

**Faculdade de Engenharia da Universidade do Porto**

**Mestrado em Multimédia**



# **HARMONIC DIALOGS**

**Report - Multimedia Lab**

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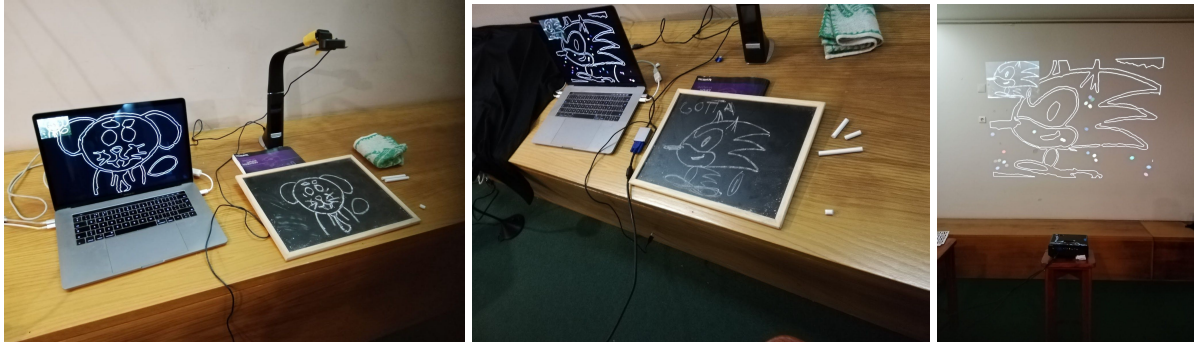
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# Introduction:

*Harmonic Dialogs (2020)* is a digital and physical experience where the users are given a computer vision system and an empty canvas to generate visual effects. The system analyses the images made by the users and projects them in big scale in the space of the installation.



This experience is presented to the users in a very free to explore way, allowing them to express themselves in a truly creative and non-traditional way and providing the users with a medium that they can get to know better with time, and where they can try out different ways of communicating their messages, feelings and play with other users.

This project focuses on the development of the social interaction project for the Multimedia Lab course of FEUP. The main objective of this project was to develop a multi-user interactive experience capable of promoting concepts, such as social interaction, collaboration and communication through multimedia technology.



Fig. 1 *Harmonic Dialogs* Logotype

Source: Own Source

## Goals:

The goals for this project are to provide the users with a platform where they can communicate or interact with other users in non-traditional ways. In this case, through the use of drawings, images or even video. This type of activity may be used in leisure activities such as in public bars, for more educational purposes, such as to stimulate younger children or kids with autism and even in kids playgrounds for them to have fun.

The project could have been conceived exclusively as an experience that allowed the user to have fun while drawing, but we also developed it as a way for users to enhance and explore their personal skills such as emotional expression.

Therefore, it was up to the group to harvest these potentialities and extend them in a more educational field linked to the cognitive and motor areas. Harmonic Dialogs intends to assist in developing emotional and psychological capacity, encourage imagination and creativity, and combat attention deficit by stimulating concentration and observation, and, additionally, through the possibility of co-creating memories and interactive messages, assisting in strengthening the bonds between participants. This was one of our goals all along, to provide the users with a dynamic medium to try out non-traditional ways of interacting and communicating with the people that are present in the same space.

