Motion Reactive Sound Generation System for Immersive CAVE Environment

A Design Perspective

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The Fifteenth International Conference on Creative Content Technologies_CONTENT 2023

June 26-30, Nice, France

POLITECNICO MILANO 1863

IARIA

Giovanni Barone is a junior designer recently graduated at Politecnico di Milano.
Now he is studying Integrated Product Design Master Study, wanting to pursue a career in scientific research. His aim is to converge his design professional skill and his competence in electronic Music, with the purpose to create different kind of experience.

POLITECNICO
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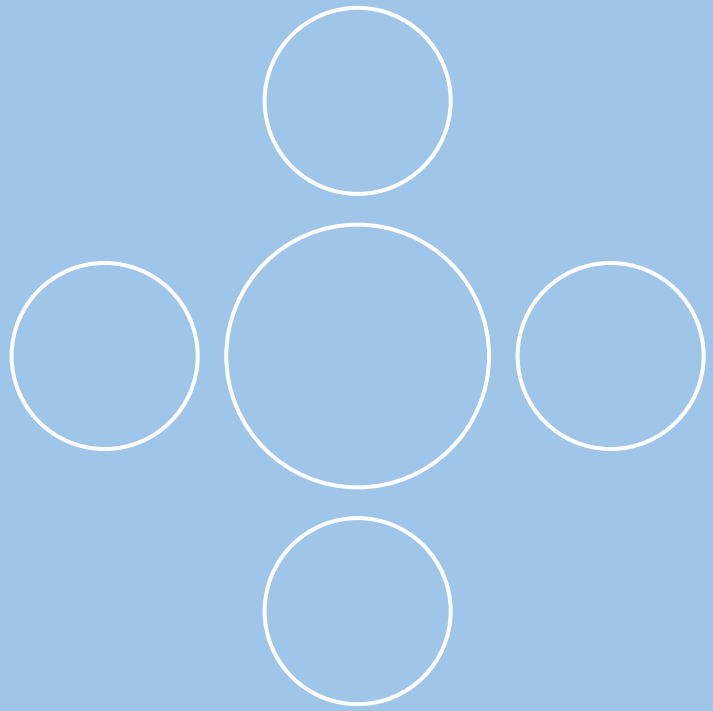
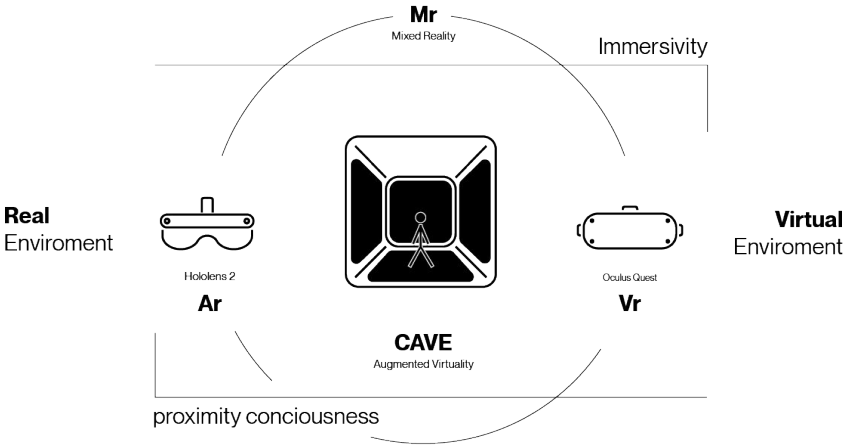
IARIA



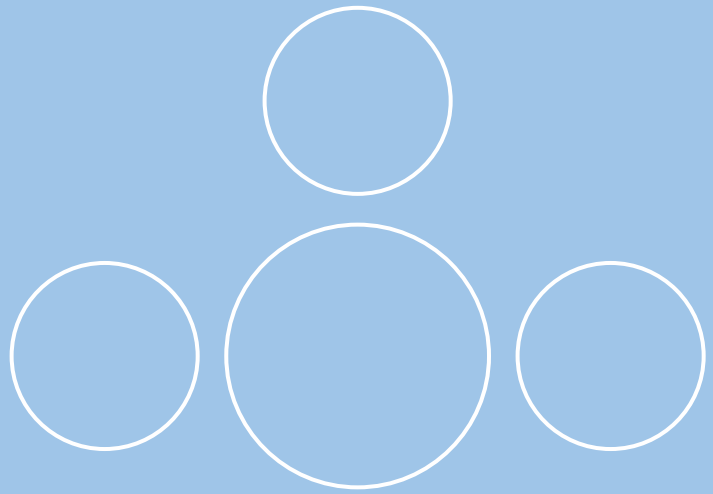
1

Introduction

In recent years, to increase the degree of immersiveness of an experience, **technologies are employed** and integrated that allow the user to go beyond what is tangible and visible in physical reality, adding **additional layers of perception**.




Literature review
Case study analysis
Model theorization



2

Immersive experience

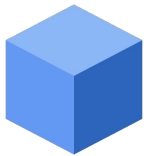
Immersivity is a phenomenon that can be experienced when an individual is in a **state of deep mental involvement**.

