

Communio: an intimate interactive installation in cooperative gameplay

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ABSTRACT

Communio is a 3 person cooperative game / art installation designed to combine the socially transformative power of play, and the perceptual manipulative powers of immersive media, to intensify the communal experience between participants. The installation consists of a 5.5' diameter planetarium dome, upon which interactive graphics are projected. Participants lie down inside the dome and look up at the screen while wearing LED bracelets on each wrist, which are position tracked by a camera. By waving their hands participants are able to manipulate the graphics in order to cooperatively win an action/puzzle game.

Keywords

cooperative games, installation art, interactive experience design, immersive dome, gestural interfaces, interactive planetarium

1. GOALS

The base goals of this thesis are to create a cooperative and intimate gameplay experience. These goals are achieved through close attention to gameplay alongside environment design. The design of games and space can have a strong influence on how we engage socially with one another. Whether it is the game field or the neighborhood, the rules, limitations and modes we accept as part of our social contract with one another construct much of our reality.

In addition, immersive media technology has a power to reshape our perception of reality. Through such techniques as enveloping the visual field and intuitive gestural interfaces, immersive technology enables us to more

intimately experience our media and create new sets of rules and parameters for reality.

The goal of increasing intimacy in gameplay interactions among strangers presents a set of social challenges for interactive experience design. With the audience being the general public, the social boundaries of personal space, eye contact, physical touch and avoidant behavior were present. In addition, some immersive media technology can actually introduce new social barriers in the form of stereo glasses, head-mounted displays, and single user head tracking.

2. Environment

In his famous book *Homo Ludens*, Ludologist Johan Huizinga lists several terms to refer to the boundary between play-grounds and the real world. He describes these bounded spaces as:

Forbidden spots, isolated, hedged round, hollowed, within which special rules obtain. All are temporary worlds within the ordinary world, dedicated to an act apart.¹

One term he lists is the "magic circle". The term derives from the practice of ancient magicians inscribing a circle on the ground in order to construct a spiritually safe space for carrying out spells and protection against negative forces. In addition it acted to contain and focus the positive energy created by actions within the circle. In its essence, it provides a point of focus for meditative practice.

As noted by Katie Salen and Eric Zimmerman in their book *Rules of Play*²

The term magic circle is appropriate because there is something genuinely magical that happens when a game begins... Within the magic circle, special meanings accrue and cluster around objects and behaviors. In effect, a new reality is created, defined by the rules of the game and inhabited by its players.

In *Communio*, the space of the installation is itself a circle, consisting of a 5.5' diameter circular dome skylight used as a projection screen, supported by 4' stilts that form an igloo-like structure with three openings around its sides. Participants enter and lay down on a lushly padded surface and look up at the projection screen above.



The screen envelops most of the participants' field-of-view, providing a meditative focus by shutting out most outside stimuli other than the projected media. The soft surface provides a sense of comfort and security for participants to interact closely. The placement and orientation of participants' heads creates a singular communal point-of-view, while the parabolic nature of the projection screen reflects the sound waves of speech into a focal point coincident with this point-of-view. The effect is a sensation of an overlapping mental head space that intensifies the feeling of unity and shared experience among players.



Another magical effect of assuming new rules for interaction when you enter into a play space is a loosening of normal social boundaries; the best example being that of the party game *Twister* where people willingly assume compromising and intimately close positions in the name of play and fun. By defining the activity to take place inside the circle of *Communio* as a "game" and providing interactions that are fun, the goal of increasing intimacy is given a default leg up. The fact that people are oriented in such a way so that they are close to one another, without actually having to look at each other closely, widens this social boundary loophole further.

While sexual intimacy is an underlying element in the work, the intimacy focused on here is less personal and more fundamental, taking the form of laying in close proximity to others, fleeting physical contact, and a shared cooperative activity.

3. Interface

While participants lay down, they put on bracelets with bright LEDs attached. Each of the three people has their own respective LED color: red, green or blue. A USB camera with a wide-angle lens in the apex of the dome tracks the movement of each LED bracelet. By using super-bright LEDs and placing neutral density

filters over the lens, the camera only sees the bright colored dots of the bracelets, while the dim surrounding lighting and clothing of participants is not exposed and appears black.

