MARUSCSÁK

Hi! I am Dávid Maruscsák, a **New Media Artist** and **Researcher**.

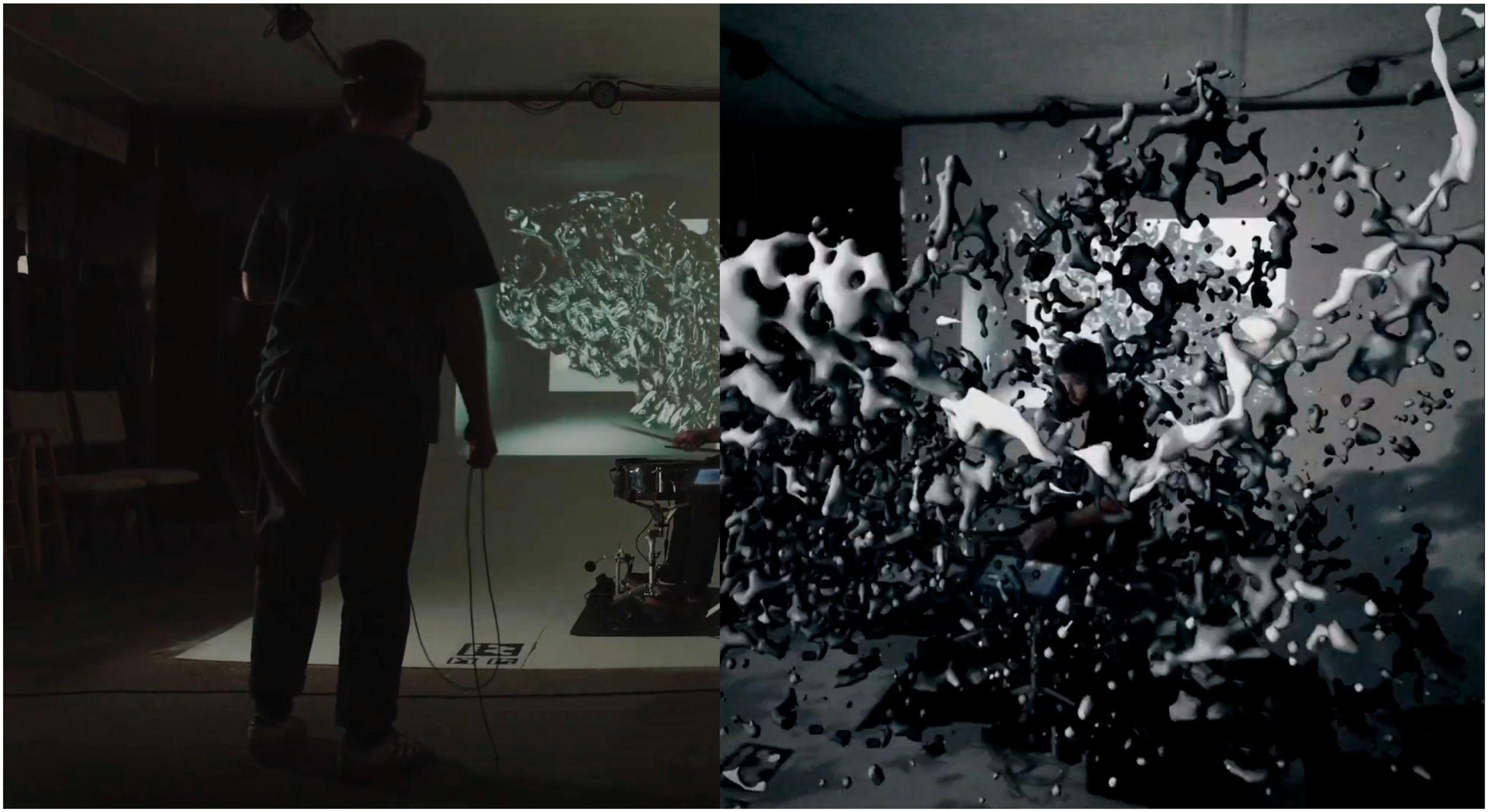
Both my artistic practice and academic research revolve around **interaction**—between people, computers, and digital worlds. I've been fascinated by the intersection of art and technology since high school, creating computer-based artworks from an early age.

During my undergraduate studies in art, I discovered the world of research and computer science. The pragmatic clarity of research offered a compelling counterpoint to the abstraction of artistic thinking, which led me to pursue a master's in Human-Computer Interaction, followed by a PhD focused on HCI, Augmented Reality, and Artificial Intelligence.

Whether I'm developing a system or designing an artwork, I always begin with interaction. My goal is to merge the digital and the physical by building intuitive interaction layers where the two worlds **can meaningfully connect**.

This layer must remain **simple, intuitive, and engaging**—especially for people with limited technological backgrounds. They often stand to benefit most from innovation, yet are the most overlooked.

In my research, I use **human-centered design principles** to create intuitive interfaces tailored to specific users. In my artistic practice, I build **visually captivating, interactive experiences.**



2024 Phases (AR)

description:

This project — *Phases (AR)* — was a collaboration between *Université Paris-Saclay*, Las Vegas-based artist *Brett Bolton*, *Notch*, and *Canon Japan*.

We integrated AR visuals into Brett's existing *Phases* performance. During the live show, Brett played electronic drums and MIDI controllers, while two audience members on stage wore *Canon MREAL X1* AR glasses and experienced an enhanced performance with additional AR graphics. To realistically simulate occlusions between the real and the virtual worlds, we used an *Azure Kinect* depth sensor and aligned it with the HMD's coordinate system. Using this technique, we could use the live performer's silhouette to occlude AR elements behind him.

