Sketching Pipelines for Ephemeral Immersive Spaces

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Figure 1: Building an ephemeral immersive space in Barcelona, 2022

ABSTRACT

This hands-on class will allow artists to use open-source tools to create interactive and immersive experiences. These tools have been created and incubated at the Society for Arts and Technology (SAT), a unique non-profit organization in Canada whose mission is to democratize technologies to enable people to experience and author multisensory immersions. During the class we invite participants to use their favorite software on platforms they are already familiar with, to interface with our tools. The toolset will include transmission protocols, video mapping tools, sound spatialization software, and gestural control using pose detection. The class will be organized in two parts: a presentation of the tools and context involving the development and applications, and a hands-on session with an ephemeral immersive space. This event is designed for art researchers, artists, designers, content creators, and other creatives interested in creating immersive spaces using research-developed tools. Participants will learn how to employ open-source tools for different artistic tasks so that they will be able to deploy their own immersive spaces after the class.

1 INTRODUCTION

Recent years have seen a rise of large-scale immersive art being deployed in many different contexts, such as re-interpretations of visual art classics [1], rave-type events with projections, ever bigger video mapping and architectural installations. Some of these experiences are stepping out of traditional concert venues and are being deployed in unlikely spaces. This ongoing democratization of immersive experiences is often powered by mainstream software companies. Software licensing prices are prohibitively high for many small-scale productions, underdeveloped areas, and marginalized groups, who lack extravagant resources. Yet, information about the availability of alternative solutions is drowned in aggressive marketing and increased visibility of large-scale and medium-scale productions openly boasting the technological pipelines employed. We propose to shine some light onto less expensive ways of creating interactive and immersive experiences using Free/Libre Open Source (FLOSS) software and Open Standards with off-the-shelf technologies to leverage the input and output options common to many types of immersive art. Our workshop will allow artists to get familiar with some of our solutions for interactivity, video mapping, and multichannel spatial audio. The workshop will emphasize the interoperability between software, where participants will "sketch user experiences" [Greenberg et al. [n. d.]], [Brien et al. 2017] using

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[1] https://www.newyorker.com/news/letter-from-silicon-valley/the-rise-and-rise-of-immersive-art

their favorite software on platforms of their choice, to interface with our tools via widely used protocols (OSC, NDI).

2 LABS HANDS-ON CLASS

Difficulties arise when deploying an immersive physical space, namely: installing the hardware, connecting devices, calibrating the videoprojection, audio spatialization, and various sensors. The creation of the experience including content and scenography oftentimes needs a dedicated pipeline due to each project having very specific production needs. Devising such a pipeline is a matter of experience or experimentation. In the latter case, and when a team of diverse expertises is involved, there is a need for tools and methods to help with adaptive iterating through variations of the pipeline to accommodate evolving hypotheses, scenarios, and scenographies that arise during the creation process.

2.1 Ecosystem of tools

We will explore production pipelines to illustrate the use of the chosen software in tandem with existing tools that have been seeing broader adoption in recent years.

This lab features the following tools created at the Metalab—SAT's research lab:

- LivePose [Frisson et al. 2022a]: a computer-vision tool for real-time skeleton tracking from video streams. LivePose sends the detection results data through the network (OSC and Websocket are currently supported).
- Splash [Décorps et al. 2022]: a modular mapping software that uses 3D models with UV mapping of the projection surface to calibrate multiple video projectors and feed them with the input video sources.
- SATIE [Bouillot et al. 2019]: an audio spatialization engine developed for real-time rendering of dense audio scenes to large multi-channel loudspeaker systems. SATIE supports multiple simultaneous sound formats and speaker setups.
- Shmdata: A library to share flows of data frames between processes via shared memory.

Metalab leverages third-party authoring tools and inter-operability protocols:

- OSSIA Score [Celerier et al. 2015]: An intermedia sequencer for precise and flexible scripting of interactive scenarios and data mapping
- OpenSoundControl (OSC): A data transport specification for networking applications and hardware.

Most of the above software can run in most Linux-based systems, including low-cost, low-energy hardware such as Raspberry Pi and NVIDIA Jetson single-board computers. Participants can install the Metalab tools in their systems or use embedded systems (provided by Metalab) containing those tools.

2.2 Schedule

Proposed timeline (1-hour hands-on class):

- **00h00** - Introduction: workshop, presenters, and participants
- **00h05** - Presentation of Metalab tools and immersive spaces: integration, interoperability, API, documentation
- **00h20** - Demo: connecting tools to create immersive spaces

- **00h35** - Interaction period: directed collective modification of the immersive space
- **00h55** - Closing remarks

2.3 Use cases and applications

This workshop is designed for art researchers, artists, designers, content creators, and other creatives interested in creating immersive spaces using research-developed tools. Applications include the use of off-the-shelf hardware and open-source software to deploy ephemeral immersive spaces.

2.4 Learning goals

Participants will learn how to employ Metalab tools for different artistic tasks related to creating immersive spaces. Those tasks include sound spatialization, video mapping, gestural control using computer vision, and mapping control parameters. The topics addressed in this workshop include evaluating the available space, setting up projection mapping, calibrating video projectors and sound equipment, setting up cameras for pose tracking and estimation, and employing a software pipeline to map everything.

3 PREVIOUS WORKSHOPS AND WHAT'S NEW FOR SIGGRAPH

We have already conducted similar workshops, but to different audiences: at GI [Frisson et al. 2022b] over two hours with researchers in computer graphics and human-computer interaction, at ISEA [Durand and Seta 2022] during a full-fledged creative workshop over two days with digital artists. With this SIGGRAPH 2023 Labs Hands-On Class, we expand to a wider audience of practitioners of immersive media.

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