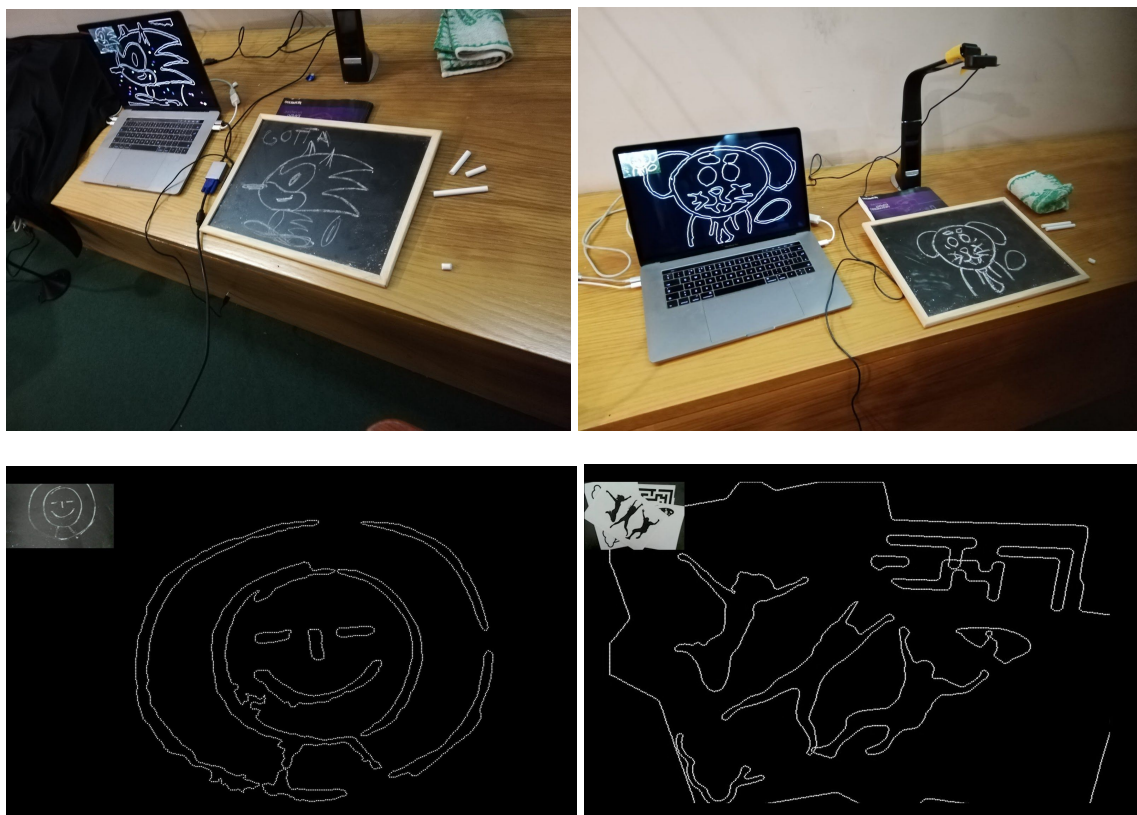


Fig 2. Project setup and some functionalities

with drawings on the chalkboard / Source: Own Source

## Double Diamond Process:

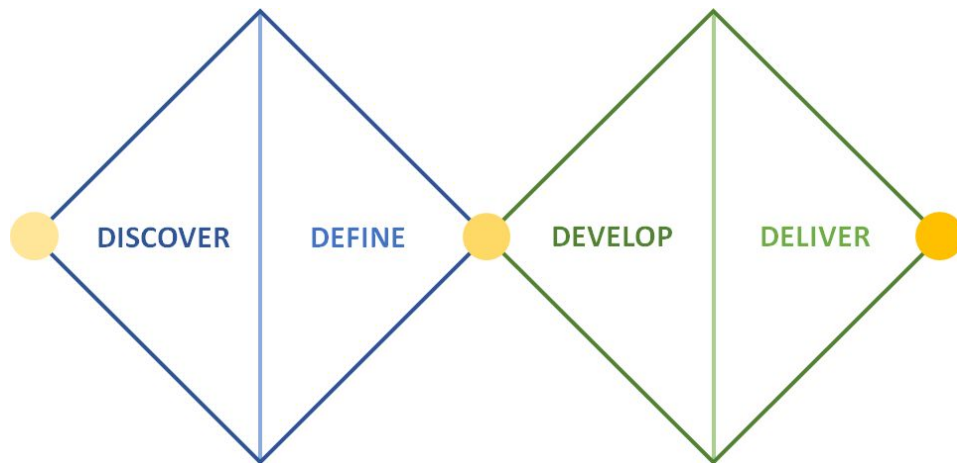


Fig 3. Double Diamond process diagram

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## Discovery:

In the first step of this project, we thought of developing a project focused on the interaction and cooperation between two users, not allowed to see or interact with each other physically, only interacting via their projected contour with an objective in common that would promote this interaction.