The core concept of our work questions whether AR could restore human presence at live events, fostering shared experiences rather than staring into our phones.

contributions:

My role bridged the **technical and creative sides** of the project. I **developed the Kinect–MREAL calibration system** and **built custom tools**, for example, a **recorder to capture 3D spatial performance data** of Brett as seen through the AR glasses. This allowed the team to play back and simulate Brett's performance without meeting him in-person. I **facilitated cross-team communication** between team members working across different locations. I also led the online rehearsal in front of the Real-Time Live! committee to demonstrate our setup before the final show. Finally, I was responsible for **running the AR part** of the show on the RTL! stage.

co-creators:

Brett **BOLTON**
Matt **SWOBODA**
Bent **STAMNES**
Christian **SANDOR**

presentations:

on-stage demo
— RTL!, ACM SIGGRAPH, Denver

tool usage:

(frequency)

Notch MREAL
— Canon HMD engine
Unity
C# / C++

- go to SIGGRAPH stream
- go to blogpost

2025 sabw-elephant

co-creators:

Csaba **BOGNÁR**
Balázs **SÁNTA**
Szatory **DORINA**
András **GUNDA**
Adrienn **HÓD**
Imola **KACSÓ**
Márton **GLÁSER**

description:

This 3D-animated music video was created for *sabw*'s track *elephant* from the album *completed disillusionment*. Our team converted real-world dance to digital choreography. In collaboration with *HODWORKS*, we recorded a two-hour dance performance featuring the company's dancers, *Imola Kacsó* and *Márton Gláser,* under the direction of *Adrienn Hód*.

We processed the multiview footage (27 cameras) to extract rigged avatars and digitally reconstruct the dancers' movements. The resulting motion sequences were then composited into a surreal, eroding digital environment.

Conceptually, the video illustrates how ephemeral gestures accumulate over time, gradually reshaping and consuming their surroundings—leaving both subtle and profound traces of life.

contributions:

I led this project, overseeing its conceptual, visual, and technical development and execution. In addition to **creative leadership**, I played a central role in the **technical development**—from coordinating the multiview capture of the dance performance to extracting the performers' movements. During the **post-production** work, I managed the team working on the reconstruction clean-up and 3D prop development. I was responsible for building the environment, compositing the dancers in 3D, and creating particle simulations. Finally, I managed the **rendering** part of the project as well, including scene optimization, lighting, and export.

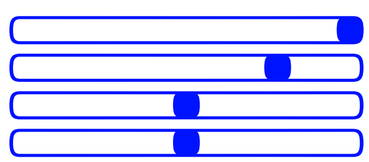
presentations:

pre-release screening
— TOLDI cinema, Budapest
— N° space, Budapest

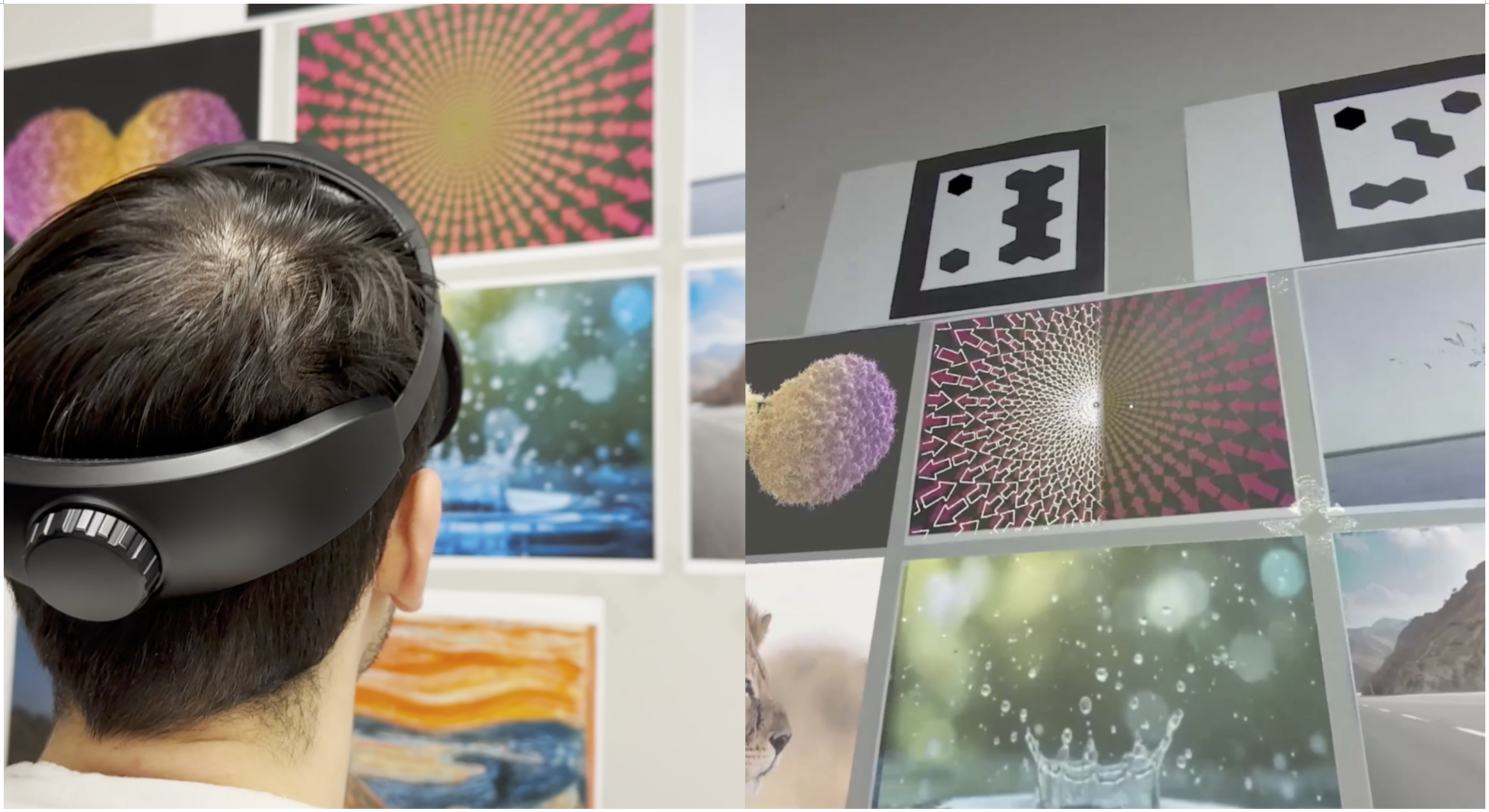
tool usage:

