Whirling Wishes: A Paper-and-Breath Interactive Media Installation for Hospital Waiting Spaces

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Figure 1: Overview of the interactive system. (1) A user writes a wish on colored paper. (2) The paper is placed under the circular display. (3) The system detects the paper, displaying it on the screen and digitally folding it into a pinwheel shape. (4) The user blows toward the circular display to rotate the virtual pinwheel. (5) After the interaction, the pinwheel flies to the shared virtual field on the main display and later unfolds to reveal the message.
(Environment © Raygeas; Pinwheel 3D model © Mylom, modified by the authors.)

Abstract

This study presents *Whirling Wishes*, a public interactive media installation that transforms handwritten messages into breath-driven virtual pinwheels in a shared virtual field. During a five-day exhibition at a hospital, more contributions were recorded when materials and instructions were more proactively placed and distributed, while informal observations suggested that the position-synchronized wind feedback was difficult for visitors to recognize. We report these descriptive deployment observations as two practical design considerations for interactive media in hospital waiting spaces: facilitating participation through visible material placement and distribution, and providing explicit, high-contrast action–feedback mappings.

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CCS Concepts

• **Human-centered computing** → **Interaction techniques**; *Systems and tools for interaction design*; • **Applied computing** → **Media arts**.

Keywords

Interactive Media, Contactless Interaction, Hospital Waiting Spaces

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1 Introduction

Hospital environments can place patients and caregivers in states of uncertainty, tension, and passive waiting. Visual art can support positive distraction and improve patient experience [Andrade and Devlin 2015; Nanda et al. 2012]. Interactive media art may extend this role through brief, expressive participation and shared contributions. However, hygiene concerns can discourage the use of shared public touchscreens [Mäkelä et al. 2022]. We therefore present *Whirling Wishes*, which transforms handwritten messages into breath-driven pinwheels in a shared virtual field without direct screen contact. A five-day hospital deployment highlighted active facilitation and visually salient action–feedback mappings as practical design considerations.

2 System Design and Implementation

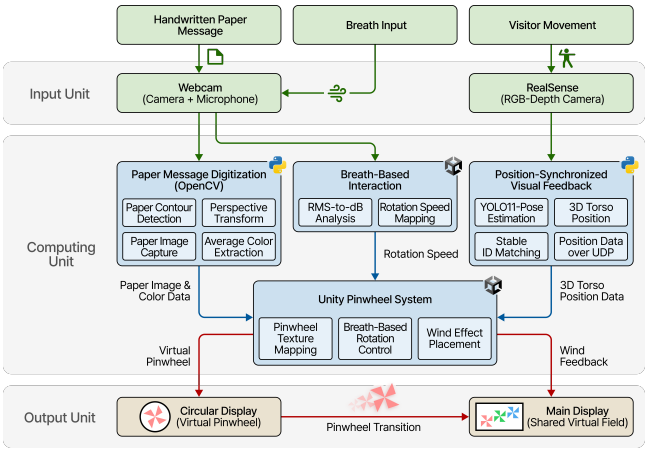

Figure 2: System pipeline for paper message digitization, breath-based interaction, and position-synchronized visual feedback.

2.1 System Overview

Whirling Wishes enables visitors to create and manipulate virtual pinwheels without directly touching the displays. The interaction sequence is illustrated in Figure 1, and the system pipeline is shown in Figure 2. The hardware consists of a top-down webcam with a built-in microphone, an Intel RealSense camera, a circular display, a main display, and a computing unit. The software comprises three modules: 1) paper message digitization, 2) breath-based interaction, and 3) position-synchronized visual feedback.

2.2 Paper Message Digitization

To reduce reliance on shared touchscreen input, participants write messages on individual sheets of colored paper. A top-down webcam detects a quadrilateral paper region using Canny edge detection, contour approximation, and geometric validation in OpenCV [Bradski 2000]. When the paper remains stationary for two seconds, the system applies a perspective transform to capture a square image and stores it with its average HSV color values. Unity then maps the captured image onto a 3D virtual pinwheel.

2.3 Breath-Based Interaction

Participants blow toward the circular display to rotate the virtual pinwheel without touching the screen. The webcam's built-in microphone measures real-time audio levels, and values above a predefined threshold are mapped to the pinwheel's rotation speed, such that stronger blowing produces faster rotation. After a five-second interaction period, the pinwheel flies upward and transitions to the shared virtual field on the main display.

2.4 Position-Synchronized Visual Feedback

To extend the interaction, the system generates visual feedback based on nearby visitors' positions. YOLO11-pose [Jocher and Qiu 2024] estimates visitors' torso positions from the RealSense camera's RGB stream, along with its depth data. The position and depth data are transmitted to Unity via UDP and used to map each visitor's physical location to a corresponding region of the shared virtual field. Wind effects generated at the mapped location accelerate nearby virtual pinwheels, as shown in Figure 3. To protect visitor privacy, RealSense RGB and depth streams were not recorded.

Figure 3: Position-synchronized visual feedback. A visitor's physical position is mapped to a corresponding wind effect in the shared virtual field.
(Wind effect © Vefects; Environment © Raygeas; Pinwheel 3D model © Mylom, modified by the authors.)

3 In-the-Wild Deployment and Observational Insights

3.1 Active Facilitation of Participation

The system was publicly exhibited for five days in the lobby of an anonymized university hospital in South Korea in December 2025. A recorded contribution was defined as a handwritten message successfully scanned and stored. Indirect encouragement during the first three days yielded 16 contributions, versus 60 under active encouragement during the final two days, suggesting that active

facilitation may improve discoverability and lower the barrier to participation.

3.2 Limited Visual Salience of Position-Synchronized Feedback

Informal observations during the exhibition indicated that the position-synchronized wind effect was less noticeable than the virtual pinwheels. Its semi-transparent and amorphous appearance made the mapping between visitors' movements and the resulting visual feedback difficult to recognize. This observation is consistent with prior findings that abstract user representations communicate public-display interactivity less effectively than mirrored images or silhouettes [Müller et al. 2012]. Future designs should therefore explore higher-contrast or human-like feedback that more clearly corresponds to visitors' body positions and movements.

4 Conclusion

This study presented and publicly deployed *Whirling Wishes*, an interactive media system that combines handwritten paper messages and breath-based interaction in a hospital environment. Exhibition records and informal observations pointed to two practical design considerations: active facilitation to improve interaction discoverability and visually salient feedback that clearly communicates the mapping between visitors' movements and system responses. Despite these design insights, we acknowledge that breath-based interaction poses airborne infection risks, even in an open conversational lobby. Future work will explore alternative inputs, such as voice or gestures, to ensure safer interactions in clinical settings.

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