In the next phase, we ended up abandoning this idea, because the interaction would be limited, since the users, despite being free to explore, don't have a full freedom of interaction.

In the end, the group focused on developing a set of tools of computer vision that would allow the user to create his own contents and interact with the other people present in the experience, leaving a memory in the desired way to inspire or simply communicate with the next users of the installation, allowing more freedom of exploration.

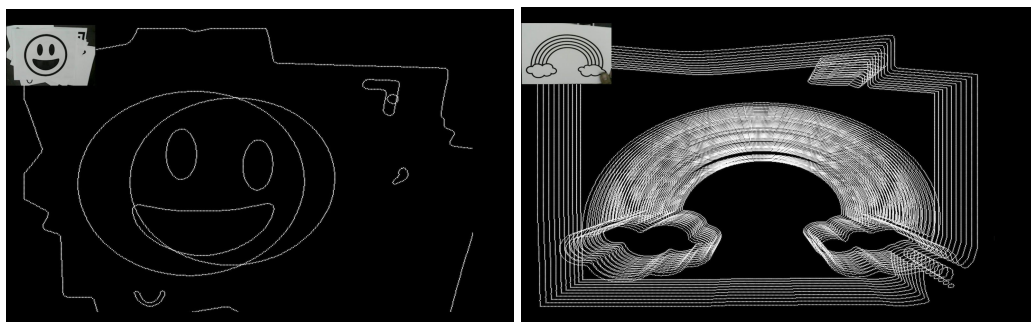


Fig 4. Some content created by different users during the experience

**Define:** The discovery phase led to the shift of the main objective to interpersonal, collaborative communication and personal expression through non-traditional ways of interacting with other users.

**Develop:** This stage consisted in creating a set of computer vision tools and ways so that the users can express themselves in a desired and adequate way. We obtained as a final result a chalkboard and several modes, visual and auditory, where the users can use and leave their creations for the next person using the system to be inspired by them.

**Deliver:** The delivery consisted of developing, testing, dealing with possible lighting difficulties, set-up and final presentation feedback from the teachers and fellow students to further improve the system with future work to be done.