(frequency)

Notch
4DHumans
Blender
Cinema4D



• go to tech presentation



description: This project demonstrates a novel pipeline where large-scale, computation-heavy video models extend the expressive potential of augmented reality.

We leveraged the *Jean-Zay supercomputer* to run the *LTX-Video Distilled model* via *ComfyUI* and generated high-quality video close to real-time speeds (end-to-end), which we streamed back to our local setup featuring an *RTX 4090* desktop driving *Canon MREAL X1* AR glasses. We implemented the AR visualisations in *Unity* and created a simple *OSC*-based touch interface for a smartphone. Users triggered the video generation by looking at a printed poster and tapping the smartphone's screen. We used *Flask* to establish the communication between the local frontend and remote backend systems.

contributions: My role in this project included **implementing the frontend system**, with a focus on **AR visualization** and **user interface**. I was responsible for **porting** the *Flask* communication protocol on the client side **from Python to C#** and integrating it into the *Unity* environment. I also contributed to the **prompt engineering** team to fine-tune the *LTX* video generation. We focused on creating prompts to ensure the outputs remained coherent and meaningful for the AR experience. Additionally, I implemented the *Unity XScaling* third-party plugin to upscale the decoded video frame by frame and dynamically swap the frames in the background—enabling seamless high-resolution playback for the user.

2025 AI-enhanced AR

co-creators:

Christian **SANDOR**
Francesco **DETTORI**
Hovhannes **MARGARYAN**
Thomas **BETTON**
Cyrille **LEROUX**

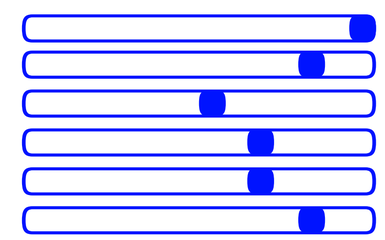
presentations:

on-stage demo
— ADOS at ARTIFLEX lab, Paris

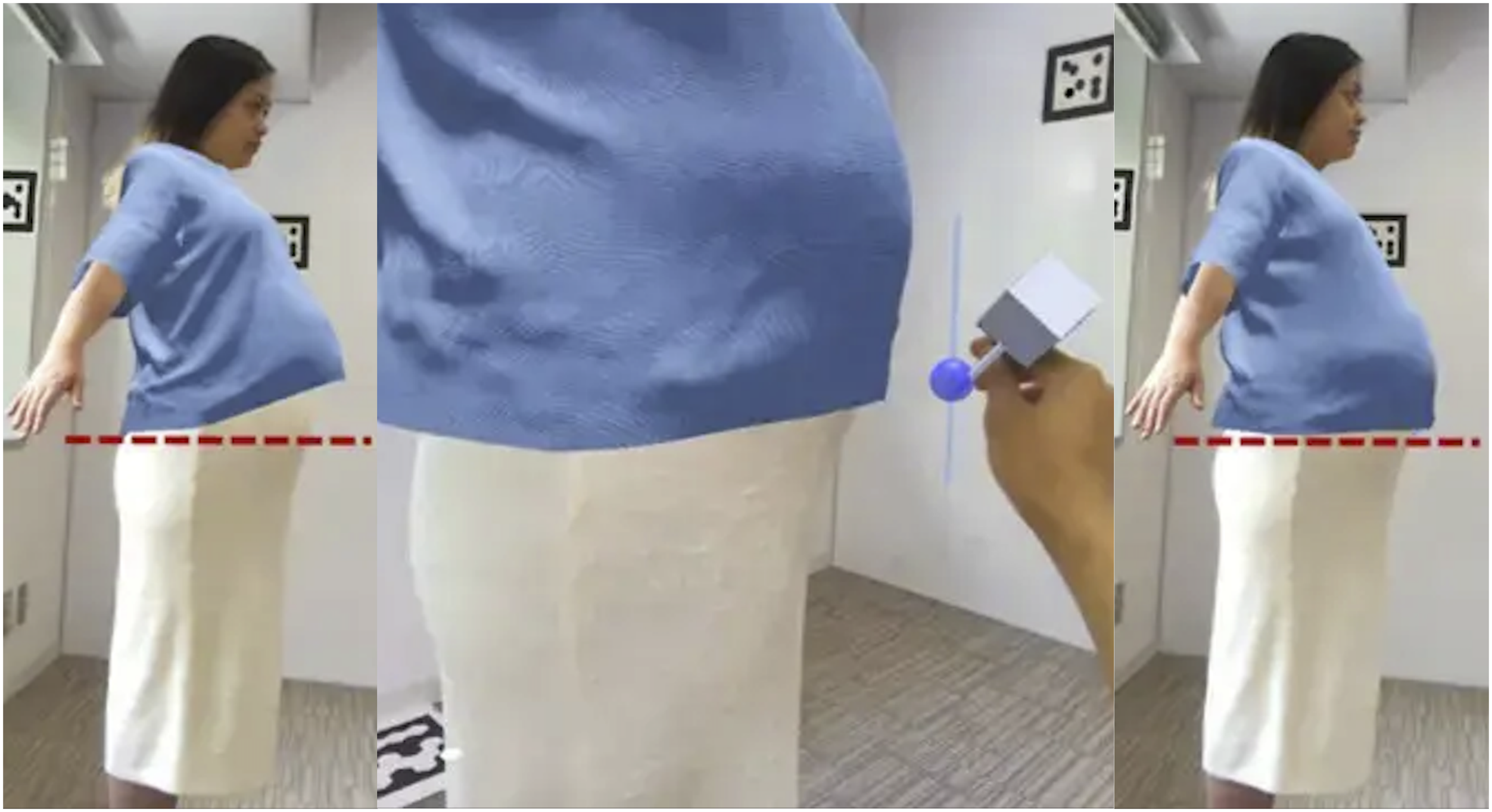
tool usage:

