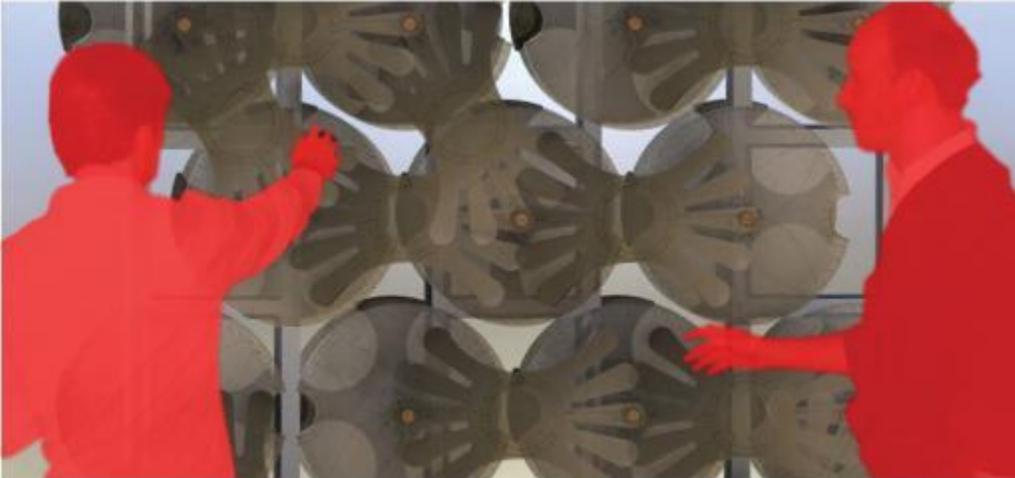


STITCHTURES: INTERACTIVE ART INSTALLATION FOR SOCIAL INTERVENTIONS

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The purpose of this paper is to describe the design and development of Stitchtures-interactive art installation for shared spaces. Physical and digital co-design activities are described in the development of the piece inspired by biological systems and collective behavior. The combined methods respond to the specific aims of the project, which investigates the effects of design and technology interventions on aiding interactions among people.



Stitchtures

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Stitchtures is an interactive art installation for people. It is a dynamic piece that encourages people to interact with it. As the interaction occurs, the art installation evolves. Consequently, inclusion of the art installation is dependent on the interaction of individuals with both single and individual and multiple and group individual contacts. The installation consists of a series of overlapping three-dimensional surfaces inspired by everyday objects. Interactions with the art piece occur via sensing technologies that are informed by biological systems. As people approach and interact with the art installation, visual feedback of shifting modalities invite, motivate and engage users.



no caption

INTRODUCTION

Interaction with other individuals seems to be a simple operation but may represent a challenging task for some people. Shared common areas in public spaces are great opportunities for interaction. Yet, sometimes they are highly underutilized. Designing interactive art installations for shared common areas

in public spaces can help people counteract lack of human interaction. An interactive design that benefits and grows from the involvement of multiple people may allow individuals to connect through interactive creation. The purpose of this paper is to describe the design and development of an interactive art installation, *Stichtures*, for shared spaces. The specific aim of the project is to investigate the effects of design and technology interventions in aiding interactions among people.

STICHTURES FRAMEWORK

The overall goal of the project is to investigate the effects of design and technology interventions among older adults in common shared areas. We identified different motivations to develop *Stichtures*. One is related to increasing interactions among people. Another motivation is related to bringing people closer to nature and art. Lastly, motivating people to move is of central importance.

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PHYSICAL AND DIGITAL CO-DESIGN

Designing an interactive art installation encompasses design in the physical and digital realms. These realms cannot be separated. Instead of foregrounding the creation of interactions and interfaces that map onto and access digital information, there is a need to explore when and how digital computational media can be drawn back to the physical environment and how physical interactions can model digital behaviors. [1] This practice can be referred to as physical and digital co-design. Co-design requires a collaborative and interdisciplinary team. As such, different disciplines including industrial design, human computer interaction, and computer vision were brought together to respond to the needs of designing an interactive art installation.

CONCEPTUAL DESIGN DEVELOPMENT

The design of this project began with team members from industrial design. Early explorations involved studying how to materialize interactions and how those physical representations can coexist with digital interactions. Initial explorations included developing concepts that addressed the ability for technology and design to contextualize users withdrawn from their surroundings. The design team began with a focus on studying patterns. One of the earliest considerations used analog cell phone flashers (flashing LEDs from frequency waves) to create reactions within a patterned system. In this version, the intention was to bring attention to the effect of self-isolation on one's surroundings and helping others realize that they are continually involved with their environment and those around them. The issue of the concept was limited by the fact that the end user would not consistently use such technologies to activate the interaction as expected.

During this phase, the team focused on studying examples of interactive art installations that were interactive and reactive. Wall projects include the Adobe interactive installation; [2] the Aperture facade installation with interactive and narrative displaying modes consisting of an iris diaphragm matrix, whose variable diameter is the main interaction with the piece; [3] and the Living Wall project, [4] which aims at creating electronically enhanced wallpaper with touch sensors, LED's and Bluetooth technology, allowing users to touch decorative elements of the wall to turn on lamps, adjust heating, or activate a stereo. Lastly, the interactive wall Mes Etoiles responds to proximity of people. The closer one gets to the wall, the larger number of dots are light up in the surface activated by the embedded proximity sensors and LEDs. [5] All these examples represent a way of using designed surfaces for people to communicate or to build collective creations using their bodies as instruments.

