

# SenseCenser: an Interactive Device for Sensing Incense Smoke & Supporting Memorialization Rituals in Japan

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Figure 1. A SenseCenser installation showing a photo of the deceased for memorialization rituals

**Abstract**

SenseCenser is a device that senses the act of placing incense chips into it and, subsequently, the volume of incense smoke produced as the chips burn. These values can be connected to various applications, such as lighting equipment, sound systems, showing (moving) images, and more specific installations at particular rituals (e.g., a funeral ceremony). We designed SenseCenser to investigate the potential role and place of interactive technologies in supporting for Japanese funeral and memorialization rituals. This paper introduces its technical architecture and also how it will be demonstrated at the DIS2018 conference.



**Figure 2.** Smoke from incense chips burnt on the electric heater inside of the Censer



**Figure 3.** Brass made enclosure (top: outside, bottom: inside)

### Author Keywords

Memorialization; Techno-Spiritual Practices; Interaction Design; Research through Design.

### ACM Classification Keywords

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

### Introduction

Incense sticks and chips are objects that release fragrant smoke when burned. In Japan, where we focus and situate our research, burning incense plays an important role in ritual practices at Buddhist funeral ceremonies, which is widely known as *shoko* [5,1]. At the funeral, visitors pick up incense chips and throw them on burned charcoal in the cup placed in front of the funeral altar [5].

More generally, across cultures and spiritual practices pacts in Catholic liturgy to Chinese ritual practices, the burning of incense is used as being symbolic of communication with and commemoration of the lives of departed loved ones as well as deities. Across cultures, it is commonly burned at graves, temples, churches, and at home.

This paper introduces an interactive system named “SenseCenser” (Figure 1) that uses sensors to detect incense smoke (Figure 2) and translates it to digital values that can be connected to various applications, such as lighting equipment, sound systems, showing (moving) images, and more specific installations at particular rituals (e.g., a funeral ceremony). At the DIS2018 conference, we will demonstrate the fully working and interactive SenseCenser prototype with a few applications as described above.

We are initially developing SenseCenser in the specific context of Japan in order for it to be used as a resource within ritual altars at funerals, gravesites, and more recent emerging urban sites of memorialization in Japan known as automatic columbaria [1,13].<sup>1</sup> SenseCenser is specifically inspired by the ritual use of incense within *shoko* Japanese Buddhist funeral ceremonies and practices. This paper describes how it SenseCenser technically works as a design research artifact and introduces potential applications and ways in which it could be used at memorialization rituals.

### SenseCenser

#### *Design Concept Background and Motivations*

In the DIS and HCI communities there has been a recent emergence of work focused on designing and studying interactive technologies to support everyday practices of memorization (e.g., [1,4,11-13]). In our research, we aim to build on and expand this prior work through designing and implementing a system that can be used within Japanese ceremonies of remembrance of departed loved ones. We decided to develop a device that senses incense smoke and translates this into digital values that can be used as output to control a range of systems (e.g., lighting, sound, image, and video). Its name, SenseCenser, simply brings together a “censer” (containing incense) used at religious rituals with the digital functionality to “sense” when a user places incense chips into the censer and the resulting volume of smoke produced. In this way, our work also builds on Kaye [2], Katsumoto et al. [6] and, more recently, Obrist et al.’s [8] calls for the HCI community to not solely focus on technology-driven olfactory

<sup>1</sup> Please see our video figure submitted with this paper for more details.

