

A COMPUTATIONALLY ENHANCED PLAY BOARD FOR GROUP INTERACTION

Orit Shaer^{1,2}, Babak Ziraknejad¹, Ken Camarata¹, Ellen Yi-Luen Do¹ and Mark D. Gross¹

¹Design Machine Group
Department of Architecture
University of Washington
Seattle, WA 98195 USA
+1 206 543 1604
{oshaer, babak, kcamarat, ellendo,
mdgross}@u.washington.edu
<http://dmg.caup.washington.edu>

²Department of Computer Science
Tufts University
Medford, MA 02155 USA
+ 1 617 627 3217
oshaer@cs.tufts.edu
<http://www.cs.tufts.edu>

Abstract

People Pretzel is a computationally enhanced game board that aims to encourage informal social interaction in public spaces. The People Pretzel uses sound, light and visual images to entice community members to participate in playful group interaction. To play, the players are required to collaborate, using their bodies as playing pieces. This physical interaction is computationally mediated and augmented to produce an improvisational multimedia performance for the enjoyment of players and spectators alike.

1. Introduction

Public spaces such as courtyards, elevator lobbies and hallways are places where informal meetings and collaboration frequently occur [2]. These public spaces not only serve as crossroads for daily activities but also as gathering places within a community where people tend to talk and informally interact. Inclusion of public art in these spaces can improve their attractiveness, stimulate conversation and foster a sense of community. Interactive public art pieces may provide opportunities for social interaction and encourage the formation of informal collaboration and social connections.

People Pretzel is a computationally augmented interactive art piece that aims to spark informal social interaction among community members by enticing them to participate in playful group activity. Interacting with the People Pretzel play board often results in a “pretzel” of people. Thus, the activity encourages the formation of informal collaborations and social connections. Physical interaction with the game board is computationally augmented to produce an improvisational multimedia performance. The system allows community members to choose their level of participation in the social activity as players or as audience thereby enabling each person to take part in the group activity and fostering a sense of community.

1.1. Related Work

Several games and public art projects are related to the People Pretzel play board. The ‘dance steps’ public art project [1] inlays brass dance steps along Broadway Seattle. The dance steps propel passers-by to try a rumba or a tango dance. Yaakov Agams’s “Fire and Water” sculpture is a fountain located in a central square in Tel Aviv. At fixed hours, a show of music, fire, spouting water and rotating colored elements is provided by the fountain. The fountain attracts tourists as well as residents to the square. The content of the show and the spectators’ need to shift points of view during the show stimulates conversation and spontaneous interaction.

Dance, Dance Revolution (DDR) is a new form of video game entertainment [4]. It involves stepping on a console in time with music while a screen interface indicates dance steps players must take. The complexity and speed increase with time. This physical interaction accompanied by music provides fun to players and spectators alike.

The Twister game [6] serves as a main source of inspiration for this project. It evolved from an earlier version called “Pretzel” [3]. The goal of Twister is to outlast opponents by stretching and entwining the body around a large vinyl sheet emblazoned with multicolored circles, without falling down. With more than two players, the vinyl sheet became so crowded that the results were often hilarious. In order to make the game more interactive and to encourage inclusion of more community members in the social interaction, we computationally augmented the Twister experience. We replaced the Twister spinner, which required a non active participant to “call the fate” of the next player in a computational selection algorithm. The goal of the game changed from outlasting individual opponents to surviving as a group as the levels of difficulty posed by the computationally enhanced board increased. Thus, the game board encourages group interaction that includes audience as well as players. The overall experience is enriched using audio streams and images as well as recorded on video. The audio stream sequence played during the game creates the soundtrack for the video. Thus, the video not only captures the play experience but also serves as an artistic product that is collectively created by community members.

2. Scenario of Use

People Pretzel is located in a public space such as a courtyard or a hallway in a university or organization campus. The board automatically lights a sequence of circles while playing audio streams and projecting images to attract passers-by.

The game rules are projected on the wall below the changing images. When the first player steps onto the board an opening musical signal is played. When a circle is lit, one of the players must press this circle before the next circle is lit while continuing to press as many previously lighted circles as possible. When a circle is pressed its associated audio stream is played and a new image is displayed on the wall. The speed is increased over time. The rapid events and movements result in an entertaining group interaction and an improvisational multimedia performance. At each movement change a camera captures a still frame. Eventually all the images are assembled into a stop-motion animation of the game. The game is over when the players miss two circles in a row. Then the animation is projected on a nearby wall for the enjoyment of players and audience alike.



Figure 1 Group interaction with the People Pretzel play board

3. The People Pretzel System

The People Pretzel System consists of four components: a play board, a projector, a video camera and a computer. Figure 2 illustrates the system architecture.

The Handy Board microcontroller [5] runs an Interactive C control program which listens to signals from the PC and the play board. It implements the game algorithm and manages users' interaction with the board. The Handy Board communicates with the play board via its expansion port (see next section for details) and with the PC via a serial port. A Java application on the PC responds to signals received from the Handy Board by playing audio streams, displaying images, activating the camera playing the game animation or sending signals to the Handy Board.