(frequency)

Unity
C#
Flask
ComfyUI
LTX-video
GPU-Cluster



- go to blogpost



description:

This project — *PerfectFit* — is a collaboration between *The University of Tokyo*, and *Université Paris-Saclay*. *PerfectFit* is a collaborative framework including cloth designers and their customers to help them co-design a virtual garment.

In this demo we visualised the virtual garment through *Canon MREAL X1* glasses. The designers could view and adjust virtual clothes on the client's body in real time and interact with the garment using a tracked physical pointing stylus or by natural hand-gestures to edit the garment's dimensions. The system used a *Kinect Azure* depth sensor to track the client's body motion, reconstruct a 3D avatar as an SMPL model which affectd the digital garment simulation.

The concept of this work addresses fashion waste caused by mass production—exploring whether AR can enable virtual design, tailoring and fitting of garments to reduce the number of the re-design loops during production.

contributions:

We used several ML-based frameworks: *MediaPipe* for hand-tracking and *NVIDIA segmentation models* for real-time hand masking. We implemented position-based dynamics to simulate cloth behavior in response to the user's motion. Additionally, *Canon MREAL X1* AR glasses require high computation resources. We were limited to two laptops with an *RTX 4090*. Therefore, the project required extensive performance optimization and we had to distribute the components across the two machines to maintain real-time performance. My role focused on identifying the optimal distribution strategy for system modules, ensuring seamless execution.

2023 PerfectFit

co-creators:

Akihiro **KIUCHI**
Anran **QI**
Eve **MINGXIAO LI**
Christian **SANDOR**
Takeo **IGARASHI**

presentations:

XR demo booth
— ACM SIGGRAPH Asia, Sydney
Best XR Demo award

tool usage:

(frequency)

Unity
MREAL
— Canon HMD engine
TouchDesigner

- go to blogpost

2023 # SecretMapping

co-creators:

Dániel **BESNYŐ**
Gábor **SZŰCS**

presentations:

photo exhibitions
— Light Dome, Budapest
— Memento Park, Budapest

tool usage:

(frequency)

Resolume
3DF Zephyr
Cinema4D
After Effects

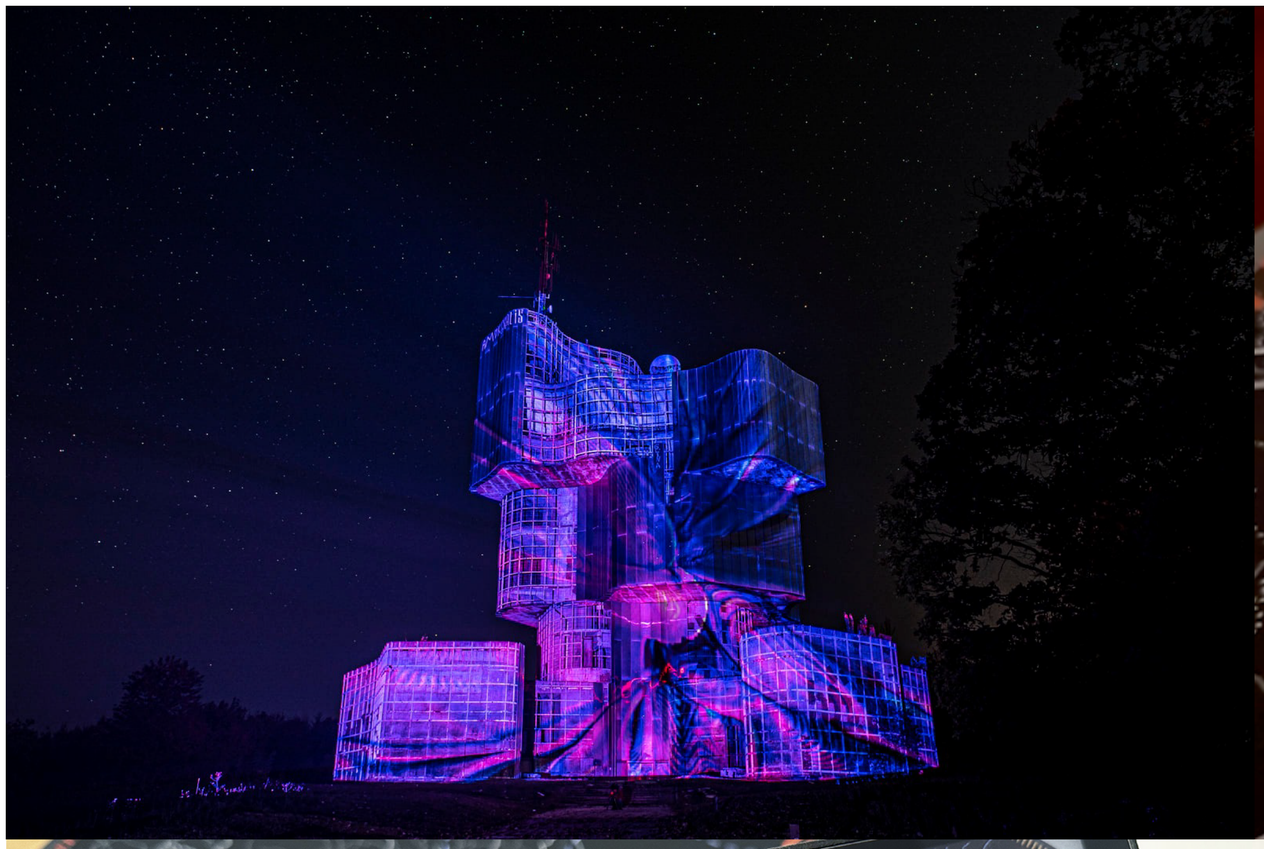
description:

