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# *The Shadow*

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## **ABSTRACT**

We propose<sup>1</sup> a 10 minutes excerpt from the performance *The Shadow*, after H. C. Andersen, directed and performed by Georges Gagneré. The demo introduces a physical hyper-actor playing with musical and visual instruments in a theatrical mixed reality. The focus is on the visual instrument that consists in five avatars acting in a virtual shadow theater. The hyper-actor directs the avatars with a cueing system that triggers combinations of idle and salient animations, respecting the presence effect of the avatars and the synchronization with the live performing.

## **CCS CONCEPTS**

• **Human-centered-computing** → **Interaction design** → Empirical studies in interaction design • **Applied computing** → **Arts and humanities** → performing arts • **Computing methodologies** → **Computer graphics** → **Animation** → Motion capture

## **KEYWORDS**

Avatar direction, hyper-actor, mixed reality, motion capture, performing arts, presence effect

## **ACM Reference format:**

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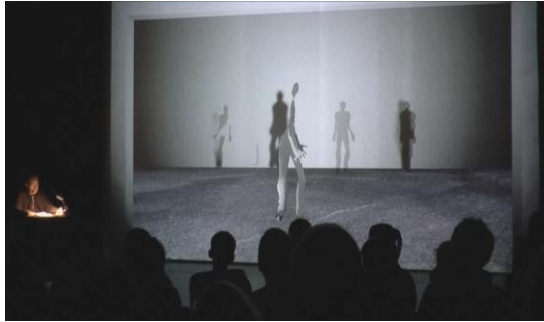
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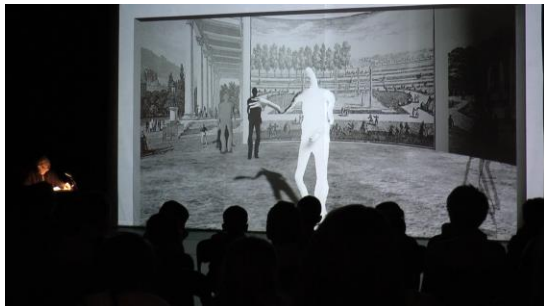
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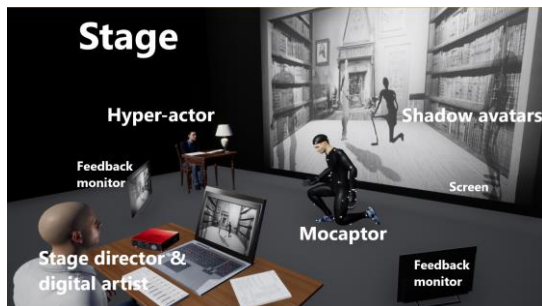
*<https://doi.org/10.1145/3401956.3404250>*



**Figure 1: Beginning of *The Shadow*: Entrance of the five avatars**



**Figure 2: The Princess (in white), The Shadow (in black), The Scientist (in grey)**



**Figure 3: Rehearsal motion capture session**

## 1 PROJECT DESCRIPTION

This demonstration illustrates a method and a set of tools for staging avatar movements that are controlled by a performer during a mixed reality theatrical performance. It refers to the *Computer Theater* field as defined by Pinhanez and follows the model of the hyper-actor to work out musical and visual expressive instruments in theatrical performances [2]. The focus is on the construction of a visual instrument made of simultaneous scenic movements of five avatars in a virtual shadow theater. Based on the hypothesis of being able to use only two groups of scenic actions, salient and idle, the demo uses a method for implementing a virtual staging that respects the presence effect condition for the avatars as they act in synchronization with the hyper-actor. The performance programming component was developed in Epic Game's videogame engine Unreal Engine 4 using the AvatarStaging framework and its AKN-Regie cueing module [1].

During the performance, the hyper-actor sits stage right at a small table with a desk lamp on, near an upstage video projection screen displaying the computer-generated content (fig. 1 and 2). He reads the text of the story speaking into a wireless microphone while accessing a midi controller placed in front of him on the table. This controller is used for playing various real time audio processing instruments requiring him to perform while modulating his acting prosody, as well as for triggering pre-recorded shadow avatar animations. The reactivity of the recording and staging system and its easy implementation using an inertial motion capture suit and a real-time rendering pipeline allows on-set rehearsals during which the director can work with the hyper-actor playing the story while a mocaptor simultaneously controls the avatars on the same stage used for the public performance (fig. 3). During the live performance, shadow avatar animations are processed in real time through AKN-Regie to follow the cues triggered with the controller by the hyper-actor.

*The Shadow* tells the story of a scholar who commands his shadow to go and visit a house inhabited by a mysterious and beautiful woman, but the shadow never comes back. Many years later, it unexpectedly returns with a human appearance, though lacking a shadow of his own. The shadow is clever and insidious, and slowly convinces the scholar, his former owner, to take on the role of his shadow. They then meet a Princess and the shadow seduces her while the scholar attempts to rebel – to his own demise. The performance premiered in Ukraine in September 2019 and then toured in France. Performances have been given to young children and some impressions have been informally collected. Globally, the presence effect was successful, and audiences were immersed in the story. This creative tool for staging animations during theatrical rehearsals and performances contributes to advancing the expressivity of virtual movements in a performing arts mixed reality.

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