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## Remnance of Form: Altered Reflection of Physical Reality

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H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

**Introduction**

Digital technology has seeped into every corner of our existence, allowing myriad forms of mediated reality to become increasingly accessible, sophisticated, and robust. As a result, we expect to see a correlating evolution in our perception and experience of reality as we examine and challenge long-standing concepts surrounding our relationship to space, time, light, shadow, and physical objects. This is also well reflected in the technical communities. There have been systems that allow for altering the functions or visual appearances of objects and space, by fusing concepts across paradigms including Tangible User Interfaces (TUI), Augmented Reality (AR), and Ubiquitous Computing (UbiComp).

The shadow is a perfect medium for communicating the meta-state of a physical object, as it is a direct projection of the object to the physical space. This fact encouraged artists to utilize shadows as a mean for creative expression through the manipulation of it.

**Abstract**

*Remnance of Form* is an interactive installation that explores the dynamic tension between an object and its shadow. By fusing light, projection, and motion technologies, the shadow can now detach itself from its former role. This creates a new narrative that challenges our perception of reality, what's real and what's not.

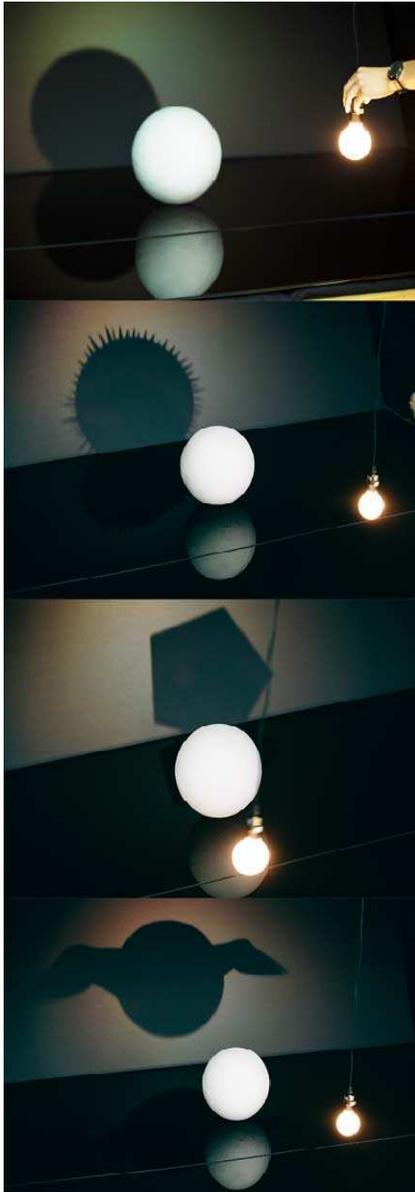
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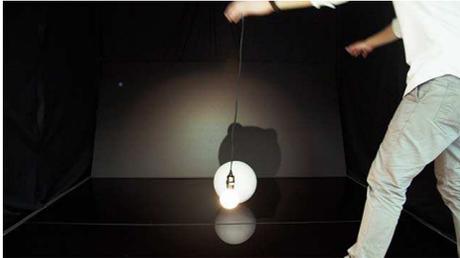
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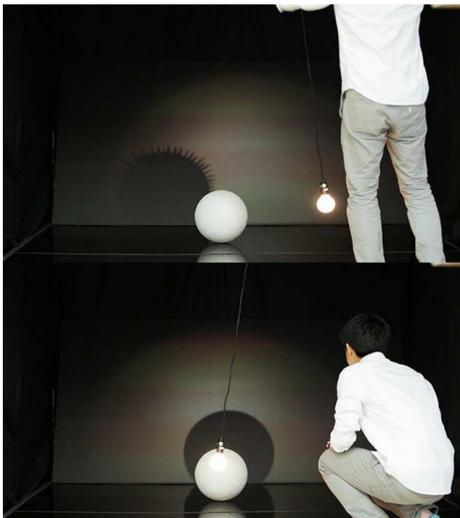
**Figure 1.** The shadow can be shaped programmatically, into any shapes.



**Figure 2.** A viewer can scare the bear-shaped ball away.



**Figure 3.** By manipulating the light bulb, different aspects of the shadow can be discovered.



**Figure 4.** The shadow shows different degree of fear based on its viewer's body posture.

There have been light/object sculptures that explore the tension between an object and its shadow [3, 6]. *Treachery and Sanctuary* [2], *Shadow Bag* [5], and *Shadow Inverted* [4] demonstrated more dynamic use of the shadow metaphor. They captured viewers' body silhouette and displayed a fake, distorted shadow of the viewers. A recent work, *Parade* [1], tracked the fake light source's motion to create seemingly impossible shadow animation according to the light source's kinetic motion.

In this work, *Remnance of Form*, we take a step forward, by more dynamically modulating and distorting the relationship between simple, mundane objects and their shadows. Through the ambient augmentation of shadows happening in the periphery of the viewer's attention [7], we try to shift and extend the perceived nature of the object. On a technological note, the highly calibrated AR system devised for this work allows for simulating the reality very precisely. As a result, the digitally altered reality, the shadow in our case, becomes indiscernible from the pure reality. We hope to deliver the notion that a sufficiently mature AR system would be capable of making direct alteration to the reality, more than a mere visual graphics overlaid onto the actual reality.

### Envisioned Exhibit

The entire installation was set up in a cubic structure of 8 feet x 8 feet x 8 feet. Three entities (a white ball, a light bulb, and a shadow) are presented to the viewers. Using Kinect and Pointgrey cameras, we track the viewers' activities as well as the position of the ball and the light bulb. The shadow's size/position are computed based on tracked positions of the ball and the light bulb; therefore, moving either of them will change the

size/position of the shadow. A high-lumen projector is used to create lighting and shadow effects.

The proposed setup allows direct manipulation of the light bulb. It is notable that, as the light bulb starts to swing like a pendulum, the computer-generated shadow becomes much more realistic because our mind automatically picks up the synchronized motions of the light bulb and the shadow. This, combined with the viewers' presences and body postures, allows the interaction between the viewers and the ball with its shadow to become more playful and perceptively appealing.

Through five unique vignettes - *Disappearing*, *Showing Fear*, *Changing Shape*, *Dream of Flying*, and *Possessing the Ball*, we demonstrate a series interactions that involve varying degree of whimsical behavior, tweaking of the shadow's shape, and viewers' engagement into the narrative.

### References

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