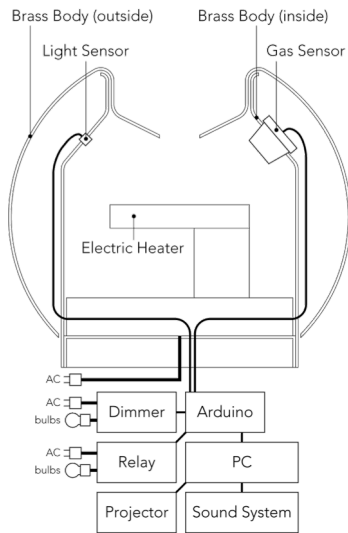


Figure 4. SenseCenser hardware installation for DIS2018 conference that controls lighting equipment, sound systems, and images

research, and to more deeply consider how smell be better leveraged as rich sensorial and experiential dimensions of engaging with interactive technologies. We aim to contribute to this line of work by demonstrating an interactive system for olfactory experience that aims to evoke a wider set of possibilities open to remembrance and memorialization.

#### *Physical Form and Materials*

In our prototyping process, we iteratively produced forms for embedding sensors with digital functionality to sense incense smoke and the action of throwing chips inside. We produced 3D printed models out of ABS plastic material that represented censer-like forms and tested them. However, these experiments were limited due to the lack of material integrity of the ABS plastic when exposed to heat. After several iterations to finalize the form and dimensions, we collaborated with a metal spinning craftsman and fabricator to produce our current 2-part brass prototype (Figure 3).

#### *Hardware Implementation*

Inside of SenseCenser's brass enclosure is a modified electronic incense-chip heater, a gas sensor, and a light sensor (see Figure 4.). We modified the heater from a Japanese off-the-shelf unit; once it was working, we scaled the inside part of the brass enclosure for it fit firmly in place. The wires from the sensors are connected with an arduino circuit that is connected to a digital dimmer, a relay, and a PC that is wired to a projector and a sound system. The gas sensor detects smoke and the flow (rate) of air particulates generated from incense chip being burned in the brass body. The light sensor detects lightness inside the brass enclosure; thus, it senses finger actions picking incense

chips, throwing them into the hole on the body, and the ambient glow generated as the incense is burned.

### **Applications**

#### *Synchronizing with Lighting Equipment*

A simple application is of synchronizing SenseCenser with lighting systems. At sites of religious ritual remembrance of departed loved ones in Japan, there are commonly lights, such as candles and electric lights that play an important role in shaping the atmosphere. Incense smoke, also used in these ritual places, is simply integrated in our system. At the demonstration, the dimmer and the relay are both connected with light bulbs. The dimmer smoothly changes lightness according to the value of smoke, while the relay functions to turn the bulbs on/off due to throwing incense chips actions.

#### *Synchronizing with Sound Systems*

Another example is the synchronization of sound with key ceremonial practices. Depending on the rate and volume of smoke, the system shifts a subtle, soothing sound's tone and its dynamics (i.e., volume). The throwing action also plays or shifts a particular sound. SenseCenser can be used as an instrument or ritual artifact specialized for producing sounds within a personal or collective memorialization ceremony.

#### *Showing Images*

Connecting SenseCenser with a PC wired to a projector, will also be synchronized with images. The photo of the deceased is placed on the funeral altar not only in Japan but also in many other countries. Similar to the lighting equipment, it smoothly changes an image's transparency according to the value of smoke, while it



Figure 5. An integrated application for funeral altar (from top to bottom).

shows images responding to actions of placing incense chips within SenseCenser.

#### Integration of lights, sounds, and images

An installation shown in Figure 5 is an integrated example of installation for funeral altars or columbaria such as [13]. Depending on smokiness, small pictures surrounding the main deceased photo are gradually appear, while its environmental lightness is decreasing. A audio also plays when the smoke emerges and the smokiness shifts and effects the sound. This installation is especially suited to the funeral altar and aims to leverage and extend rituals, interactions, and artifacts common to the visitors' memorialization practices.

#### Conclusion and Future Works

This paper introduced SenseCenser, a device that detects incense smoke to produce various applications such as lighting equipment, sound systems, and showing (moving) images intended to support particular rituals (e.g., a funeral ceremony). We will demonstrate the fully working and interactive SenseCenser prototype at DIS2018 conference.

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