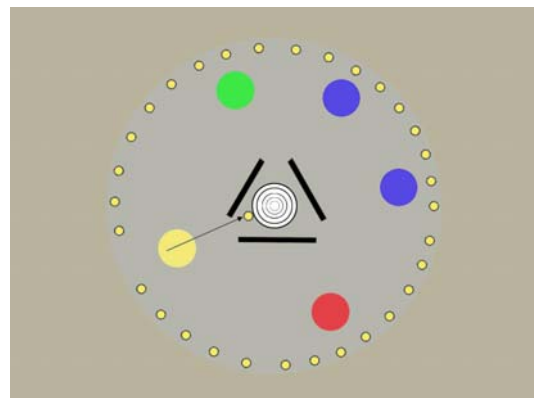
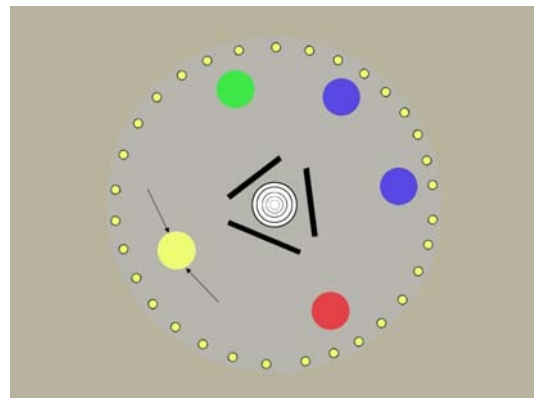
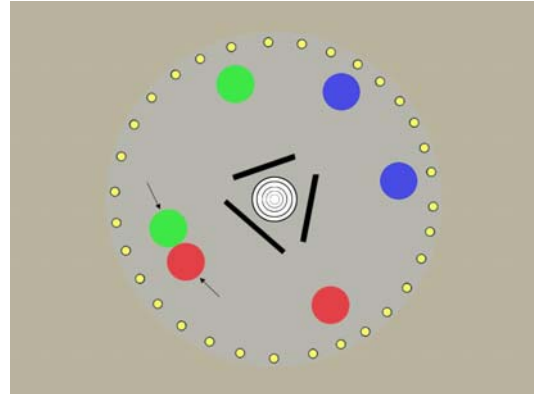


When participants move their hands, projected circular paddles on the screen move with them. Each is colored the same as their corresponding LED color. This basic intuitive control of simply waving your hands makes the game more accessible by lowering the barrier of entry and avoiding having to learn complicated controls before moving on to executing the play mechanics. In addition, this intuitiveness allows players to let the controls fade into the background and bring them into closer contact with the media.



3. Gameplay

The gameplay is a cooperative mix of an action-puzzle-shooter. Like the classic games *Pong* and *Breakout*, the paddles deflect balls that move around the screen. When players move their LEDs closer together, their paddles change to yellow, which then triggers one of the nearest yellow balls rotating around the edge to fire into the center. A series of white rings in the center represent the target that players must hit with the yellow balls.



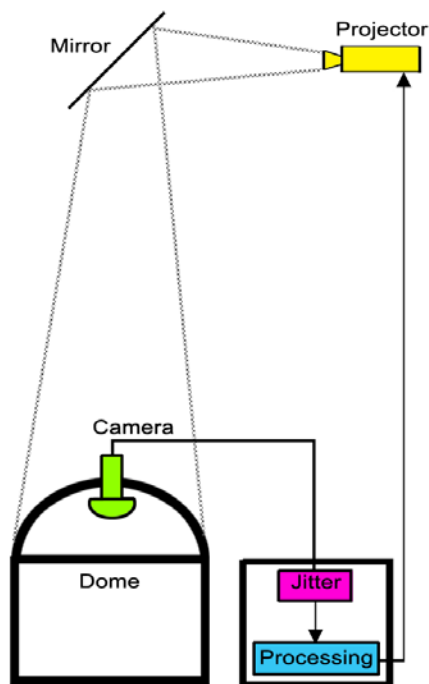
A triangular barrier rotates around the target, and deflects any yellow balls that strike it. Players

must coordinate their actions to shoot yellow balls through gaps in the barrier to strike the rings that make up the target. When all the rings are destroyed, the yellow balls and target reset.

In addition, white balls are ejected out from the target that destroy the yellow balls upon collision, but that can be deflected by the paddles. Players must coordinate and balance their offensive and defensive tactics to destroy the target and win the game.

4. Technology

The hardware configuration consists of a Dell Inspiron E1705 running Max/MSP-Jitter³ and Processing⁴. The webcam sends a video stream showing the colored LED dots to Jitter which then analyzes and tracks the location of the dots. The XY coordinates of the dots are then sent to Processing via Jesse Kriss' MaxLink⁵ library. Processing uses the coordinates to draw the paddles in the same position as the LEDs and drives the rest of the real-time graphics.



These graphics are sent to a projector which bounces light off a ceiling mounted mirror down onto the dome screen. The screen is a custom manufactured skylight made of white translucent acrylic.

5. Prior Art

At the beginning of the process of designing this thesis, I was influenced by the cooperative games that were part of the *New Games Movement* founded by Stewart Brand and others in the early 1970s in the United States as a response to the Vietnam War.