Having examples of interactive art installations, Stichtures iterations focused on surfaces development. Investigation of patterns included developing a moodboard containing references to adult's everyday objects such as clothing, linens, upholstery, décor and jewelry. The goal was to lead design decisions around familiar forms while avoiding the presence of obtrusive devices that may intimidate or discomfort the users. This approach responded to the need of bringing about a physical design that was familiar to our end user.

As the refinement phase of the pattern progressed, a repetitive floral motif emerged, similar to a quilt. Quilts are physical comforters made of repetitive patterns traditionally composed of three layers of fabrics combined using the technique of quilting. Meaning, the joining at least two fabric layers by stitches. This allowed the team be inspired not only to develop a layered three-dimensional pattern but also to use conductive thread for stitching the pattern as a unified installation. Quilts also evoke the idea that users are building this piece by stitching together the sections of a whole. Simultaneously, it also allows the design to be linked to nature by emphasizing the plant and floral aspects of the form.

Digital interactions were also biologically inspired. By looking at nature as a source of inspiration and innovation, the art piece's core idea was framed on behaving like a living plant that requires care and attention (interaction). Through different versions, formal designs were simplified, abstracted and molded individually from natural variations of the Clematis flower (Clematis Vitalba, Clematis Jackmannii, and Clematis Stans respectively). As an integrated pattern, forms were refined by looking at the behavior of the liana. The liana vine uses trees and other vertical support to climb canopies to reach sunlight. This intertwining concept was adopted. The art piece was the designed with growing sections that permanently light up and, like the liana, they go from piece to piece and connect all the pieces as the art piece grows.

The final design consists of several layers containing a total of 52 modular pieces and distributed in a designated area of 97.25x84.50x10 inches from the actual retirement community common shared space. There are three different types of layers, which have a distinctive pattern designs. One of the layer designs covers a grid area of 4x4 modules with 16 modules. Each module is 21.75 x 21.75 inches. Additional layers cover a grid area of 4x8 modules with 28 modules. Each module is 21.75 x 14.75 inches. All modules are cut from transparent acrylic, of which two of the three distinctive designs are white fabric backed. These are attached by architectural aluminum rods, which allow the hard wiring to run throughout the piece. All modules are hand stitched with conductive thread to bring power to LEDs. Each modules hold white colored LEDs.

In order to promote a more natural form of interaction with the art installation, the interactive technologies development phase was based on behavioral patterns found in nature connected to communication. For example, behavioral communication patterns were noted in how animals interact at close proximity. As input mechanisms with the art installation, proximity patterns were defined to provide an active area large enough for two or more people to interact with the piece and prevent situations where users get drawn too close to each other that it repels them or too far from each other that they don't interact.

In terms of output mechanisms in the art installation, there was a need to provide an unspoken language that is easy to recognize to the users. Blinking was defined to lure users closer to the piece. The design decision was inspired by fireflies and how they use blinking lights to lure their mates. Additionally, the monochromatic white light and fabric mimics species without defenses that need to blend with the environment. [6] This mimicry creates a more relaxed invitation that uses the idea a defenseless animal to make the piece approachable instead of using the shocking invitation of bright colors to bring users into interacting with the art installation.

The result is an interactive art installation where the only form of feedback is through the use of monochromatic light. Sets of white LEDs accentuate sections of individual modules becoming the voice of the piece. Approximately 2000 LEDs create a series of organic patterns in three types of interactions: invite, engage, and motivate. Each interaction has its own method of communication (see figure 5). For the invite interaction, blinking is used to attract users to the art installation. Once an infrared range finder detects a user in its 5-meter sensing range, the LEDs on the outermost layer starts blinking (pattern #1). As the user gets closer, the blinking slows down until the LEDs become permanently on.

At close proximity, the piece focuses on the engage interaction. This form of interaction is centered on real time feedback that responds directly to users' actions. Phototransistors detect shadows casted by users and immediately respond to the user's actions by creating dynamic light patterns in the back layer of the piece (pattern #2). The more users simultaneously interact with the piece, the more patterns become lit up.

Finally, to encourage users to continue interacting with the piece, the motivate interaction is implemented. Inspired by plant growth, the motivate interaction is based on the amount and type of user input. As users interact with the piece by activating the phototransistors, sections of the last layer (pattern #3) permanently light up. This permanently lit state represents the growth of the plant with ivy like shape. The more users interact with the piece, the more the plant grows and the more sections of the piece permanently light up. To control the growth rate, a timer determines when the next piece should light. The count is renewed when a new section is lit. Conversely, a second timer initiates to control the to decay of the plant, turning off sections when no interactions occur. Additionally, the piece accounts for collaborative actions in the motivate interaction mode by only lighting the center sections of the circles when two or more people interact with the piece.

CONCLUSION

Bringing design and technology to common shared areas in public spaces may increase social interaction among people. This paper described the physical and digital co-design of art pieces inspired by nature. Designing art installations to aid social interaction remains to be explored. Yet, Stichitures was designed to be an interactive installation that creates an environment which proliferates communication through

the meeting of design and technology. This dynamic piece encourages people to interact with it, which causes the art piece to evolve. However, the evolution of the piece depends on the interaction of multiple individuals; a single individual will only have a temporary effect on the piece. The co-dependence on others inspires communication between individuals, which builds to create a greater sense of connection on a human level.

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