_ P. Milgram and F. Kishino. A taxonomy of Mixed Reality visual displays (1994).
_ S. Agrewal, A.M.D. Simon, S. Bech, K.B. Bærentsen, and S. Forchammer. Defining immersion: literature review and implications for research on audiovisual experiences (2020).

Therefore, **immersive experience** can be defined as the **perception of being a part of a different environment** than our normal day to day.

CAVE systems are **AV environments** where the user's experience takes place within walls, on which a **virtual world is projected**, equipped with a **motion tracking system** that becomes an intermediary between the virtual world and reality.

_ *M.A. Muhanna. Virtual reality and the CAVE: Taxonomy, interaction challenges and research directions (2015).*



A physical cubic room

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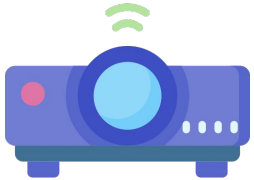

Video-projectors that recreates the virtual world on the cube

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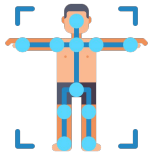

Motion tracking systems

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Computers

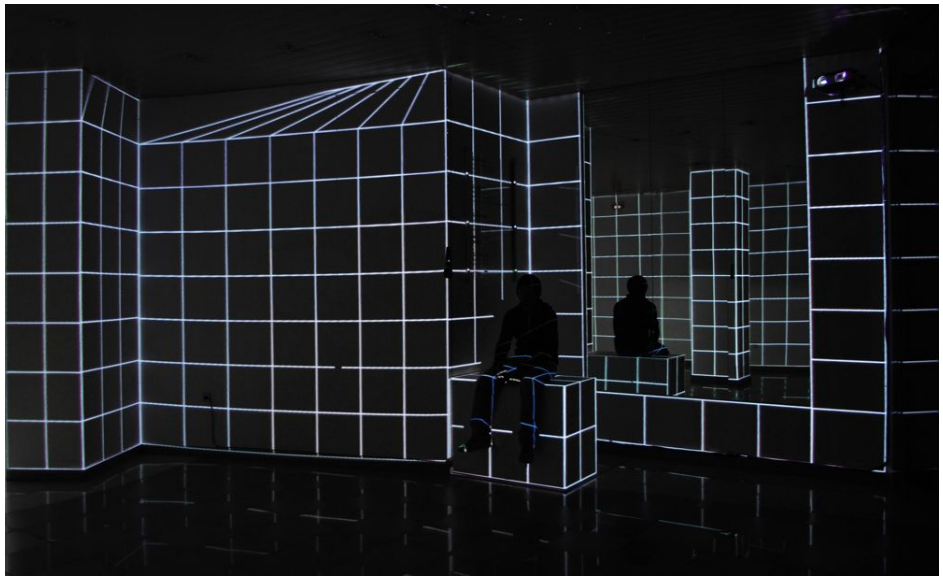
These systems enable **authentic interaction between the user and the virtual world**, creating, for example, dynamic and responsive scenarios influenced by the user's movements.

3

Audio reactivity

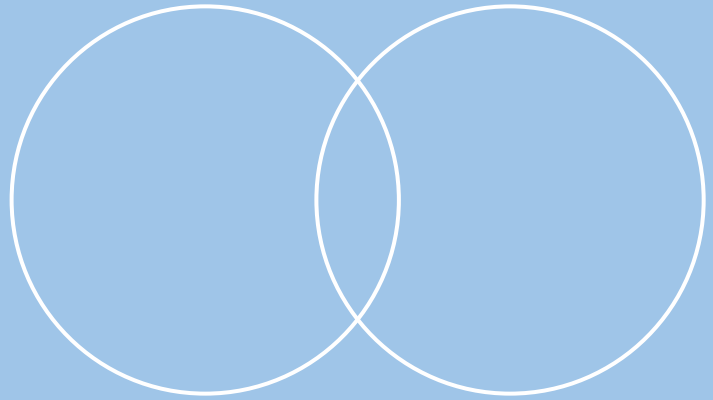
By **audio reactivity** it is mostly meant the whole world that has to do with **visual elements that are generated or changed to the rhythm of music**.