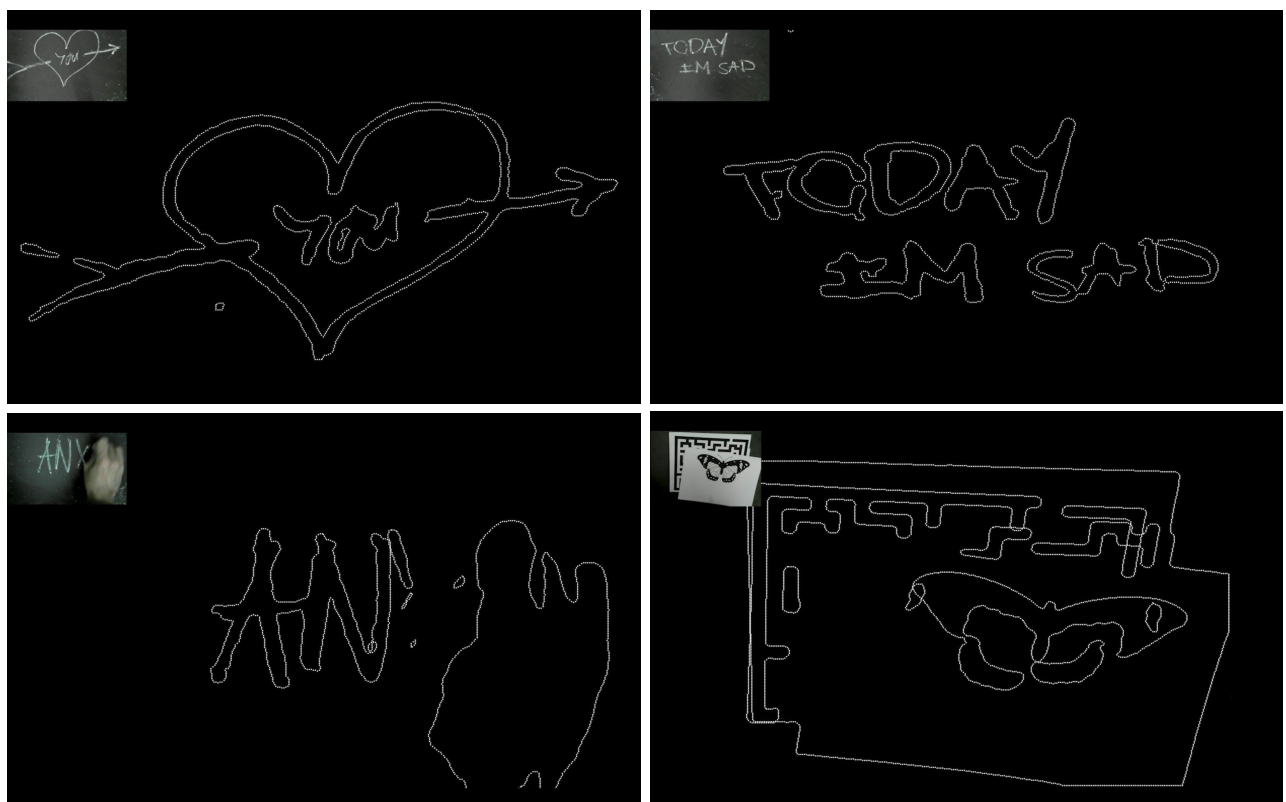


Fig 4. Example of drawn messages in the chalkboard by different users

## User Experience:

- **The Product:** People can draw or use images in front of the camera to generate visual representations of their creations. They can also record their creations so that a “memory” can be displayed simultaneously with the experience at any given time. **This “memory” is the product of all of the recordings made up to that point, and is also interactive.**
- **The Interface:** The project uses a computer vision system which captures the drawings and/or images made by the participants in a small chalkboard, and displays them through a projector. The images captured and projected by the system can also be modified through sound in real-time. Through the computer’s keyboard, the participants can also record a few seconds of their interaction with the system and/or play a “memory”, which is the product of all the recordings made up to that point.

