# Exploring Aesthetic Experience Through Interactive Shape Changing Critters

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CHI 2016, May 7–12, 2016, San Jose, CA, USA

## Abstract
In this paper I introduce three designs that explore expressive tangible interfaces by embedding shape changing interactive surface through everyday object. Design surfaces are enmeshed in issues of aesthetics, experience, and engagement that go well beyond traditional approaches of user evaluation and transparency-oriented theories of user-centered design [4]. This research trajectory of HCI field seeks a new way to bridge the interdisciplinary gap between art, design and technology. I propose three sophisticated shape-changing surfaces fabricated by mixed media in an artistic approach, while exploring variable interactions triggered by multimodal input such as talking and touching of digital artifact.

## Author Keywords
Tangible user interface; Affective Computing; Digital Crafting; aesthetic interaction

## ACM Classification Keywords
H.5.2. Information interfaces and presentation. J.5. Arts and Humanities.

## Introduction
HCI research is increasingly concenred with affective, experimental interactions; especially those that evoke a

**Petal of light**

**Materials:** Rapid Prototyped gypsum powder, 6 servo motors, Arduino, and a microphone

**Process:** Designed using Rhinoceros software, printed using a 3D Color Printer. Each unite module is connected to a servo motors and rotated as the user's voice is detected by a microphone

**Spiky Starfish**

**Materials:** fabric, polymer clay, acrylic paint, metal wire, metal gears, arduino, flexible sensor and mixed media.

**Process:** Fabricated by suing mixed media, mini servo motors and embedded in the pouch and the several gears are motorized when people are trying to open the cigarette pouch.

user's active and open meaning making process of interaction design.[6] Explorations of research on shape Changing interfaces introduces a range of informative design spaces to hedonic design purposes. Through these three designs, I'll introduce how exploratory design concepts are enmeshed with affectiveness that represents emotional engagements through the tactical and visual elements of shape-changing interfaces.

## Petal of light, 2009

The first design is Petal of Light, a sound interactive lamp shade that aims to create a novel interfaces; it transforms the structures under its surface through an envolving mutimadular interaction. It is designed to represent a natural form that vocally interactes between a human and digital artifact. Importantly, interactive objects can be conceived of as an organic entity taking on different shapes or functional forms responding to environmental changes or user actions. This design mainly concerns how the digital artifact provides an exploratory engagement that evoke user's active meaning making. It does not give the user a single determined instruction to use, but it remains open to argument or interpretation concerning the surface of the digital artifact while having a bodily interaction.

After a case study, I suggest that this concept also applies to a lampshade. The sculpture changes its surface configuration according to the ambient volume. Specifically, the shape of the lampshade can be transformed into either an open or closed form by changing the structures under its surface. Accordingly, the amount of light and shadow effects can be controlled through surface shapes. The display of different lighting effects through SKIN could provide awareness of the atmosphere, for example, to influence people to behave appropriately in public spaces such as a library or office. [1]

**Figure 1, Petal of Light, Sound Interactive Lamp**

## Spiky Starfish, 2014

**Figure 2, Spiky Starfish 2014, Motion Interactive Bag**

Next, Spiky Starfish 2014 is a computational motion interactive bag that aims to understand "felt technology" through an expressive computational wearable design. It is fabricated by mixed materials such as fabric, metal wire, polymer clay etc. This design concerns how the mundane object creates an aesthetic communication visually, and tactically that provokes a self- reflective awareness when the user experience this unusual shape chaining interface of the bag. Affective computer aims to give computers the ability to feel, recognize, and react to emotions [2], but conversely, spiky starfish explores how the computational artifact triggers a user's unpleasant emotional arousal through the dynamic life-like behavior [3]. This change occurs with the revealing of viscerally damaged organ shapes or aggressive spiky textures. The way it works is that the combinational elements computational elements and craft enables to create textural transformations through the shape-change interface, such as a pair of bird wings that turn into an angry starfish with spikes, which simulates life forms that are threatened by people's approaches. It reveals the metaphorical personal traits by expressing aggressive visual language aiming to create a disruptive interaction when people try to take the cigarettes from the bag.[8] Spiky starfish is intended to create a disruptive interaction through the aesthetics of coupling of "violation of unity principles and animalism [7]", rather than offer the supportive interaction when a vice is desired.

## Vitality, 2015

The third design I embedded in a the shape-changing kinetic movement is a motion interactive lamp, Vitality (2015). This was fabricated by a 3D rapid prototyped process. 'Vitality' further aims to explore how an expressive tangible interface brings ambient intelligent to our everyday life with fulfilling the rich experience. Particularly, ambient system further aims to provide the human needs beyond functionality. This includes features such as playfulness, creativity and functional expression. Vitality aims to offer an opportunity for users play with the shape changing movement by touching of a lamp. It advocates the shift from the tangible interface for task-oriented processes, to an

experience-driven concept. Importantly, it can evoke user's emotional arousal when they touch of the fur tail that triggers the creature to "awaken".

**Figure 3, Vitality 2015, Motion Interactive Lamp**

It's touched on a question how the shape chaining interfaces create unique aesthetic experience to people when the computational object react as 'a pet'. The lamp mimics an animal's sudden movement indicating exciting, warning, or surprising come about in a surreal way when user pets the fury tail. Based on real life show room studies, when it displayed at two galleries at New York, USA, and Shenzhen, China, I found that the audience didn't pay attention of the lite bulb or LED it self but focused on interacting with the shape changing elements while they "playing with and petting" the digital artifacts. Overall, this suggests an engaging way to merge the shape changing elements into computational designs while that defamiliarizing the meaning of interacting.

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