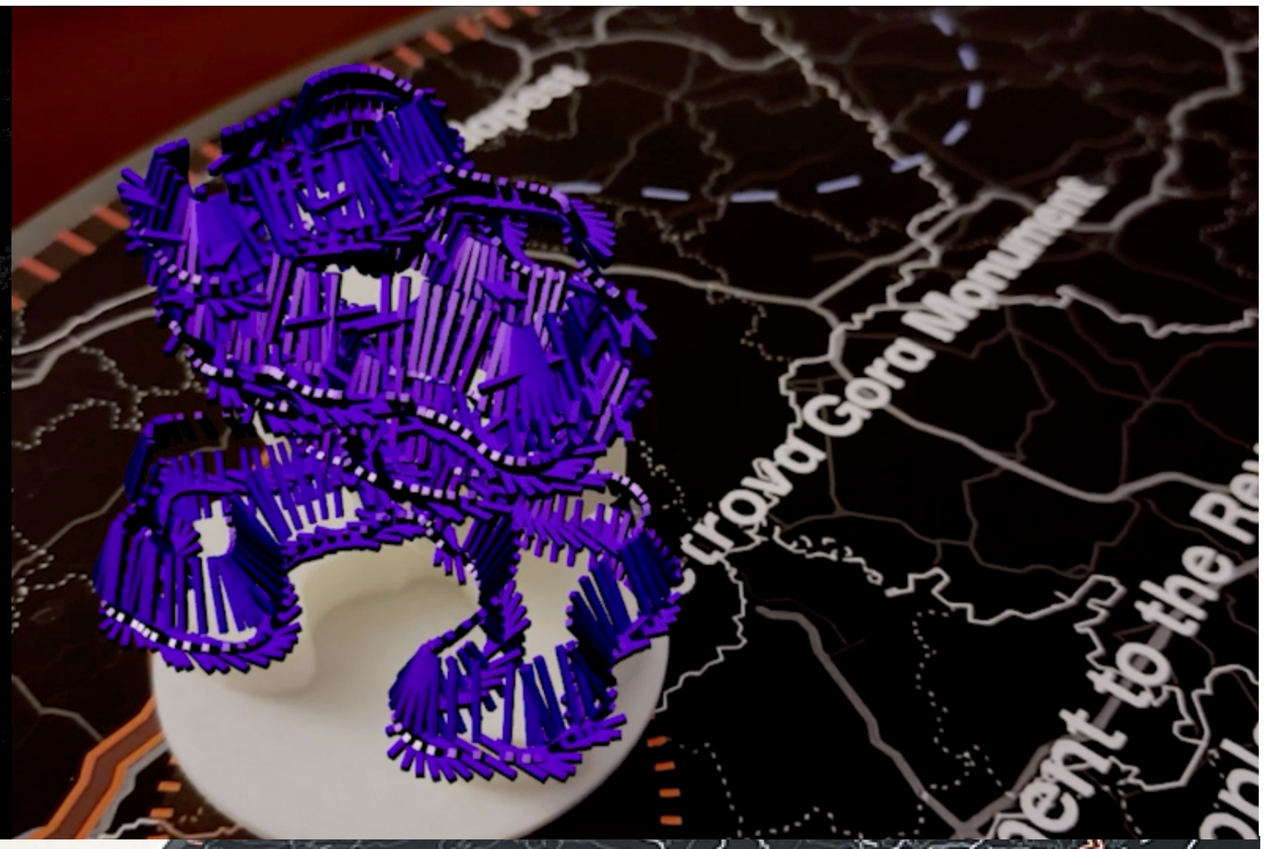
SecretMapping is a collective of artists formed out of a desire to express our creativity and artistic taste amidst the flood of repetitive corporate commissions.