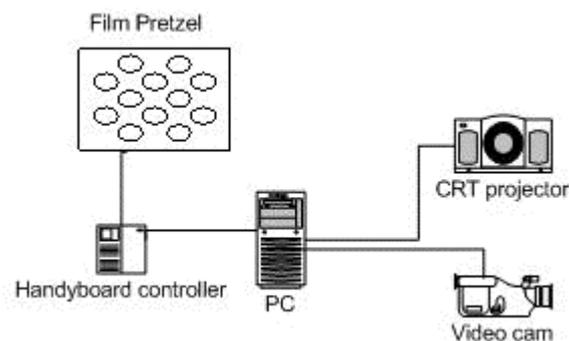


Figure 2 The People Pretzel system architecture

3.1. Computationally Enhanced Play Board

The People Pretzel board is four feet on each side and consists of twelve eight inch circles (see figure 3). The board was designed to accommodate players with different body sizes. The maximum number of simultaneous players may vary from four adults to seven children. The board is elevated two inches from the floor surface to create the feeling of a performance stage.

Each circle contains a pressure sensor and an LED. The sensors connect to the Handy Board's expansion board analog input ports. The LEDs connect to one of the Handy Board's eight digital output ports or one of its four motor control ports.

Each circle is associated with an audio stream and an image. When a circle sensor senses pressure the Handy Board interprets this signal, the game algorithm makes a decision for the next movement, and a signal is sent to the PC. The PC responds by playing the associated audio stream and projecting an image until a different circle is pressed. These signals are also used to activate the camera or determine the play board mode of operation.

The play board has three modes of operation: standby, active and game over. In standby mode the play board automatically selects and lights circles to attract users. When a signal from a pressure sensor is received the board's mode is changed to active. In active mode the control program manages the game session. When the game is over the board awaits a signal from the computer notifying that the animation was displayed and then board mode is changed to standby.

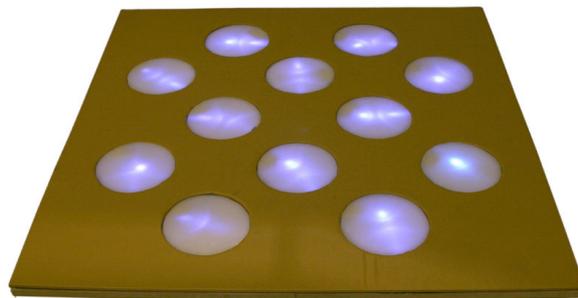


Figure 3 The People Pretzel play board

4. User Feedback

We demonstrated People Pretzel in a courtyard at a university building. During demo night, more than two dozen community members (students and faculty) interacted as players and audience. The maximum number of collaborating players was four. In more than three sessions players consisted of students and faculty. In other sessions players were drawn into the middle of the game. During all sessions the audience was active and interacted with the players by coaching them. We received positive feedback from players as well as audience.

As a result of demo night we changed the game's standby mode. We added sounds and images to the presentation of lights to draw more attention from passers-by.

We plan to reinstall the play board in the university courtyard, monitor users' interaction with the system and analyze its effect on creating informal social interaction.

5. Discussion and Future Work

We are interested in how pervasive computing can be used to encourage social interaction. We designed a computationally enhanced play board as a means for promoting informal interaction in public gathering spaces. People Pretzel uses audio, light and visual information to intrigue passers-by to participate in a playful social interaction. It augments physical group interaction in a multimedia performance for the enjoyment of the players and the audience, allowing any community member to participate in group activity in an active or a passive manner.

We intend to turn People Pretzel into a programmable physical interface. Users will program it to support a variety of games or to control environment parameters such as lights and background music. Users will program the system with a high level description language that will be

automatically translated into an Interactive C program and downloaded to the Handy Board microcontroller. By allowing users to easily program a physical user interface we provide them with tools to shape and enrich their collective experience in a community gathering space.

6. Acknowledgments

We would like to thank Julius A. Schorzman and Todd R. Simeone for their hard work and creative approach that contributed to the project and the students in the Physical Computing class for their feedback. We would also like to thank Robert Jacob and Nancy Leland from the Computer Science Department at Tufts University.

This research was supported in part by the National Science Foundation under Grant CCLI-0127579 and ITR-0326054. The views and findings contained in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

7. References

- [1] BCC Program Brings Artists into the Public Arena, <http://www.bcc.ctc.edu/bcctoday/fall00/art.stm>
- [2] Employees on the Move, Steelcase Workplace Index Survey, April 2002.
- [3] HOFFMAN D., Great Toys from our Childhood, Chronicle Books, San Francisco, CA, 1996, p. 39.
- [4] SMITH T., Video Game That's Good for You, in: The Early Show CBS News, June 2002. Also in: <http://www.ddrfreak.com/newpress/CBC%20News.htm>
- [5] The Handy Board Microcontroller, <http://handyboard.com>
- [6] Twister Game, http://www.hasbro.com/pl/page.viewproduct/product_id.9543/dn/games/default.cfm