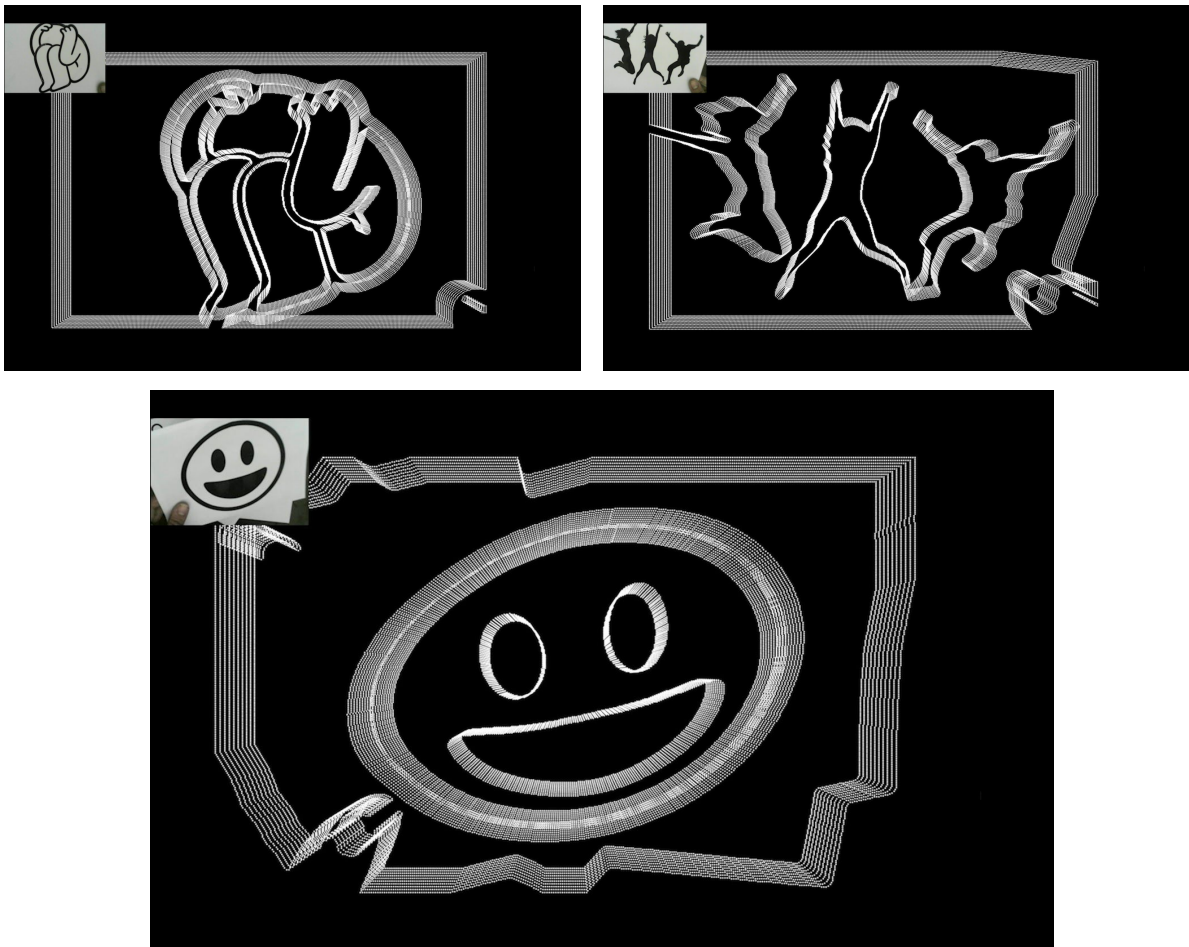


Fig 5. Interaction with a image capture and sound

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1. **Intended:** The participants use a chalkboard to make drawings and/or messages, which are captured by a camera, processed by a computer vision algorithm and displayed through a projector. The participants can then interact with the projected image through sound: depending on the sound volume detected by the system, the image reacts in a different way. There are also different “modes” of interaction with the image through sound, and these “modes” change automatically after fixed time intervals. Using the ‘R’ key on the system computer’s keyboard, the participants are able to make a short recording of their interaction with the system. The recordings made by all the participants are used as input for a “memory”, which represents a fusion of every recording made up to that point. This “memory” can be displayed simultaneously with the captured image at any time, using the ‘P’ key on the system computer’s keyboard. The “memory”, similarly to the image captured by the camera, can be interacted with through sound
2. **Real:** The participants use a chalkboard to make drawings, which are captured by a webcam, processed by a computer vision algorithm and displayed through a projector. The participants can then interact with the projected image through different modes of interaction, which can be changed by the participants using the numerical keys on the system computer’s keyboard. There are two modes of interaction with the image: through sound depending on the sound volume detected by the system, the image reacts in a different way. Another mode of interaction allows the creation of small colored particles, which collide with and bounce against the projected image, making a sound every time they collide. This sound is piano note, and the note played is tied to the particle’s color. In this mode, the participants are able to create more particles using the ‘B’ key in the computer’s keyboard. Using the ‘R’ key on the system computer’s keyboard, the participants are able to make a short recording of their interaction with the system. They can also play the last recording made as a “memory” at any time, using the ‘P’ key on the system computer’s keyboard. This “memory” is displayed by the projector simultaneously with the image captured by the camera, and can also be interacted with through the different interaction modes”.