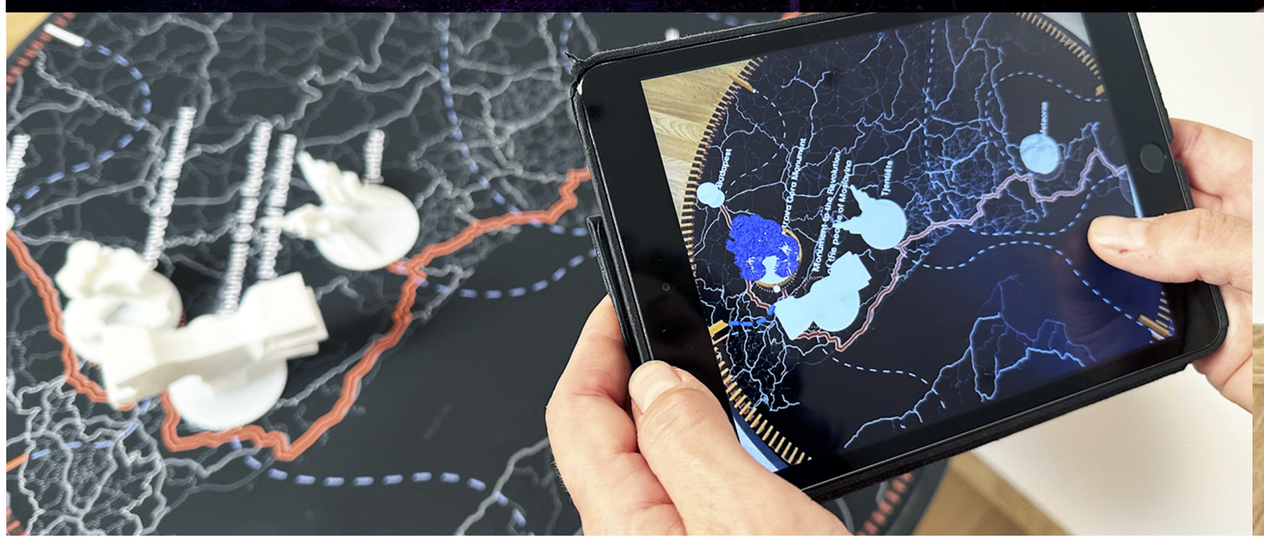
Throughout this project, we create projection mappings on abandoned buildings, decommissioned industrial machines, and forgotten architectural landmarks. Most importantly, we travel to visit these sites together. The goal is to reclaim these spaces—once vital, now silent—by reactivating them through light, animation, and storytelling. Each projection is site-specific, designed to reinterpret the structure's original purpose and aesthetic using the medium of **projection mapping**. By animating façades, reimagining forms, and illuminating decaying details, we symbolically give these places a *new life*, allowing the ghosts of the past to momentarily return and inhabit the space.

We usually have limited time on-site, so we prepare visuals in advance using online images or existing 3D models. On location, we adapt the content through mapping techniques or make quick adjustments—especially when using generative tools. A rare exception was the monument on the right, where we had time to **create a photogrammetric model** and precisely tune the visuals to its surface.

- go to project website







2023 **MiniGI**

co-creators:

Dániel **BESNYŐ**
Gábor **SZŰCS**
Jeanne **VÉZIEN**
Christian **SANDOR**

presentations:

XR demo booth
— ACM SIGGRAPH Asia, Sydney

tool usage:

(frequency)

Unreal Engine
— iOS Development
— AR Kit

description:

MiniGI: Guerrilla Mappings in Miniature is a scaled-down version of our *SecretMapping* work and visualizes an imagined route through five past destinations.

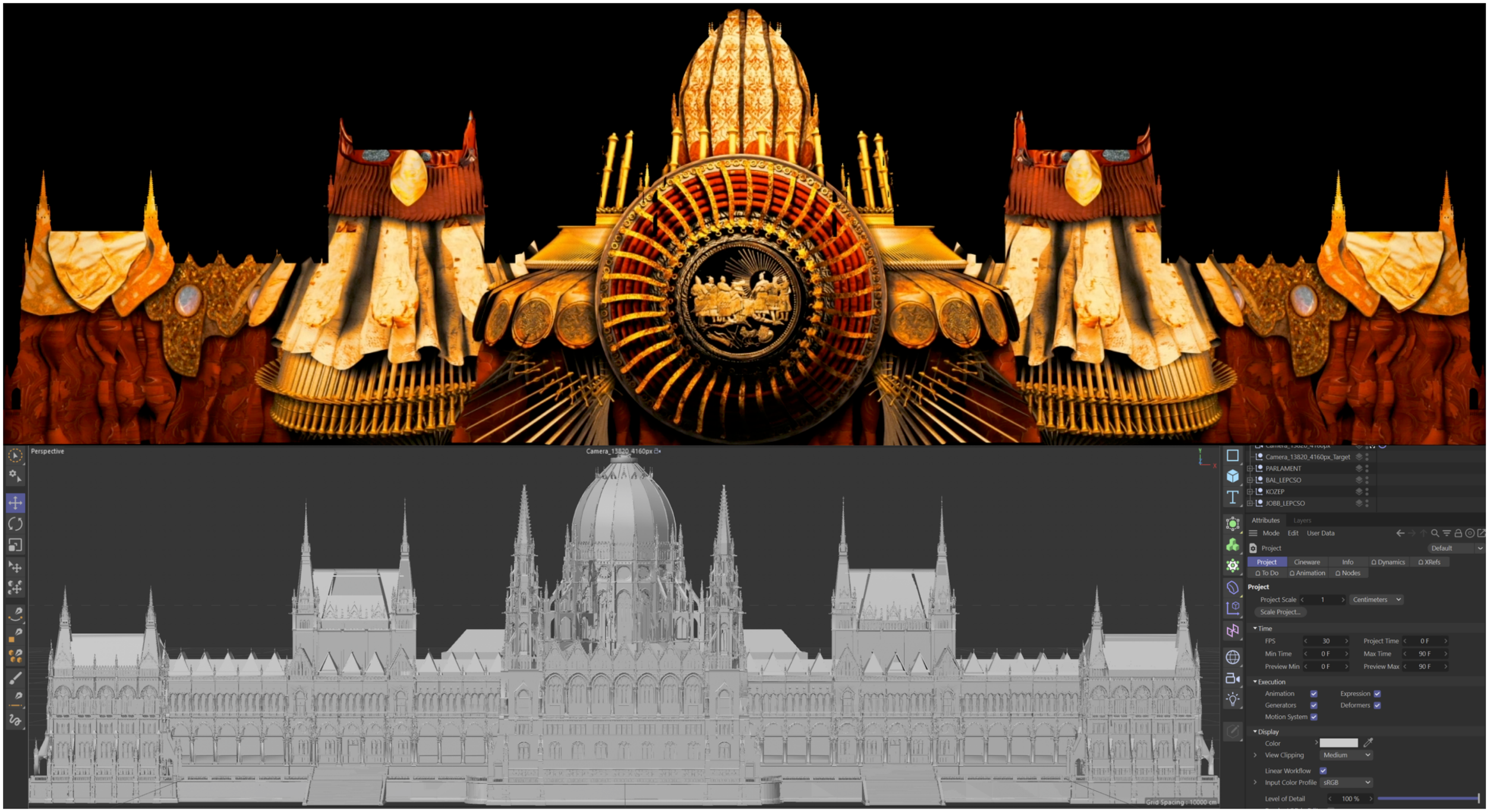
The demo consisted of a tabletop map with 3D-printed models of the buildings and landscapes we previously visited. The idea was to extend the projected visuals with AR elements. We developed an iOS application in *Unreal Engine 5* to render these spatial 3D visuals around the objects, visible through the handheld device's screen.

