

- assess the suitability of the OPENVIMO platform for potential online data collection and experiments.
- recall the functionalities of the OPENVIMO platform for participant interaction and management, as well as data collection and storage.
- operate and deploy the OPENVIMO platform in a suitable software environment.
- implement a simple study for online data collection using the OPENVIMO platform.

## 3 Relevance

### 3.1 For ICMI Community

Data collection is a crucial challenge in multimodal AI research, with online studies offering a promising approach. Usage of OPENVIMO can enhance participant diversity and scalability of data collection protocols while mitigating issues like privacy risks, aligning with ICMI's aim to foster ethical research practices. By leveraging open-source technologies, it supports customization of experimental protocols and comprehensive data collection, essential for advancing human-human and human-computer interaction studies. The hands-on experience provided by our tutorial will empower researchers to implement innovative, ethically sound studies, supporting scientific advancements in multimodal AI.

### 3.2 For ICMI 2024 Theme

The OPENVIMO tutorial aligns with ICMI 2024's theme of "*Equitability and environmental sustainability in multimodal interaction technologies*" by providing an accessible and scalable platform for studying human social interactions through video conferencing. Moreover, by leveraging open-source technologies, OPENVIMO promotes equitable access to research tools, enabling researchers from traditionally under-served communities to conduct studies without reliance on costly third-party services.

## 4 Target Audience

The target audience of this tutorial are researchers (at any career stage) interested in conducting multimodal data collection or experiments using videoconferencing. Basic programming knowledge is

helpful (but not required) for parts of the tutorial dealing with implementing studies using the platform (e.g., writing up a study flow in the templating language). However, general IT knowledge (e.g., installing Python packages and running shell scripts) is required to understand the deployment of the framework.

## 5 Detailed Description

This tutorial introduces attendees to the capabilities and potential uses of OPENVIMO as a platform for online experiments and data collection revolving around videoconferencing. To facilitate this, the tutorial will be broadly structured into three separate parts, each about 60 minutes long.

### *PART 1 - Introduction to the OPENVIMO Platform.*

- (1) **Background/Motivation:** We begin the tutorial by providing an overview of relevant aspects of the platform, motivating its development, and pointing out relevance in the landscape of alternative solutions.
- (2) **Functionalities (with demonstrations):** In the following part, we then describe the core functionalities afforded by OPENVIMO in greater detail. We support this explanation by walking the audience through an example study conducted using the platform from different perspectives: a researcher designing an online study involving videoconferencing, a person participating, and a study manager monitoring and supporting participants.
- (3) **Core Concepts and Architecture:** Here, we look under the hood of OPENVIMO, outlining the overall architecture and describing its individual components. Moreover, we point out and motivate crucial dependencies (such as the covfee data collection framework) and open-source technologies it relies on (e.g., the openVIDU WebRTC framework).

### *PART 2 - Using the OPENVIMO Platform.*

- (1) **Installation and Deployment:** Here, we walk tutorial attendees through the process of installing and configuring OPENVIMO for local testing and deployment on a server.
- (2) **Study Implementation:** This section builds on the basic example introduced in *Part 1* for designing a study. It involves walking attendees step by step through recreating a study design in which their participants first fill in a series of survey questions, then wait until a fixed number of participants in the study have completed these questions before then being automatically connected to a videoconferencing room for a timed conversation that is being recorded. Attendees then can group up to test their implementation and how to access the resulting data.
- (3) **Management and Monitoring:** Here participants learn how to connect to the management interface of their OPENVIMO study, how to monitor interactions (and calls) of their participants, communicate with them via chat or video call, or remove them from an ongoing session.

### *PART 3 - Reflections on the OPENVIMO platform.*

- (1) **Discussion of potential for Applications and Use-Cases:** Here, we first provide some examples of existing data collection setup from our own research and then discuss the

suitability of OPENVIMO for (re-)creating them. For this we provide a series of criteria to guide users on when we see OPENVIMO being more suitable than relevant alternative frameworks for online studies (e.g., JSPSYCH[3], oTREE[2], or MTVE[1]). In particular, we reflect on the lessons learned from a large-scale data collection procedure that has involved a prototype version of the platform[6]. Beyond that, we outline some advanced possibilities (e.g., multi-player games between participants in video calls) requiring advanced programming knowledge.

- (2) **Q&A with the Developers:** Finally, we close the tutorial with an opportunity for attendees to ask specific questions about any issues they deem relevant. This could be an elaboration on specific aspects presented in the tutorial already, but it could also involve advice on the possibility of implementing a particular data collection protocol or study design.

## 6 Materials

The source code for OPENVIMO is currently provided as a module of the [COVLEE framework](#)[7]. Moreover, preliminary documentation of the platform covering some of the topics of the tutorial can be found online on [openvimo.com](#).

Attendees who wish to follow along with the hands-on portion of the tutorial in *Part 2* must bring their laptops with them. These are expected to possess a functional webcam and networking capability. We will make a containerized environment (e.g., using Docker) available to attendees for easy installation and usage during the workshop.

## 7 Organizers

**Bernd Dudzik.** is an Assistant Professor at TU Delft and holds a PhD in Computer Science (2021). His research focuses on Affective Computing and Multimodal Human-centered Machine Perception, exploring context-sensitive modeling of human situation understanding in everyday interactions. He contributes to the Dutch Hybrid Intelligence Consortium, investigating human-centered AI for collaboration support. Dudzik is an active member of AAAC, IEEE, and ACM, serving as an Associate Editor for the IEEE Transactions on Affective Computing, and on ACM SIGCHI's Partnership Committee. He was a lead organizer of the workshops on *Modeling Socio-emotional and Cognitive Processes In the Wild (MSECP-Wild)* at ICMI (2022[5], 2023[4]) and the [ASOCA workshop](#) at ACII 2023.

**Jose Vargas Quiros.** is a PhD candidate at the Socially Perceptive Computing Lab at TU Delft, The Netherlands, since 2018. He is interested in multimodal action recognition and conversation quality assessment in-the-wild, the study of inter-personal adaptation and synchrony, and efficient annotation of in-the-wild data.

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