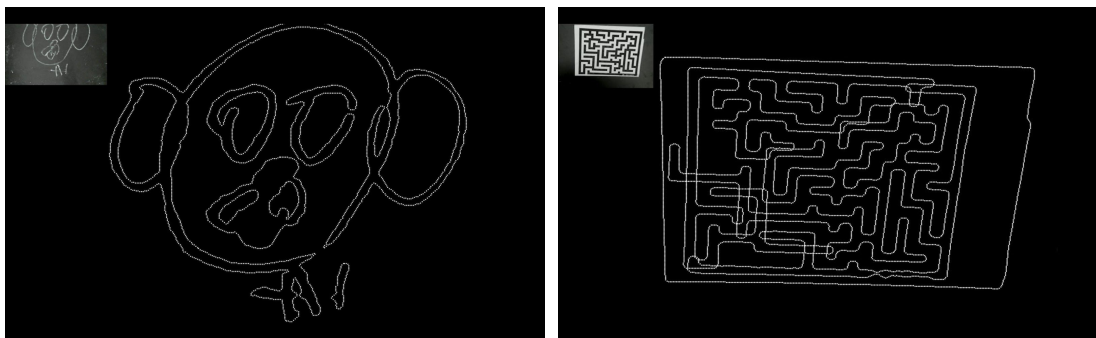


Fig 6. Images created and manipulated by different users



**Innovation Points:** Using visual and sound input to better express messages or create collaborative visuals with other people looks like a very interesting realm full of possibilities to be explored. Each new road taken can produce a lot of interesting, worth investigating results in terms of interactivity, multi-user interaction and communication.

**Future Improvements:** Make the different interactions and functionalities more user friendly and captivating as possible so that many different users will want to use this system, both individually or in a group.

### Technology and Interface:

#### Technologies:

- Computer Vision
- Computer Audition
- Generative Visuals

#### Interface:

- 1 projector
- 1 computer
- 1 webcam
- 1 chalkboard

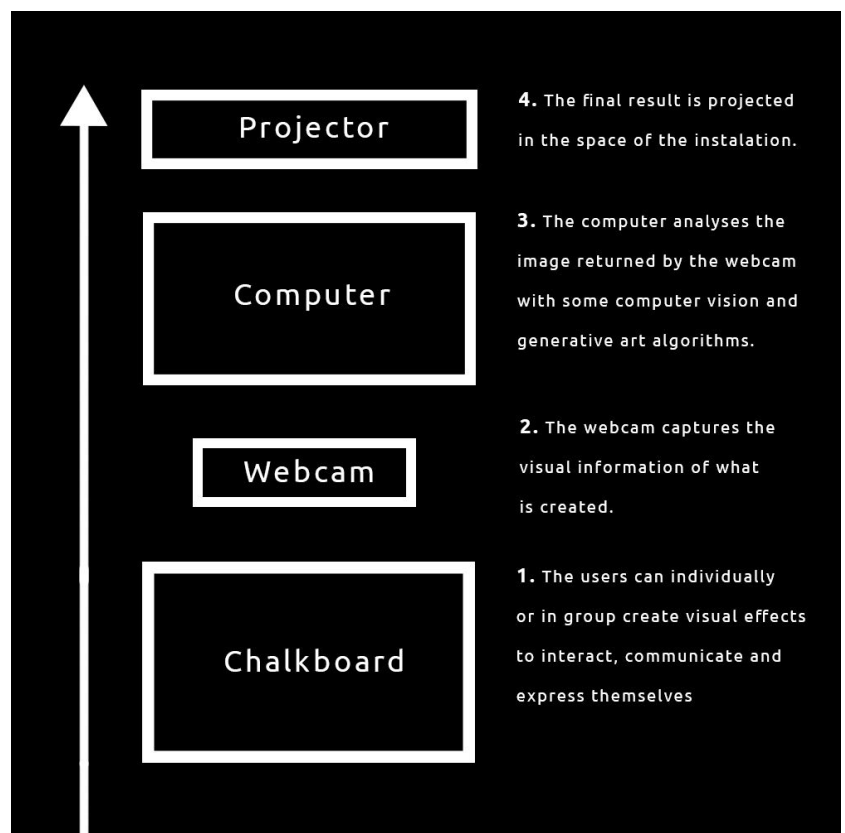


Fig 7. Technological concept explanation

# Communication of the Project:

## 1. Platforms

In terms of communication strategy, the Harmonic Dialogs project will be present on various online and offline platforms. It will be disseminated online through social media, such as Facebook, Instagram, LinkedIn, Youtube, and the website.