Users could interact with the installation. They could control a moving light that traveled along the route. It worked as a representation of the artists' position and their position along their journey. When the light reached a destination, it activated that site and the visualizations appeared around the 3D printed object.

contributions:

I shaped both the concept and the technical framework of the installation. I **developed the iOS application**, **built the interaction system**, **installed and presented** the entire project at the *SIGGRAPH Asia XR* demo booth.

- go to submission video



2023 3D Projection Mapping on the Hungarian Parliament

co-creators:

part of a 9-member team
responsible for the 3D animations
tailored for the building's facade

presentations:

live projection
— State Foundation Day,
Budapest
live broadcast
— online + national news

tool usage:

(frequency)

Notch
Cinema4D
Octane Render

description:

Creating 3D projection mapping on the *Hungarian Parliament* was the most technically demanding rendering project I've worked on, at an ultra-wide resolution of 13,820 × 4,160 pixels.

In both 2022 and 2023, I joined a 9-member team commissioned by *Centrum Production* to design projection-mapped content for the entire façade of the building.

The work was part of *Hungary's State Foundation Day* celebrations, featuring live projections on both the *Parliament* and the *Buda Castle*, broadcast nationally.

I used *Notch* as the primary rendering engine to handle the intense output demands, and I modeled custom 3D assets in Cinema 4D.

• go to aftermovie

2023 **Rozsda**

description:

The title *Rozsda* refers to the Hungarian painter *Endre Rozsda*. The installation features one of his paintings, *A kékszakállú herceg vára*. The title of this painting comes from an opera by *Béla Bartók*, a Hungarian composer. The installation includes a 20-minute-long excerpt from the opera, played through the spatial sound system of the dome immersive space.

The projection reflects the opera's content and builds upon *Rozsda*'s painting style. Visually, it consists of numerous small 3D elements that float and travel subtly in the dome's 3D space. These particle-like forms *breathe*: at times distancing from each other to create a suffocating, shrinking illusion, and at other times clustering into a membrane to create a spacious feeling for the visitors standing under the dome. In these moments, the particles align to follow the structure of Rozsda's original painting.

contributions:

I developed the project both conceptually and technically. The visuals were **generated in real time**, allowing the visitors to interact with the installation. At the center of the dome stood a totem-like object with a reflective surface that mirrored the ceiling. When visitors hovered their hands above it, they could stir the particle system and influence the movement of the visuals.

I also created an executable to assist the technical team in setting up the installation **every Wednesday for a full year** at the *Hungarian National House of Music*.

presentations:

open to visitors for 1-year every Wednesday at the Hungarian National House of Music

tool usage:

(frequency)

TouchDesigner
Intel RealSense

2021 # AURA

description:

AURA was designed for the 360° cylindrical projection system developed by *Jeffrey Shaw* at the *School of Creative Media* in Hong Kong. The projection surface reminded me of *Trajan's Column*, and I began to see the enclosed circular space as a timeline — a space where visitors come and go, enriching the space's history.

