

# Abstract

## Computing Applications to Become Familiar with Japanese Traditional Performing Arts

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The Japanese traditional performing arts such as *Sado*, the tea ceremony, *Kado*, the flower arrangement, and *Kodo*, the scent smelling ceremony, have been inherited among centuries, being nowadays cultures with timeless and universal values. Japanese traditional performing arts backed by tradition and stylistic beauty are aesthetic and attractive. On the other hand, beginners have the impression that it is difficult and not familiar. Thus recently, it tends to be shunned and stagnant. There are mainly four reasons: lifestyle, cost, education, and population dynamics.

First, in the modern living environment and lifestyle, it is challenging to experience. Usually, a Japanese-style room is necessary to practice, which more and more modern houses do not have. Second, utensils and tools are costly, so it is tricky to prepare for practice. Third, the younger generation had fewer opportunities to experience traditional performing arts in school education, so their motivation for learning it is declining. Fourthly, the number of masters for the Japanese traditional performing arts has been decreasing year by year, leading to a shortage of successors.

The work described in this thesis aims to clarify an effective method for beginners and inexperienced people to become familiar with the Japanese traditional performing arts and to construct computer-supported applications to promote their introduction. The objectives of this study include:

- To visualize cyclic environmental information for supporting *Sado* cooperation, using a method of Media art.
- To visualize and generate *Ikebana* layout and color combinations, using methods of simulation and gamification.
- To propose and develop a familiar and intuitive practice environment for *Ikebana*, using a method of VR, AR, Tangible User Interface, and Physical Proxy Interface.
- To make a user intuitively and attractively experience *Kodo*, using a gamification.

“Maboroshi-An” is a visualization system for *Sado*. Maboroshi-An uses LED for the visualization of the different timing of the Japanese traditional tea ceremony. Maboroshi-An supports the cooperation for beginners during *Sado*.

“CADO” is a computer-supported flower arrangement simulator for *Ikebana* (Japanese traditional flower arrangement). CADO helps users with arrangement suggestions based on traditional layout and color combination of flower arrangement. CADO also instructs users on how to cut flowers and to arrange them step by step. First, to implement the proper rules of flower arrangement to our system, a

feasibility study was performed, after which the system was built, developed and evaluated.

“TracKenzan” is a training system for *Ikebana* in a 3D computer graphics space using a trackpad and a stylus pen. In TracKenzan, a trackpad represents the *Kenzan* (a needlepoint holder for flower arrangement), and a stylus pen equipped with a 3D tracker represents each flower stem. The user selects virtual flowers with adjustable length to build the arrangement. The position and orientation of the virtual flowers correspond to those of the pen and the user places the flowers by pressing the desired position on the trackpad. TracKenzan provides an intuitive and straightforward interface for users to practice *Ikebana*. This thesis describes the development and evaluation of the proposed system.

“eGenjiko” is a gaming system for *Genjiko* (Japanese traditional scent-matching game) utilizing a computer-controlled censer and a tablet device. *Genjiko* is a scent-matching game in which players smell five scents and guess which are identical. The game is so simple and attractive that even a beginner can enjoy it. The system has a computer-controlled censer that selects randomly five scents and diffuses them. After smelling all the scents, a player answers the matching pattern of five scents by drawing on a tablet device. Then the system returns the correct answer. Using our eGenjiko, a single player who is not familiar with *Genjiko* can enjoy the game casually, without inviting other players. This thesis describes the developed proposed system.

The study described in this thesis showed the design guideline of the experience and support system to make familiar with traditional arts through the above four proposed systems. It proposes a classification model of four levels of skill proficiency that should be considered as proficiency in traditional performing arts. Finally, it summarized the perspectives of the experience and support system for the Japanese traditional performing arts mentioned.