As for the first platforms, Facebook's strategy would settle on creating the page to disseminate information about the project. Also, release posts related to the experience, both video and photo format, so that the project can reach many audiences. In Facebook, we intended to reach a target placed in the adult age group, namely the parents of children and adolescents, who constitute the prominent target audience.

On Instagram, the group would publish photographs of the participants, real-time instastories to record the moments of the experience carried out in the room by visitors, to re-post their drawings and relive the experience. Also, polls would be an interesting strategy within the application for voting on the best illustrations. It will help other students in visual computing, generative art and multimedia get to know the project.

Through the project's success, promotional articles could be written to be shared both on the project website and on the students' LinkedIn to expand the project to a more professional audience, such as teachers. Since Harmonic Dialogs involves an educational aspect, it would be interesting to establish partnerships with primary and secondary schools, taking advantage of the project's potential at this level. The teaser video would be shared on all networks and released via the YouTube account. This video would be promotional and will serve as a motto for social networks' presence, inciting curiosity in public.

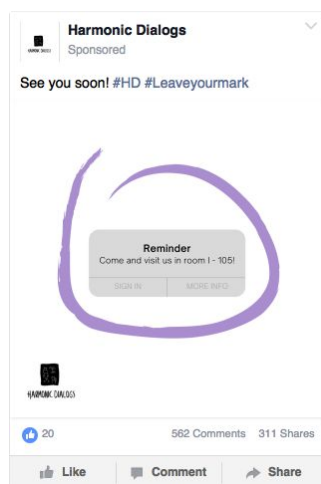


Fig 7. Example of a Facebook Post

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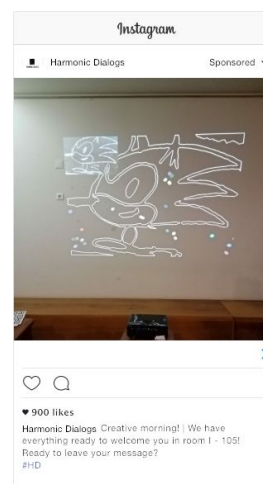


Fig. 8 Example of a Instagram Post

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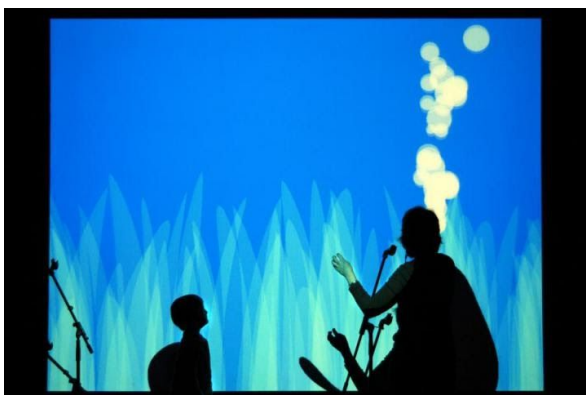
## Bibliographic Research:

These works of art were the main inspiration for this project. We decided to explore non-traditional social interaction and communication methods between the users of Harmonic Dialogs from these pieces. We can see the different non-traditional ways to stimulate interaction and communication between the multiple users present in this artwork from the videos presented.

[1]Levin Golan. (2007). Interstitial Fragment Processor [Video]. Vimeo.  
<https://vimeo.com/86071976>



[2] Lieberman Z. e Levin G. (2003). Messa di Voce. [Video]. Youtube.  
<https://www.youtube.com/watch?v=STRMcmj-gHc>



[3]Beal C. (2019). Augmented Reality Sandbox. [Video]. Youtube.  
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