The idea of the project emerged during the COVID-19 pandemic, when physical interactions were restricted. I wanted to create an installation where visitors could leave a trace of their presence for others to encounter and collaboratively build *Trajan's Column*—a spiral archive of recent personal stories. After each person interacted with the piece, the space would rotate upward in a spiral, making room for the next visitor to leave a body-shaped imprint of themselves. Users could also rotate the spiral backward to revisit past traces left behind by others.

contributions:

To capture these 3D imprints, I used a *Kinect Azure* depth sensor. I developed the full system in *Unreal Engine 4*, including the visuals, interaction logic, and real-time playback. I was responsible for both the conceptual development and technical implementation, while receiving valuable conceptual and technical guidance from *Jeffrey Shaw*, *Christian Sandor*, and *Alvaro Cassinelli*.

mentor:

Jeffrey **SHAW**

co-creators:

Christian **SANDOR**
Alvaro **CASSINELLI**

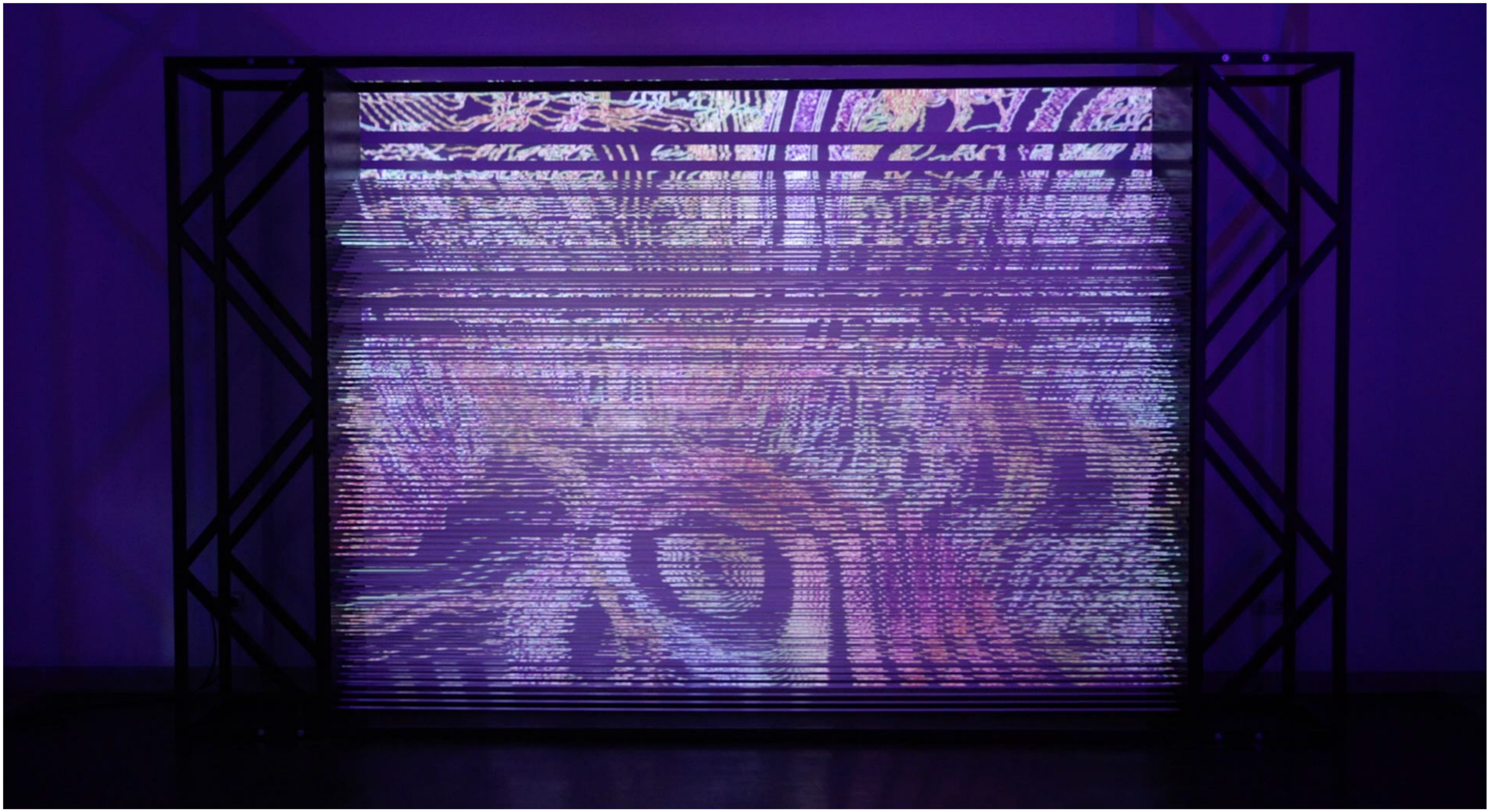
presentations:

internal presentations for visitors at the School of Creative Media

tool usage:

(frequency)

UnrealEngine
Notch
Kinect Azure



2021 DynamicalSystems

co-creators:

Mátyás **BOLDIZSÁR**
Máté **BREDÁN**

presentations:

online exhibition
— xCoAx Conference
exhibitions
— Hi! Could you generate me an immersive exhibition?
— solo exhibition at QContemporary, Budapest

tool usage:

(frequency)

TouchDesigner
Ableton
Python

description:

Dynamical Systems is an audiovisual installation that explores feedback and chaos.

We built a custom projection screen made from a steel frame enclosing layers of horizontally stretched white threads. These threads break up the projected visuals creating a sense of spatial depth through parallax layering, resulting in a fragmented image. Users could see the image differently depending on their viewpoint.

We used real-time generative visuals that explored feedback loops. The presence and position of visitors in front of the installation influenced the system's ongoing evolution.

We initially used 3D tracking (via OpenCV) to detect users' positions in front of the installation. Later, during the pandemic, we adapted the system for remote interaction, streaming a live feed of the installation and enabling users to join via webcam. In the online version, we tracked the visitors' heads and hands on their webcam feed. This allowed gestures from anywhere in the world to influence the visuals in real time.

We presented the work at *xCoAx 2021 Conference on Computation, Communications, Aesthetics & X*, where it was exhibited as part of the conference's online gallery.

• go to conference proceedings