

Penumbra: Expressive Shadow Puppetry in VR

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Introduction

Penumbra (2019) is the second in a series of experiments exploring expressive shadow puppetry. It builds off *jalan-jalan* (2019), a piece for laptop orchestra by Mark Sabini and Hillary Hermawan. However, unlike in *jalan-jalan*, the presence of the orchestra in *Penumbra* has been greatly reduced, further personalizing it and allowing the player to focus on experiencing shadow puppetry interactions that are possible only through VR.

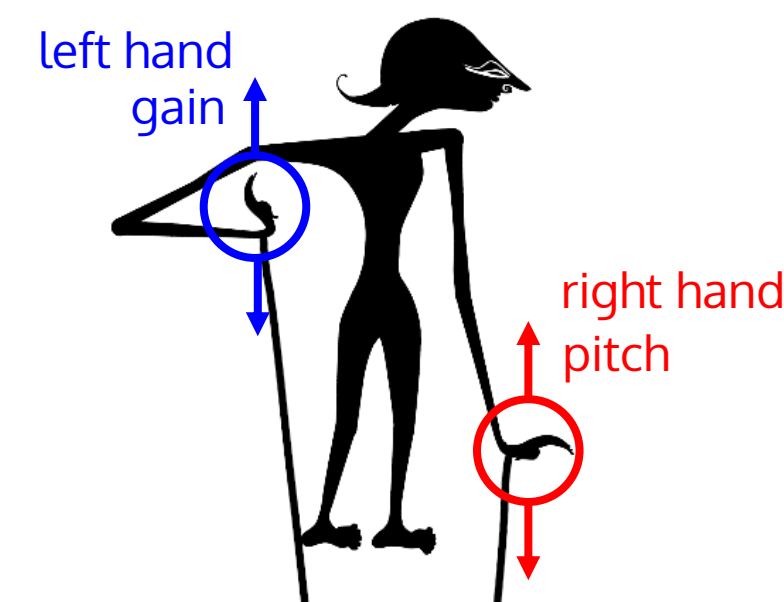


Figure 1: Control Scheme

The player simultaneously manipulates the puppet, stage, and music using the controllers.

Space



Figure 2: Elements of the Space

The space was designed to encourage and enable new interactions with the shadow puppet, while staying true to the performative aspect of *jalan-jalan*. As shown in a), the stage itself accommodates a fully cylindrical screen. As shown in b), the stage also utilizes virtual hemispherical speaker arrays (“hemis”) to spatialize the sound and provide haptic feedback.

Interactions



Figure 3: Progression of Scenes and Interactions

As *Penumbra* progresses, it explores the different interactions possible with the puppet.

- I. The Stage:** The player awaits the beginning of the shadow play and becomes familiar with the space.
- II. The Bridge:** The puppet appears onscreen, mimicking the setup of traditional *wayang kulit*.
- III. The Walk:** The screen expands to become fully cylindrical, and the puppet walks to the player's gaze.
- IV. The Skies:** The ceiling unfolds into a canopy full of bright, twinkling stars.
- V. The Dance:** The puppet comes off the screen, and the player and the puppet dance together.
- VI. The Calling:** The sun starts to rise, so the puppet looks up, moving by itself for the first time.
- VII. The Recollection:** The puppet returns to the screen, though it is visibly missing its baton.
- VIII. The Artifact:** The puppet walks offscreen and the lights come on. The player picks up the puppet's baton, which has materialized to become fully physical.