One such game is *Chute Ball* where a large ball, painted like Earth, sits within a circular parachute and is moved around by players holding and the lifting the edges of the chute. As described in the *New Games Book*:

For the ultimate in group coordination, get the Earthball rolling around the edge of the parachute. To keep it moving on the chute without it flying off requires a steady wave-like motion, with the Earthball nestled ahead of the crest. The rhythm, harmony, and cooperation this entails makes the game as beautiful as it is challenging.⁶

Another game is *New Volleyball*. One variant called *Infinity Ball* is played with the same rules of traditional volleyball where each team can only hit the ball 3 times before sending it over the other side. However, the score comes when either team successfully sends the ball over the net. The score is shouted out in unison by both sides. This creates a cooperative game where everyone works together to keep the volley going as long as possible in order to reach a high score.

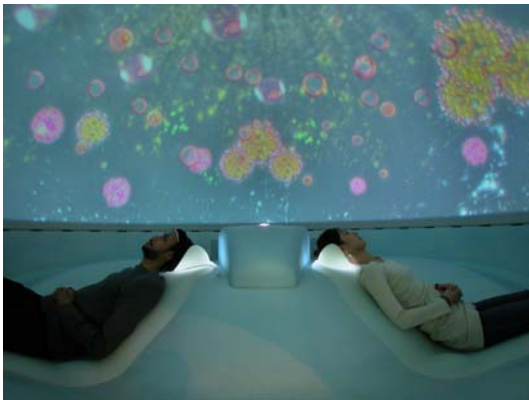
The spirit of fun, cooperation and the positive power of play were strong elements within the movement, and are something I tried to capture in the design of the game mechanics in *Communio*. Bernie DeKoven, the co-director of the *New Games Foundation*, articulates a theory of fun in his book *The Well-Played Game*. Central to his theory is the concept of *CoLiberation*. DeKoven describes this as:

What happens when we work extraordinarily well together. Like on a basketball team or in an orchestra, when we actually experience ourselves sharing in something bigger than anyone present...It's the experience of the ME empowering the WE empowering the ME. ME and the Other freeing each other. Me and the Harmonic creating the music, ME and the Group Mind, the Team Spirit creating each other.⁷

The gestural interactive walls by Zachary Booth Simpson's group *Mine-Control* are an inspiration as far as designing cooperative games between

small groups of people in front of projection screens. One work in particular is *Save the Baby?*⁸ where players must use the projected shadow of their bodies and other objects to move cartoon alien creatures towards a baby on one side of the screen. The creative collaboration along with intuitive gameplay was a strong influence.

The installation *Wave UFO*⁹ by Mariko Mori is very similar in its physical construction to *Communio*.



Participants lie down and look up at a front projection dome screen. Sensors attached to their heads monitor their brain waves and manipulate the projected imagery. Different colored cells are projected on the dome and represent electrical activity in the two halves of the brain. Two cells coming together represents the two halves of the brain working together in “coherence”. This idea of a unified point of view and immersive media influencing our mental functions influenced the physical design of *Communio*.

6. Conclusions and Future Work

One of the most successful aspects of the project is the creation of an inviting space where people are comfortable to lie down next to one another and share an experience. The social boundary loophole of being close while not having to look at one another was very successful as strangers throughout the exhibition lied down together with little hesitation. The soft cushioned floor, its resemblance to a child’s play fort, and the act of staring at the visuals in the “sky” of the dome were aspects players particularly enjoyed.

While the physical design has been very successful, some improvements to tracking and more robust bracelets that can be seen from

wider angles by the camera will create a solid platform for developing future projects. Utilizing the immersive quality of the screen is one area for improvement and experimentation. Inducing sensations of movement, such as flying and falling, could be particularly interesting in this physical orientation as well as in a shared experience.

Mechanics that encourage more improvisational and creative gameplay, as well as physical contact have been envisioned. Creating music similar to the game *Electroplankton*, and flying through audio visual landscapes and tunnels similar to those in *Rez* are two strong influences and potential points of reference for future revisions.

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¹ Johan Huizinga, *Homo Ludens: A Study of the Play Element in Culture* (Boston: Beacon Press, 1955),pg. 10.

² Katie Salen and Eric Zimmerman, *Rules of Play* (The MIT Press, 2003),pgs. 95-6.

³ Cycling '74, *Max/MSP-Jitter*, <http://cycling74.com>

⁴ Ben Fry and Casey Reas, *Processing*, <http://processing.org/>

⁵ Jesse Kriss, *MaxLink*, <http://jklabs.net/maxlink/>

⁶ New Games Foundation, *New Games Book*, (Main St Books, 1976),pg. 165.

⁷ Bernie DeKoven, *The Well-Played Game: A Playful Path to Wholeness*, (Writers Club Press, 2002), pgs.149-50.

⁸ Zachary Booth Simpson, *Mine-Control*.
<http://www.mine-control.com/savethebaby.html>

⁹Mariko Mori, *Wave UFO*. 2003.