_ *N. Collins. Generative music and laptop performance (2003).*



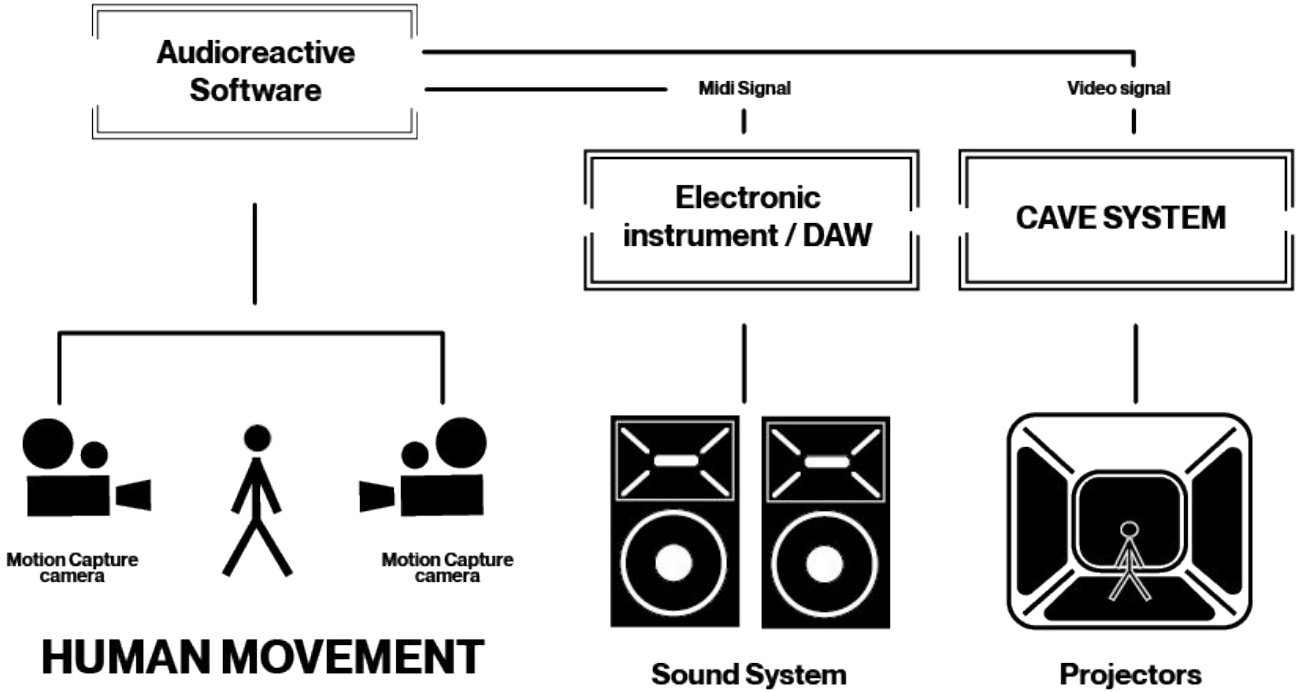
Audio reactive installation by Quadrature

Techno shamanic vision by Jon Weinel



4

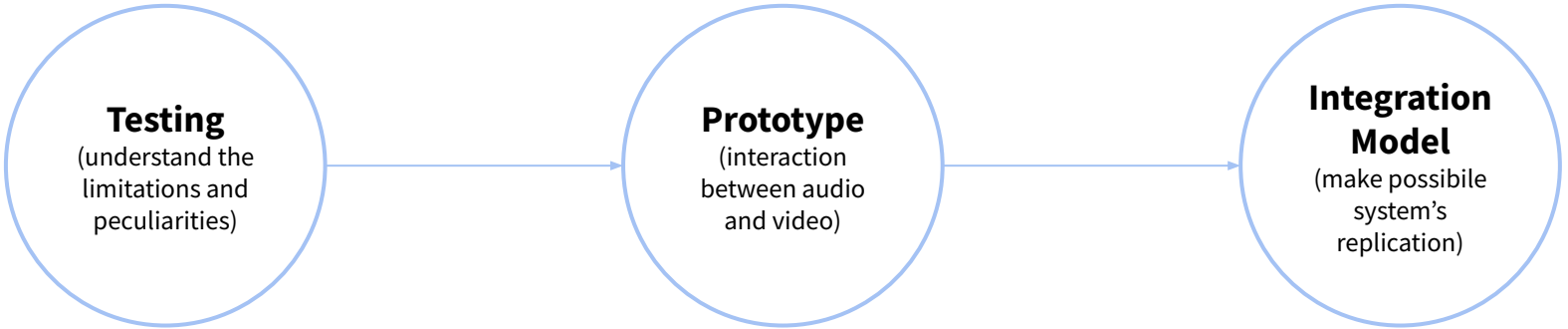
MRSG system


Audioreactive Software
Midi Signal
Video signal
Electronic instrument / DAW
CAVE SYSTEM
Motion Capture camera
Motion Capture camera
HUMAN MOVEMENT
Sound System
Projectors

Starting from audio reactive systems and their operative functions, the aim is to hypothesize a change in the process of application of such technologies: if in the field of VJing music is an input to create visualizations, through the hypothesized system **the scope is to create music using visual sources**, and to be precise cameras that integrates motion capture technology to control sound generating machines through the MIDI communication system.

5

Discussion


Testing
(understand the limitations and peculiarities)
Prototype
(interaction between audio and video)
Integration Model
(make possibile system's replication)

The application of these technologies and systems to immersive environments can **enhance the level of multisensory and cognitive immersion**.

For sure, the main issue and **challenge** is going to be encountered during the development stage of the project, when the **different hardware should be linked to each other through to exploitation of ad-hoc software**.

Thank you for the attention

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