Final Project Proposal

Intr_cept (or My Idea of Fun)

People and Roles

Visual development: ..... Elie Zananiri
Sound development:..... Philip Viel
Conceptual development: ..... Lucie Bélanger

Programming Jitter 3D tracking: ..... Lucie Bélanger
Programming Jitter animation: ..... Elie Zananiri
Programming Jitter sound: ..... Philip Viel

Animation development:..... Elie Zananiri
Website development: ..... Philip Viel
Set construction and accessories:..... ALL

Project Description

"Intr_cept (or My Idea of Fun)" is a responsive environment where the participant can play ball with a virtual being projected on a wall. While the ball is being thrown towards the wall, its position will be determined in real-time and the projected character will move according to that position. When the ball hits the wall, the projection will give the impression that the virtual being hits it back. The installation will bring the participant to instantiate a physical dialog with a virtual being.

Conceptual Interests

The project builds a bridge between solitary moments of our childhood and today's rarification of these moments, as a consequence of our highly connected lives. Everyone remembers a solitary game they played as a child when all their friends were away. These games, enriched with a child's fertile imagination, are symbols of creativity. They transformed instants of solitude into playful moments. Technologies are allowing the adults that we became to fill these "gaps" in our social lives. We can be constantly connected to another person through communication technologies. The virtuality of our relationships shifted our perceptions of sociability and solitude.

We decided to use a ball game to represent the solitary child game. Everyone has already played ball against a wall, imagining all sorts of challenges or adventures to augment this simple game. This decision is based on the physicality of the game. A ball does not have any reference to the virtual, it is a physical object that is associated to children and games. The virtuality of the piece is only reflected by the projected person on the wall. We can imagine that person as being a friend, throwing the ball back at us and thus, transforming the solitary game into a virtually social activity. The control of the interactive piece is given to the participant through a simple ball. Since a ball is a very common object, it will easily break the barrier between the participant and the technology. The ball is also an element of surprise in this interactive installation since we have no pre-determined expectations related to virtual environments, contrary to a gamepad for example. The participant is free to do what they want with the ball, she can throw it in the air, dribble... but if she throws it on the wall, she will soon find a partner to play with.

We will need to find a balance between the sense of control and the richness of the response. We want the participant to engage with the piece and with the character. In order to give some personality to the character, we will introduce the idea of missing a catch. It will avoid the participant to predetermine the result of the throw, will add some humor and bring the participant to be aware of the other's "feelings" through pity, laugh or anger.

Following this idea of relationship, the project is also about bringing the virtual to act upon the physical word and to create a dialog between a physical and virtual being. We are interested in examining how the participant will engage with the virtual character. How does a relationship build between a person and a virtual character? Does physicality helps breaking the boundary?

Technical Interests

The main technical pursuits of this project can be divided into three parts: 3D tracking of the ball in motion, development of an animation algorithm to react to this movement in real-time, and generation of a soundscape responding to the tracking and melding with the visual outcome to create a rich environment.

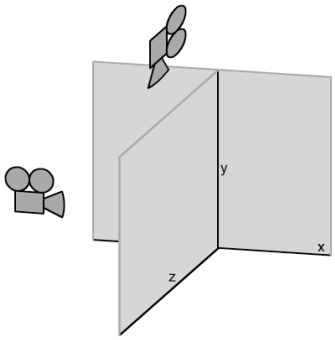

Fig 1: 3D tracking planes

The 3D tracking will involve the precise combination of two live camera feeds. One camera will be placed parallel to the projection, it will be responsible for analyzing the z and y axis (depth and height). A z-coordinate of 0 would correspond to the moment the ball hits the wall. The second camera will be placed on top of the installation, looking-down on the z and x axis (depth and width). The combination of these 2 planes will allow us to get the x, y, and z coordinates of the ball on its trajectory towards the wall. Special calculations and adjustments will have to be made on the live analysis to take into account image distortion due to perspective (i.e. an object moving in a straight line on the z axis actually has a diagonal trajectory when represented in two dimensions).

Programming an animation algorithm to respond in real-time to the position of the ball will require the development of an an efficient image sequencing technique. The animation sequencing must be fast in order to respond to the ball movement, and flexible to accurately and realistically reflect the physical world. In order to do this, the image sequences will be built in a tree-like structure, where each path leads to a different position on the projection, and each step in the paths will be visually consistent with the previous and following steps. This tree structure will allow to select displayed images dynamically based on the position of the ball, while giving a natural flow of movement to the resulting animated sequence. To keep the game interesting, the user must throw the ball exactly on the targets. If he misses, the projected character will show some sign of deception or disapproval. This added challenge and behavior will bring a playful aspect to the installation, while keeping it captivating for more than a few minutes.

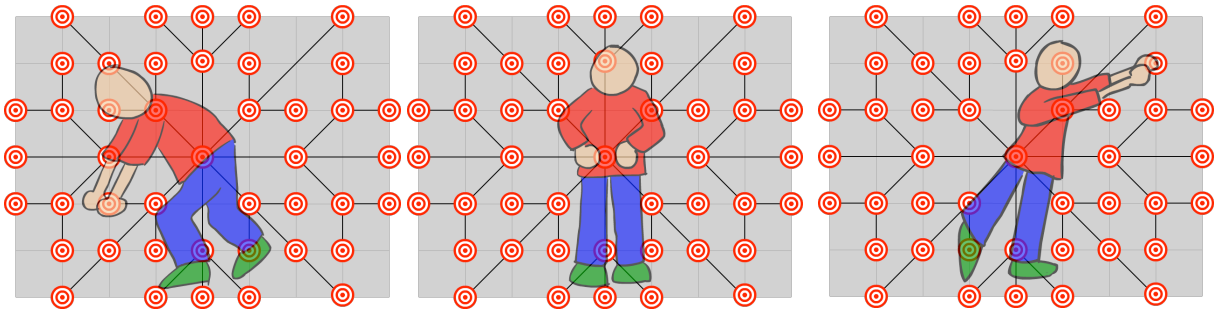

Fig 2: Representation of the image sequencing to fulfill the live animation.

The installation will also include an interactive sonic environment. The participants will be immersed in a soundscape that will shift based on their position as determined by the 3D tracking system. The audio will be used to create scenes and invoke different environments that could go from the concrete sound of a busy schoolyard to a more abstract and virtual personification of imaginary sonic fields. It will be as if the decor of the space would be made up of sound, that is sound will used to create an Audio Scenography of the room. The sound will most probably be made using the Max/MSP environment or using the SuperCollider audio synthesis language. The main goal for the sound component in this project is to extend the possible meanings and interpretations of the piece as well as to retain the participants attention and interest a little longer and also to make sure they're absorbed by the installation.

Deliverable

The final project will be a responsive installation triggered by the position of a ball in a 3D space. The system will track the ball in 3D and animate a character in real-time according to the physical coordinates of the ball. The complexity of the character animation will be determined during the process.

The final presentation will take place on November 27th in EV 7-745. The studio has been booked accordingly, for installation, testing and final presentation.

Resources needed

2 webcams
1 camera (for capturing frames)
2 laptops
speakers
projector
wall for ball + projection
ball
a studio
hooks and wire (to set up)

References

Myron (WebCamXtra) – open source computer vision and motion tracking library
Jitter recipes, book 3 – interesting Jitter visualizations and motion capture examples
Definite Clause Deduction – decision tree Java applet
Wikipedia: Decision tree
Wikipedia: Computer vision
Wikipedia: Optical flow

Milestones / Timetable